

REBUILDING OUR INFRASTRUCTURE: GOT A SPARE BILLION?

Actions, dollars needed now

HUDSON VALLEY **PATTERN** *for* **PROGRESS**

Contents

FOREWORD	3
INTRODUCTION	5
DEFINITION.....	5
THE VALLEY: WHERE WE ARE TODAY	6
ADDRESSING THE PROBLEM.....	7
ROADS/BRIDGES.....	7
WATER/SEWER.....	8
THIS REPORT'S METHODOLOGY	13
“OPPORTUNITY AREA” SNAPSHOTS	14
BREWSTER: Trains and commuters key for growth	14
KINGSTON: History, waterfront are springboards for future.....	14
MONTICELLO: Water needs, population variations strain budgets	14
MOUNT VERNON: Many needs and finding money to fix them	14
CITY OF NEWBURGH: Many steps underway, but many concerns, too.....	15
CITY OF PEEKSKILL: History sets the stage for the future	15
CITY OF POUGHKEEPSIE: Problems, potential and a vision for moving forward	15
KEY RECOMMENDATIONS TO SUPPORT OPPORTUNITY AREAS AND OTHER MUNICIPALITIES IN THEIR EFFORTS TO IMPROVE INFRASTRUCTURE	16
KEY RECOMMENDATIONS: OPPORTUNITY AREAS.....	16
KEY RECOMMENDATIONS: FINANCING	17
KEY RECOMMENDATIONS: PLANNING	20
KEY RECOMMENDATIONS: COORDINATION	21
KEY RECOMMENDATIONS: TECHNOLOGY	22
KEY RECOMMENDATIONS: LEGISLATION	25
KEY RECOMMENDATIONS: IMPEDIMENTS	26
CONCLUSION	27
ACKNOWLEDGEMENTS	27

FOREWORD

The Hudson Valley's many attributes -- including natural beauty, world-renowned amenities and diverse populations -- have made it a terrific place to live and do business.

Over time, however, warnings started to appear for its municipalities. Their infrastructure, the often unseen bones of a community, were deteriorating. There were issues with roads, water quality, sewer pipelines, bridges and more.

While some components of infrastructure were dutifully attended to, lack of funds meant that others couldn't be immediately maintained. Delays added up. The passage of time brought to the fore critical situations and needs beyond normal wear and tear.

Infrastructure reliability is at a precarious juncture in valley history. Action is required -- and quickly.

Hudson Valley Pattern For Progress ("Pattern") does not question the recognition of this issue among the region's various stakeholders, but we are concerned that, following decades of disinvestment, that there is now the capacity to align a complete commitment of resources to solve the issue.

The issues are all too apparent: Many roads urgently need repair or upgrades. Communities have deep, persistent worries about water and wastewater management and safety -- or have plants and systems where repairs and upgrades can no longer wait. Commuter hubs in some spots are so heavily used that they are wearing down or simply not modern enough to handle contemporary and future demands. And through it all, population trends and clusters changed. That forced cities, towns and villages to attempt to adjust as they simultaneously tried to plan and schedule infrastructure improvements.

Indeed, the New York State Department of Transportation (NYSDOT) recently commented to Pattern regarding the state of repair. "Much of the roadway and bridge infrastructure in New York State, and in particular in the Hudson Valley, is aging and can be a challenge to manage," it said. NYSDOT further remarked, "The Hudson Valley has many roadways and bridges that were first constructed in the early part of the 20th century and at times lack the functionality afforded by current standards." The current team at NYSDOT has a remarkably difficult set of challenges.

The New York State Department of Environmental Conservation (NYSDEC) also has documented infrastructure concerns. Most of the 140 municipal wastewater-treatment plants between New York City and the Troy Dam are operating beyond their original design life, NYSDEC told Pattern. It also pointed out that 11% of sanitary-sewer pipes in the Hudson Valley, covering 2,600 miles, were installed before 1925. About 26% are over 65 years old. Not their doing, but now their concern.

Pattern wishes to acknowledge that the State of New York is trying to address these issues. For instance, Governor Andrew Cuomo was recently in the Hudson Valley to give a progress update on the \$542 million statewide Empire Bridge Program. Thirty-five of those projects are in the valley; 21 are complete. The 2017-2018 state budget provides \$2.5 billion to safeguard water sources and delivery, and \$27 billion for roads, bridges and related transportation infrastructure.

However, based on the long list of needs, while a good start, there is much yet to do. Accompanied with the massive price tag to remedy it, the need for increased action is both urgent and evident. To be clear, with so many elements of our infrastructure past their normal life expectancy, we are not crying that "the sky is falling," and yet, borrowing a line from a movie, "Houston, we have a problem." The governor took care of the worst-case example of crumbling infrastructure, the Tappan Zee Bridge, when he swiftly broke the logjam. Today, we are on our way to a new bridge. The governor showed us that sometimes there is a way to do the "impossible."

Today, the more likely threat to the valley from the continued failure to more heavily invest in our infrastructure would be the advent of another super storm like Lee, Sandy or Irene, where we witnessed the impact of chronically neglected infrastructure, or the growing catastrophe of not maintaining or safeguarding water quality as experienced in the City of Newburgh. Further, as most recently pointed out in The Wall Street Journal, the degree that permitting and environmental-review processes can contribute to years of delay, it is imperative that they be carefully amended to allow expeditious and timely reviews of critical infrastructure projects.

Strong infrastructure benefits economies, according to the International Monetary Fund (IMF). It reduces the inefficiencies in time lost in getting to work and aids the shipping of products, its report said. On a national scale, increasing infrastructure investment by 1 percent of Gross Domestic Product (GDP) can raise GDP 1.5% four years later, IMF reported.

Hudson Valley municipal budgets are stretched tight. Expenses rise far faster than revenue. Costs jump. Delayed repairs or maintenance mean even higher dollar price tags later. And while tax-cap limitations help residents' pocketbooks in the short term, lower tax revenue to pay for items like infrastructure -- critical to cities, villages, towns and counties -- may have longer-term impacts. Amending the tax cap to exempt infrastructure would be another critical step to making it easier to rebuild the region's infrastructure.

There also is a cautionary tale to be observed. Sprawl has a price tag. If growth years ago had been regulated and concentrated, infrastructure needs today would be focused on specific areas. Instead, there has been more growth everywhere. That expansion has come with a day to pick up the check for the cost of infrastructure. That day is today. Moving ahead, Pattern recommends a more skeptical view regarding the creation of new towns and villages. The need to maintain the infrastructure of hundreds of units of government has a price. The cost of creating them is not just today's costs, but in 20 to 30 years, there will be additional cost of having to rebuild infrastructure in those communities.

In short, the Hudson Valley's infrastructure, highlighted in this report by the needs of seven small and mid-sized urban communities, as well as the needs of the entire region, requires billions of dollars to fortify this vibrant region's future. The dollars need to be found, and quickly.

Jonathan Drapkin, president & CEO

INTRODUCTION

This report attempts to analyze, interpret and project efforts to revitalize the region's infrastructure with a lens placed on urban centers, balancing that against the overwhelming need to invest in the region's infrastructure. It examines seven financially challenged communities, known as Opportunity Areas, as designated by the Mid-Hudson Valley's Regional Economic Development Council (REDC). They are the villages of Brewster and Monticello and the cities of Kingston, Mount Vernon, Newburgh, Peekskill and Poughkeepsie. This report also provides a broader view of the Hudson Valley's infrastructure needs and offers strategies to address them.

In addition, the report provides municipalities with targeted strategies to pursue funding. It helps plan, strategize and sequence short- and long-term visions for repairs and upgrades. It lets elected leaders know that assistance, both money and expertise, is out there -- and that there are proven models of success.

In 2014, Pattern received a grant from New York State's Empire State Development (ESD) Corporation, which enabled:

- The formulation of infrastructure snapshots and strategies for the seven communities examined.
- The convening of three annual infrastructure conferences (2014-2016), which sought both the current state of infrastructure and how to address it.
- Two regional surveys (2014 and 2016) that assessed local and regional infrastructure conditions.
- Identifying "best-practices" suggestions, based on the experience of municipal leaders and officials, and how to apply them elsewhere.
- Providing annual assessments that provided information on Hudson Valley communities and tailored suggestions to better address, and the funding of, local infrastructure concerns and projects.
- And to develop a detailed list of barriers to maintenance and expansion of infrastructure in the Hudson Valley, accompanied by recommendations to address them.

To better serve the reader, the initial section of this document serves as the "report" and is devoted to recommendations. The items listed above are then detailed in a series of appendices.

DEFINITION

Pattern recognizes that the definition of infrastructure can be quite broad. In its 2016 report, "Infrastructure: An Investment in the Future," Pattern defines infrastructure as the physical and organizational structures maintained by public-works departments (including transportation infrastructure such as roads and bridges); public services (water supply and sewage); where applicable, natural-gas distribution; and broadband and cellular-service availability. Pattern does not incorporate some items that are often included within the definition of infrastructure, such as housing, municipal and educational facilities or "green" infrastructure.

THE VALLEY: WHERE WE ARE TODAY

The challenge of maintaining the Hudson Valley's infrastructure in a state of good repair is a daunting task. Despite the involvement of many governments, state agencies and public and private professionals, the need simply outpaces the capacity.

One assessment of the current situation is that New York State's infrastructure was rated a C- in 2015 by the American Society of Civil Engineers (ASCE).

Compounding the constant need to reinvest, The Great Recession worsened our current situation. Many levels of government are now spending a notably smaller share of their overall budget on infrastructure, compared to the middle of the last decade. Further, their staff capacity to address this critical issue was compromised, resulting in the need to rely on outside consultants or simply not address issues that weren't immediate priorities.

And therein is the conflict: Needs greatly outpace the dollars committed.

- From 2004-2014, valley counties, cities, towns and villages spent \$4.47 billion on public infrastructure, an average of just under \$447 million annually. Hudson Valley communities devoted only 7% of their budget to infrastructure in 2014, compared to 8% a decade earlier. That one-percentage-point variation means millions of dollars of improvements were often postponed.
- Throughout the Hudson Valley, government expenditures for infrastructure have declined each year since 2010. However, spending levels still remain 7% above the corresponding 2004 figure.
- From 2004-2007, the region's counties assumed a greater proportion of municipal investment. Smaller communities have severely pulled back on spending, thereby increasing the counties' proportion of the total pie. In 2014, counties were the only level of government spending a higher percent of their budget on infrastructure than in 2004.
- The New York State tax cap, established in 2011, has limited municipalities' ability to use tax dollars. While reducing the burden upon taxpayers, it has meant less money to commit to infrastructure repair. Long-term budgeting and planning that pre-dated the tax cap suddenly lacked the projected flow of money. That meant altering maintenance and construction schedules, often defined in Capital Improvement Plans. Pattern research found, however, that some communities did not even have such plans, which help to identify priority capital projects, equipment purchases and maintenance. These plans sometimes fell to the wayside due to tighter budgets, lack of staffing and inability to line up money from other sources.

ADDRESSING THE PROBLEM

The issue of infrastructure has been prominent in the news. Bridge repair, water quality and crumbling roads are just a few of the headlines read on an almost daily basis. New York State has taken significant steps, including the most recent state-budget approval and other factors mentioned in the foreword of this report, to provide support. NYSDOT provided this statement to Pattern: "In recent years, both Governor Cuomo and members of the legislature have focused on the age and condition of the state's infrastructure. Therefore, the New York State Department of Transportation (NYSDOT) has received a record amount of funding to address our roads and bridges, and we've been able to address numerous bridges and roadways that were in need of repair."

ROADS/BRIDGES

Scorecards from a variety of independent sources document the depth of the needs in this area.

The American Society of Civil Engineers graded New York State roads as a D- in 2015. TRIP, a Washington, D.C., based national transportation organization, said in 2016 that 17 percent of roads were in poor or mediocre condition. That ranked it 10th-worst nationally.

Analyses of bridges similarly pointed out that action is necessary. A February 2017 report from the American Road & Transportation Builders Association said 37% of New York State's 17,462 bridges are structurally deficient or functionally obsolete. The American Society of Civil Engineers assessed bridges' condition as a D+ in 2015. NYSDOT ratings of bridges' conditions showed that almost half, 156 of 333, had a condition rating of 5 or under, indicating they needed repairs, many critically.

The wide breadth of infrastructure needs makes it difficult to bring us back to a "state of good repair." The DOT told Pattern: "Of course, the large inventory of roads and bridges in the region means our funding requirements can't always be met to address every need or potential improvement to the system. We still have many bridges and roadways that are in need of rehabilitation, replacement or upgrades to meet the needs of current traffic volumes and usage, but, if the trend to focus (dollars) on infrastructure continues, it can only benefit NYSDOT and the traveling public throughout the region, state and country."

NYSDOT also told Pattern For Progress that it urges continued focus and finances for infrastructure needs. "Maintenance work and capital improvements continue to keep the highways and bridges safe, but the condition of the nation's infrastructure and the backlog of infrastructure needs that need to be addressed have been well documented," it said. "Additional funding would allow the nation to address the unmet infrastructure needs, which would extend the service life of the infrastructure and improve the functionality of the system."

Dollars are indeed being put toward critical work. In 2016, the budget allocated \$22 billion over five years to improve state roads and bridges. The 2017-2018 budget raises that amount to \$27 billion to preserve and upgrade roads, bridges and other vital transportation infrastructure throughout the State. It is the largest transportation plan ever enacted in New York State.

WATER/SEWER

One example of the critical need to protect water infrastructure is demonstrated by the ongoing situation in the City of Newburgh, where residents, through their tap water, may have been exposed to perfluorooctane sulfonate, a chemical linked to cancer. Blood tests were offered to the city's 28,000 residents after the chemical -- used for years in firefighting foam at the nearby military air base -- was found in 2016 in the city's drinking-water reservoir at levels exceeding federal guidelines. Results showed levels of the chemical's presence were three times the national average.

That's just one example of the larger need to upgrade infrastructure. In October 2016, Hudson Valley conservation and business organizations called on New York State lawmakers to increase funding to pay for clean water and wastewater infrastructure improvements. The organizations, including Pattern For Progress, endorsed a report by The Construction Industry Council of Westchester & Hudson Valley, Inc., and the Construction Advancement Institute of Westchester & Mid-Hudson Region, Inc. The report identified nearly \$1 billion in public-works projects needed to control pollution and protect drinking water in the region.

The Hudson Valley's situation is not unique.

The federal Environmental Protection Agency's 2012 Clean Watersheds Needs Survey reported that New York State needed \$31.4 billion to replace, repair and rehabilitate wastewater infrastructure. That's \$2 billion more from a version of that report just four years earlier -- showing the accelerated cost of delaying improvements. The American Society of Civil Engineers' 2015 grade of wastewater systems in New York State was graded as a D.

Water-improvement needs statewide far outweigh dollars available.

The New York Environmental Facilities Corporation's 2017 Intended Use Plan "anticipates that the demand for financing will continue to exceed the amount of financial assistance that EFC can provide each year." It has identified clean-water infrastructure projects requiring over \$3 billion. "EFC anticipates that it will be able to provide zero-percent interest rate or low-cost financing for approximately \$830 million of projects costs, which comprises approximately 25% of the identified demand."

In Governor Cuomo's State of State address Jan. 10, 2017 at SUNY Purchase, he proposed spending \$2 billion over five years for water infrastructure and safety. The final state budget, approved April 7, included \$2.5 billion for the Clean Water Infrastructure Act, designed to protect public health, safeguard the environment, and preserve the state's water resources. These funds will help local governments address water emergencies, pay for local infrastructure construction projects, underwrite land acquisition for source - water protection, and investigate and mitigate emerging contaminants in drinking water.

This commitment of dollars is important. Over the next 20 years, the governor said, New York State will face the nation's third-largest need for drinking-water infrastructure investment at \$22 billion, and the

nation's largest need for wastewater-infrastructure investment at \$31.4 billion. This \$2.5 billion investment will improve municipal-drinking water systems via improved filtration; upgrading distribution and treatment systems, including replacing lines that have lead; connecting contaminated private wells to public systems; improving municipal wastewater-treatment systems with newer technology and additional capacity; protecting drinking water at its source by conserving open space and building green infrastructure to capture runoff and filter contaminants; and increasing the state Superfund to expedite the cleanup of hazardous waste that may impact sources of drinking water.

The 2015-2016 state budget provided \$200 million in grants to be doled out over the three next budget years. Communities were invited to apply for grants to fund wastewater and drinking-water pipeline upgrades.

In December 2015, Governor Cuomo announced \$75 million in grants to support 45 water and wastewater projects, part of a \$440 million infrastructure initiative. This included \$8,904,907 in grants as well as \$20,601,827 in loans for Hudson Valley municipalities.

Construction News, an industry publication, reported in summer 2016 that the state had invested \$9 billion in water and wastewater programs since 2011.

Overall, the fallout has been clear. The efforts to address New York's infrastructure must continue.

THE NATIONAL PERSPECTIVE

The Hudson Valley's issues concerning infrastructure are felt nationally. There is infrastructure deterioration and a lack of dollars to address it across the 50 states. The Army Corps of Engineers' 2017 assessment of the nation's infrastructure is D+, barely a passing grade.

The price to bring national infrastructure to a state of good repair by 2020 is \$3.6 trillion, according to the American Society of Civil Engineers. That level far outpaces current federal investments. The Federal Highway Administration estimated an annual investment of \$20.5 billion is needed over the next 16 years to repair and replace bridges. Rusting alone has rendered 15 percent of the country's bridges structurally deficient, according to the National Association of Corrosion Engineers.

Further, The American Water Works Association reported that the 237,600 water-line breaks that occur each year in the United States cost public-water utilities \$2.8 billion annually to address. Aging, leaky pipes lose 7 billion gallons each day from our water systems, according to the American Society of Civil Engineers. The bill for water-infrastructure modernization is \$600 billion alone in the next 20 years, The New York Times reported Dec. 24, 2016.

This graphic, based on ASCE data, illustrates the funding gap, in billions of dollars, that would have to be closed to bring infrastructure to a state of good repair. The ASCE uses a definition of infrastructure far broader than the one used in this report. The overall estimates remain the same.

Cumulative Infrastructure Needs By System Based On Current Trends, Extended to 2025

all values in constant billions of 2015 dollars

2016-2025 (10 years)			
Infrastructure Systems	Total Needs	Estimated Funding	Funding Gap
Surface Transportation ¹	\$2,042	\$941	\$1,101
Water/Wastewater Infrastructure ¹	\$150	\$45	\$105
Electricity ¹	\$934	\$757	\$177
Airports ¹	\$157	\$115	\$42
Inland Waterways & Marine Ports ¹	\$37	\$22	\$15
Dams ²	\$45	\$5.6	\$39.4
Hazardous & Solid Waste ³	\$7	\$4	\$3
Levees ⁴	\$80	\$10	\$70
Public Parks & Recreation ⁵	\$114.4	\$12.1	\$102.3
Rail ⁶	\$154.1	\$124.7	\$29.4
Schools ⁷	\$870	\$490	\$380
TOTALS	\$4,590	\$2,526	\$2,064

¹Data taken from ASCE's Failure to Act: Closing the Infrastructure Investment Gap for America's Economic Future (2016).

²Total needs are federal and non-federal high-hazard dams.

³Funding only includes publicly funded remediation, not funds from private sector.

⁴Total needs number based on discussions with the National Committee on Levee Safety.

⁵Does not include backlog and estimated spending for U.S. Army Corps of Engineers and city parks.

⁶Needs and funding estimates based on market projections and current investment trends.

⁷Data from State of Our Schools: America's K-12 Facilities (2016). 21st Century School Fund Inc., U.S. Green Building Council, Inc., and the National Council on School Facilities.

*Numbers may not add up due to rounding

Map reprint courtesy Construction Industry Council of Westchester & Hudson Valley, Inc.

Moreover, national infrastructure investment, as a percentage of Gross Domestic Product, has decreased 50% over the last 60 years, according to the United States Bureau of Economic Analysis. Between 2008 and 2013, the United States spent 2.4% of its annual GDP on infrastructure, according to Statista, Inc., a statistics service for businesses and academic institutions. That level of spending was only 15th globally, Statista reported. No. 1 was China, where it was 8.8%. India's expenditure was 5.2%, placing it third; Australia's 4.7% came in as fourth-most; and Canada was at 3.5%, in 10th place. As public assets age across the United States, shrinking investment in infrastructure will leave the nation with an older, less-efficient foundation for economic growth. The percent of investment shows how the United States prioritizes infrastructure compared to other nations. The United States' investment is shrinking, as the chart below indicates.

Government Gross Investment As A Share of Gross Domestic Product In the United States



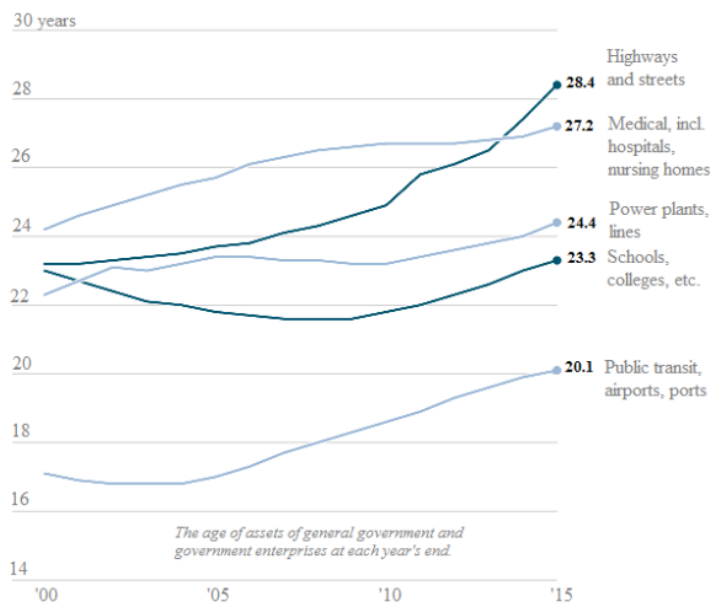
That directly affects the nation's health and economic well-being. Inadequate and failing infrastructure reduces the likelihood of economic growth and business expansion. Businesses will have difficulties operating or expanding in areas where ports, railways and highways, to name just a few components, are insufficiently prepared.

Factors other than funding can delay projects' start or completion. Regulatory reviews of projects, while a requirement of law and designed to safeguard a community, sometimes turn into a long, costly process. Laws relevant to project review include the 1970 National Environmental Policy Act, National Historic Preservation Act of 1966 and the Endangered Species Act of 1973. In addition, lawsuits filed by residents seeking answers or demanding additional oversight of a project can slow the review process. For instance, California's transportation department announced a project in the 1960s to extend a Los Angeles County freeway. Environmental reviews and neighbors' legal fights are ongoing -- and the project still is not complete. Though this may be an aberration, it shows the potential for long-term court disputes regarding aspects of infrastructure and to find a more expeditious approval process. And then there is the "people factor." Deteriorating roads and bridges mean increased congestion. There are more costs. More time is lost. More people simply sit in traffic longer. Commuters are delayed in getting to work. Truckers are impacted in their ability to deliver goods.

Deteriorating water and sewer systems affect health, quality of life and the value of homes and neighborhoods, let alone the number of potential construction jobs from engaging in needed repairs.

The chart below demonstrates that the average age of infrastructure is increasing. The potential for damage and increased cost of repairs grows each year we do not reverse this trend.

Average Age of Infrastructure



Source: Bureau of Economic Analysis

his administration has compiled a list of 50 top infrastructure projects, totaling \$137.5 billion, according to The Kansas City Star. The New York transportation-related presence on the list included

It's why the issue of infrastructure took the national stage during what was one of the most contentious presidential races in history. Despite their vast differences, Hillary Clinton and Donald Trump agreed upon on the critical need to rebuild the nation's infrastructure.

Their strategies, not surprisingly, differed. Candidate Trump pledged to invest \$1 trillion into national infrastructure. Candidate Clinton promised an injection of \$275 billion over five years.

Since Donald Trump's election as president,

\$14.2 billion for phases of the Second Avenue Subway; \$12 billion for the Gateway railroad project (serving New York City, but most work would be in New Jersey); and \$700 million for reconstruction of the Peace Bridge in the Buffalo area.

The president also has discussed a plan that would cost \$550 billion. Just days after taking office, he signed an executive order to streamline the environmental review process for “high-priority” infrastructure projects. The move, *The Detroit News* reported, allows state governors or department heads to request high-priority status for any infrastructure project, directing federal officials to then expedite environmental reviews for those projects.

Meanwhile, Capitol Hill Democrats proposed their own \$1 trillion plan, which would “invest federal capital to leverage private investment.” Bridges, schools and housing would benefit. About \$100 billion would go to “America’s Main Streets” and create 1.3 million jobs by focusing on cities, towns and rural communities. Results would include “smarter” downtowns due to better transportation technology, congestion reduction and improved safety and grade crossings. Housing would benefit as well, receiving lead remediation and blight removal. Another \$10 billion would be seed money for a new infrastructure finance entity that would “unlock pools of capital to provide low-cost loans, loan guarantees” and focus on transportation, energy and water infrastructure, the Democrats’ proposal said.

There have been previous large-scale efforts to invest in infrastructure. From the Works Progress Administration during the Great Recession to The American Recovery and Reinvestment Act (ARRA), created after the 2008 recession, infrastructure funds were made available to both stimulate the economy and address badly needed repairs. Unfortunately, ARRA fell far short of addressing the vast needs. One key detriment was a lack of “ready to go” projects. Pattern for Progress recognizes that need -- and this report hones in on how to align visions and projects that are ready for quick action. Please see the section labeled “Key Recommendations To Support Opportunity Areas and Other Municipalities in Their Efforts to Improve Infrastructure,” starting on page 16.

Unfortunately, the public sometimes does not appreciate the importance of solid infrastructure until a calamity occurs. A January 2017 nationwide poll by Reuters found that 51 percent of respondents did not want a higher tax bill to fund repairs, and 56 percent said they do not want the government to borrow money to pay for infrastructure. Whether the issue is a priority with the general public or not, the concerns do not dissipate. The poll reinforces the theory on public support: Until it is a crisis, it can wait.

Beyond the public, the attitude of “we can put it off” has until recently been prevalent among elected officials. There simply is nothing exciting about cutting the ribbon on a new sewer, or infrastructure to protect water. For decades, deferred maintenance was the preferred approach. How long can we extend the life of our communities’ infrastructure? As we move from not merely “it is getting old” to publicly watching numerous crises, spending on infrastructure is gaining in popularity.

THIS REPORT'S METHODOLOGY

This report provides an in-depth look at seven economically distressed valley communities identified as “Opportunity Areas” by the Regional Economic Development Council. The complete set of Opportunity Areas were selected by the REDC as a result of exhibiting at least one of the following criteria:

- An unemployment rate that exceeds the region’s rate by 25%
- A poverty rate above the county or 20% of national standards
- A homeowner rate less than 60%
- A subsidized school-lunch rate higher than 35%
- An income level less than 80% of the county’s median income (based on the five-year American Community Survey)
- A commercial vacancy rate over 15% of the designated area.

Brewster, Monticello, Kingston, Mount Vernon, Newburgh, Peekskill and Poughkeepsie were then selected for inclusion by Pattern in an effort to ensure they were dispersed throughout the territory covered by the REDC. Also, due to their criteria for the selection of an Opportunity Area, Pattern sought to understand the community's capacity to address its own infrastructure needs.

As part of this research, Pattern created infrastructure snapshots for each Opportunity Area. Pattern relied on:

- An examination of the built environment
- Budget data from 2010 to 2015
- General concerns as expressed by each community
- Barriers to maintenance and expansion
- Community "wish lists"
- The federal Environmental Protection Agency's Five-Year Needs Survey
- Funding recommendations.

Major NYSDOT projects for each community are listed under the Infrastructure and Community Development summary. Each profile includes a summation and comparison where applicable. This allowed Pattern to identify trends, provide recommendations and emphasize best practices. However, given the lack of staff in these communities, Pattern was not always able to obtain a complete set of data. Pattern attempted to supplement information by contacting each county's planning department. But the county planning departments did not always have the staff to drill down to the needs of each of their municipalities.

This report strongly advocates improving and reinvesting in infrastructure. It encourages long-term planning, examining funding mechanisms, maximizing shared services, consolidation to reduce the cost of infrastructure improvements, increasing use of technology, encouraging public-private partnerships and supporting growth and development in the Opportunity Areas throughout the region. The long-term impact of sprawl has never become so obvious as it did through the research for this report.

"OPPORTUNITY AREA" SNAPSHOTS

Pattern surveyed seven of 10 Opportunity Areas, and all seven responded. Below are summaries of Community Infrastructure Snapshots. **The full summaries can be found in the full online version at www.pattern-for-progress.org/what-we-do/libraries/reports/**

BREWSTER: Trains and commuters key for growth



Water and sewer upgrades, now underway, are setting the stage for new residential units, retail and office space and parking adjacent to the heavily used train station. Recently, the village announced and credited Pattern for being among the advisors helping to advance a new vision for the downtown, which ultimately led to a \$2 million Consolidated Funding Application award to fund a significant Transit-Oriented Development (TOD) project. It now seeks \$10 million to \$20 million in infrastructure costs to support the initiative. The project would transform the Village of Brewster. Securing the funding for the necessary infrastructure will be a challenge.



KINGSTON: History, waterfront are springboards for future

It was once New York's capital. The city is now enjoying a renaissance due to new investment -- restaurants, shops, attractions and nightlife, especially along its historic waterfront. The city's waterfront-development plan is long overdue for an update and will need to incorporate the recent renaissance. The lighthouse is a tourist attraction that should be designated a historic landmark. Infrastructure to support these efforts is critical.



MONTICELLO: Water needs, population variations strain budgets

The small village of Monticello once thrived as part of The Catskills, America's vacationland. Now, Monticello -- with significantly reduced revenues and ever-growing needs -- requires help to rebuild its water systems, roads and ability to consistently serve residents. Concerns grow during the summer when Monticello's population vastly increases. The village government raised concerns about its capacity to plan and ability to obtain grants and loans to repair, replace and upgrade the infrastructure. Ideas for rehabilitating Broadway abound and the advent of a new casino nearby should help.



MOUNT VERNON: Many needs and finding money to fix them

The municipal leadership in the City of Mount Vernon has an optimistic vision for its future. The city understands the demands for additional housing, commercial and retail space; however, leaders also recognize the foundation to support the need is based on infrastructure. Like many urban centers, Mount Vernon requires substantial upgrades of the water and sewer systems and improvements in the surface transportation system. The city is working on this vision by creating a methodical system to obtain financing and synchronizing efforts internally, while simultaneously ensuring safety for residents and businesses.



CITY OF NEWBURGH: Many steps underway, but many concerns, too

The city along the Hudson River is facing significant water-quality issues and major surface-transportation challenges. Newburgh has fallen victim to severely declining revenues, suburban flight, real and perceived concerns about crime and a deteriorating downtown that once was its pride and joy -- and a magnet for visitors. The redevelopment of the waterfront represents positive momentum and needs to continue, expand and connect to the new investment and energy of lower Broadway, SUNY Orange and the Liberty Street Corridor. Methodical planning followed by additional investments through the creation of public and private partnerships investment are critical to restoring the city. Pattern's Center for Housing Solutions and Urban Initiatives is playing a key role in coordinating and partnering with planning staff, businesses and nonprofits to establish a Creative Neighborhood. The neighborhood seeks to attract and retain residents and businesses in the most challenged areas of the city. It seeks to also bridge connectivity with the thriving waterfront.



CITY OF PEEKSKILL: History sets the stage for the future

A destination for commuters who swarm into the Metro-North train station, Peekskill has challenges serving its residents and the business community. The city's water- and sewer-system infrastructure is in desperate need of major upgrades. The roads are in poor condition and there is a high demand for additional parking. Peekskill has great amenities and a strong foundation to build upon, including the Metro-North train station, an artists' district and a waterfront ripe for additional development. The city's Main Street has already attracted new investment with additional development on the horizon.



CITY OF POUGHKEEPSIE: Problems, potential and a vision for moving forward

Bursts of development from new restaurants to the presence of the popular tourist destination the Walkway Over the Hudson have Poughkeepsie primed for continued rebirth. The massive budget deficit, ongoing water-safety issues and perceptions of danger are all major concerns as the city looks to improve.

A new mayor with extensive legislative experience and ability to envision a future, along with a firm strategic plan, hold promise. Rethinking its transportation network is critical. Recent infrastructure grants will help.

Please see the detailed profiles in the full version of the report online at www.pattern-for-progress.org/what-we-do/libraries/reports/.

Also, Pattern currently meets with the mayors of three of these municipalities -- Kingston, Poughkeepsie and Newburgh -- on a regular basis, where issues such as infrastructure are discussed.

KEY RECOMMENDATIONS TO SUPPORT OPPORTUNITY AREAS AND OTHER MUNICIPALITIES IN THEIR EFFORTS TO IMPROVE INFRASTRUCTURE

Summaries are listed here; each community snapshot also offers suggestions for the Opportunity Areas. Given the unclear direction of the new federal government, Pattern For Progress highly recommends that all levels of government in New York State work together to achieve the goals in this report. With the recent approval of the state budget, one of infrastructure's building blocks is now in place.

KEY RECOMMENDATIONS: OPPORTUNITY AREAS

- 1. Public/private collaboration to manage municipal systems:** This relieves governments from substantial maintenance and ownership costs and generates revenues from sales of infrastructure such as water systems. Communities that privatize must consider costs and fees. An example: A Quebec pension-management firm, Caisse de Depot et Placement du Quebec, signed a deal last year with the province of Quebec to plan, finance and manage two new rail projects, including transit links to Trudeau International Airport and across Montreal's Champlain Bridge. The firm's cost is \$3.8 billion US. Quebec's government is in debt and could not have funded these efforts on its own, which led to the public/private partnership, according to Strategy & Business magazine.
- 2. Capacity-building grants:** Grants should be made available to assist with capacity building to address infrastructure needs. From grant writing to construction through maintenance, three-year "capacity grants" should be provided to designated Opportunity Areas.
- 3. Infrastructure punch list:** Meetings with infrastructure consultants for all Opportunity Areas, not just the seven specified in this report, could create a "punch list" of ideas for state assistance. Pattern For Progress intends to create a Hudson Valley list in 2017.
- 4. Focus on shovel-ready efforts:** County officials and Opportunity Area leaders should together establish projects that are shovel-ready. Opportunity Areas often lack staffing capacity. Teaming with a county to assist with priority projects can help provide staffing resources and identify best practices.
- 5. Prioritization of grants:** Due to Opportunity Areas' severe needs, Pattern recommends that their infrastructure-related grant requests receive priority consideration from New York State. This could help these communities rebound faster.
- 6. Prioritize grants over loans:** Grants are always more attractive than loans simply due to the lack of need to repay money, even if this means the amount is either smaller or must be a combination of grants and loans. However, one-time funding infusions often will cover assorted costs at the start, but the municipality must assess how those costs are covered longer-term after the grant is exhausted.

7. **Consolidated Funding Application training:** Workshops would aid understanding of the process, offer best practices and encourage municipalities to apply. Pattern For Progress intends to lead such classes in the Hudson Valley in 2017.
8. **Grant writing:** Municipalities should evaluate opportunities to team up to establish grant-writing expertise. If multiple communities each contributed toward a shared cost, they could pay for an expert to focus on grant writing in the area of infrastructure -- and help multiple communities. There also may be grant opportunities to fund this innovative approach.
9. **Water-leak sensors:** The City of Middletown is replacing water meters for homes and businesses, and will transmit data hourly to provide information to the city about water usage. New meters will be more accurate, will allow people to see exactly how much water they're using and will save on manpower because city workers won't need to drive by homes and businesses to pick up radio signals. The meters also will take note of low-flow rates that typically indicate leaks and drips, enabling notification of the need for repairs that will save water. The town of Olds in Alberta, Canada, placed acoustic sensors in water pipes. The sensors analyzed sound patterns every day. The software detected new, evolving and pre-existing leaks. Software pinpointed repair locations. Over time, an expanding database of sensor information provided an assessment of the entire system. In six months, 21 leaks were repaired, saving \$177,336 in lost water. (<http://bit.ly/1pilhSb>)
10. **Green-energy efforts:** Two cities in Ulster County are part of efforts to make their communities more attractive while modernizing their infrastructure. In Ellenville, Ulster County has installed nine electric car charging stations at county facilities available for public use. The energy is created through natural means such as solar. The county's cost of the service — about \$500 a year — is minimal. The county will install six additional stations in 2017. Ulster County, whose government base is in Kingston, was the first county in the state to become net-carbon neutral, County Executive Michael Hein said. "We're the only county to get 100 percent of our electricity from renewable resources." Ulster buys nearly 19 million kilowatt hours of green electricity from sustainable sources annually through a combination of renewable energy certificates and utility green-power products.

KEY RECOMMENDATIONS: FINANCING

While these recommendations can assist projects throughout the Hudson Valley, we strongly urge the Opportunity Area communities that lack funding to consider alternative approaches.

1. **Federal tax credits and public-private partnerships:** The Trump Administration, which has repeatedly emphasized the importance of infrastructure care, is examining these techniques as an alternative to using federal spending to pay for infrastructure. These approaches face congressional consideration by Democrats proposing federal spending as the primary money source.

2. **The Design-Build delivery method:** To save money, consultants team with contractors to deliver detailed design plans and construct the project. The New York State Legislature has provided NYSDOT with a two-year window to use this technique for highway and bridge projects. The traditional Design-Bid-Build method is still the primary means of delivering projects, but Design-Build allows NYSDOT flexibility and to realize those cost savings.
3. **Accelerated bridge construction:** NYSDOT said this process reduces the time it takes to replace a bridge, saves money and cuts down on construction delays for motorists. This approach was used on Interstate 84 in Putnam County in 2014 (please see photo below). Replacement bridges over Dingle Ridge Road were constructed adjacent to the highway without impacting traffic. Then, with traffic diverted over separate weekends, each existing bridge was demolished and new bridges were slid into place, the DOT said. This technique is gaining national use, and in New York, has been at locations including the Van Wyck Expressway in Queens, the Belt Parkway in Brooklyn, and on the old Tappan Zee Bridge.



4. **Private-sector funding:** Since the recession, asset-management companies, including some private-equity firms and hedge funds, have been active investors in multiyear infrastructure development efforts, according to Business & Strategy magazine. J.P. Morgan, Allianz Global Investors and BlackRock are among asset managers pouring hundreds of millions of dollars into capital projects in places such as Canada and Africa. They reap their return from repayment of loans or revenue that the project might generate, such as tolls on a bridge.
5. **Tax Increment Financing (TIF) legislation:** TIFs are techniques to borrow money to subsidize construction, including infrastructure work. They use, as collateral, future revenue and gains in real-estate taxes and equity on an improved or completed project. TIFs are intended to subsidize infrastructure improvements, spur redevelopment of areas in difficult economic straits or new developments or construction projects. Dollars also can also be used for acquiring land, paying for planning expenses such as legal and engineering fees, demolishing and rehabbing buildings, cleaning up contaminated areas or funding job-training programs. It's important to ensure that the municipality is transparent with the public about its use of this financing technique; years may elapse between the original financing and full repayment. Municipalities must study the impact of repayment obligations and balance this financing approach vs. other bonding approaches to ensure it is indeed the best choice.

- 6. Fairly allocating state money:** Each region of the state deserves a fair share of allocated funds. Baselines should consider demographic information, usage volume, age of infrastructure and regional variation in wage and material costs.
- 7. Annual infrastructure reports:** To track the status of infrastructure over time, and help track repair and replacement considerations, municipalities should be required to provide an annual assessment of infrastructure conditions to the Office of the NYS Comptroller. The Comptroller's Office should then publish annual assessments. Municipalities, in return, would receive consideration for state or federal funds for their participation.
- 8. Innovation in bonding:** In 2014, Denver sold “mini bonds” to the public to raise money. With prices as low as \$500, the public bought \$12 million in bonds – giving residents an investment in their community and educating them about the importance of infrastructure. The money went to 319 infrastructure projects. Two types of bonds were sold: a 9-year bond with a 50% maturity rate to yield \$750 (4.26% return) and a 14-year bond with a 100% maturity rate to yield \$1,000 (4.8% return). Though the city is paying more interest on these mini-bonds than it would on traditional bonds, the goal was to involve residents – a move seen as a longer-term win for the city. New York City has done this as well. Massachusetts started an online ordering system that gives individual investors direct access to new bonds. New York State should continue to do bond referendums for component parts of infrastructure, but on a more regular basis.
- 9. Foreign-government investment in infrastructure:** While an opportunity for new revenue, a foreign government's potential investment in infrastructure may bring complexities with regulatory issues. For example, China’s government formed the China Investment Corp. to pursue overseas, including American, investment opportunities. Chairman Ding Xuedong said in a Reuters report: “There's not sufficient capital from the U.S. government or private sector. It has to rely on foreign investments” for infrastructure investment.
- 10. Sales tax revenue allocated to infrastructure:** Los Angeles County voters approved a half-cent sales-tax increase to pay for \$120 billion in transportation projects. Atlanta's mass-transit system will get \$2.5 billion over 40 years for a light-rail project. Raleigh, North Carolina voters backed \$1 billion for a transit system via a sales-tax allocation.
- 11. Income tax allocated to infrastructure:** An income-tax increase of .25 percent in Indianapolis would help pay for a transit hub. It was approved by nearly 60 percent of voters and now is being considered by the Indianapolis council. The revenue is considered a long-term solution for city transportation concerns and an important investment toward growing commerce. The tax is 25 cents for every \$100 earned and would pay for a 70 percent increase in bus service routes. The annual tax revenue from the strategy is \$56 million.
- 12. Congestion toll pricing:** This is a growing financing source. Such toll collection is used in San Diego and Washington, D.C.'s suburbs to give paying drivers access to lanes with less traffic. Stockholm and London charge motorists a fee to enter what had been clogged business districts. New York City has considered higher tolls for bridges into Manhattan during peak-traffic periods. This should be considered for Hudson River bridges only if the revenue funds bridge repairs.

- 13. Budgeting:** At all levels of government, an assessment of annual maintenance needs should be built into the budget so that dollars are available when needed. Removal or transfer of such funds should come with penalty unless that municipality is in dire financial need. This would avoid the practice of deferred maintenance.
- 14. Gas taxes:** The federal gas tax has remained stagnant at 18.4 cents per gallon since 1993. This major source of revenue could be fortified by increasing the per-gallon rate. On a statewide level, New Jersey increased its rate by 23 cents to 37.5 cents on Nov. 1, 2016. It was the first gas tax hike for the state since 1988. The previous rate of 14.5 cents per gallon had been the second-lowest in the nation after Alaska, according to the Tax Foundation. Pennsylvania, Michigan, Nebraska, Georgia, North Carolina, Indiana and Florida increased their gas tax at the start of 2017, while New York reduced its rate 0.8 cents per gallon when 2017 began. A potential increase in New York's rate may be considered as a funding source for infrastructure needs.

KEY RECOMMENDATIONS: PLANNING

There is deep value in managing time, dollars, needs and results. Systematic approaches, with both a short- and long-term view, are critical tools, particularly in an era where dollars are tight and needs are multifaceted.

- 1. Coordination among levels of government:** Small municipalities are advised to work with counties, and the state when necessary, to maintain long-term planning and budgeting. Access to such expertise can strengthen short- and long-term planning approaches. For example, NYSDEC's Clean Watershed Need Survey is conducted every four years and projects municipal needs for 20 years. This ties into the state Environmental Facilities Corporation's annual Intended Use Plan, which lists projects ready for financing. DEC also plans long-term for water-quality improvement projects such as disinfection and nutrient removal.
- 2. Conduct build-out analyses:** Understanding the amount and location of development that may ultimately occur provides a clear view for larger-scale planning. These analyses help put a project in the context of municipal planning and zoning regulations. They help frame implications on the tax base, traffic, school enrollment, park needs, sewage and water facilities, natural and historic resources, farmland and rural landscapes, and overall quality of life. We do ask the state to re-examine the mandatory percentages for "projected" growth as it does increase the cost of projects.
- 3. Five-year plans:** Development of such long-term vision would serve current and future user needs, improve economic growth and minimize socioeconomic disparities. Officials should understand that the plan is a map, and that variations in funding or other factors may alter the vision. Still, communities should be aware and work to meet their goals.
- 4. Early warning system:** Establishing an objective recordkeeping system regarding tracking conditions, repair schedules, replacement timeframes and projected costs will enable a municipality to effectively budget and seek expertise as needed. It also would, in theory, de-politicize repair and replacement needs. It would also highlight potential trouble spots. We urge consideration be given that, as part of annual reports to the NYS Comptroller, the Comptroller issue "infrastructure alerts" as it does for municipal finances.

5. **Not paving some roads:** Where *appropriate*, this saves money. Transportation agencies in at least 27 states have unpaved roads, according to the National Highway Cooperative Highway Research program. Montpelier, Vermont, a town of 7,760, reverted to dirt roads to reduce maintenance costs and eliminate the need for petroleum-based asphalt. With the use of road reclaimers (specialized construction vehicles that grind the existing asphalt and smooth out the road's surface), the dirt and gravel are secured with geotextile. That is a sturdy, porous fabric used to increase soil stability, prevent erosion and help with drainage. Unpaved roads can certainly create problems for vehicles, especially considering polluted sediment, runoff and dust. However, unpaved roads can be treated with a dust-taming mixture of calcium chloride, vegetable oils, animal fats and organic petroleum to reduce the impact. In small towns that face budgetary constraints, fixing pothole-ridden roads can be burdensome. Unpaving less-traveled roads can be a cost-effective tactic to free money to fund other infrastructure projects. Unpaving saved Montpelier \$120,000 in its 2009 budget of \$1.3 million for street building and repairs.
6. **Rolling, not removing snow:** There once was a time when snow was rolled, pressed and sanded, and not salted and plowed over until the blacktop showed. The result: Sometimes equally safe road conditions without the detrimental impact of salt upon the condition of blacktop, and the environmental runoff. This requires rolling the clocks back. But in states with unpaved roads, let alone those that are paved but seldom used, this old approach should be evaluated to determine if there is a compromise to motorist safety as well as a reduction in cost. There are paved roads that are in such poor condition, that consideration should be given to this overall approach to low-trafficked routes.

KEY RECOMMENDATIONS: COORDINATION

Shared services and planning: More municipalities sharing infrastructure services and related staffing, as well as frequently taking part in regional planning and coordination, could result in new revenue and savings. Governor Cuomo's 2017 State of the State address squarely targeted this potential. He directed county executives to lead municipalities through a process to identify areas to share services and save money. If nothing else, focus should be brought upon sharing/consolidation of infrastructure services beyond that which is already done today.

1. **Public-sector/private-sector coordination:** Regular communication among those responsible for urban infrastructure and those who offer consultation on construction and financing of infrastructure projects raises awareness of infrastructure needs. Participation in scheduled events such as mayoral forums, and updates regarding short- and long-term projects, are examples of ongoing models to continually share information. Pattern, for instance, strongly recommends the approach for improving the water quality and infrastructure employed in Westchester County along Long Island Sound. A partnership of contractors, union workers and environmental organizations banded together to expedite the critical infrastructure needs associated with improving water of the Sound.

2. **Bipartisan approaches:** Focusing on community needs and solutions in a bipartisan way is an essential tool in addressing infrastructure needs. The current polarized political environment creates obstacles that sometimes inhibit healthy, civil debate among those with differing viewpoints, even if both sides are deeply vested in the outcome of policy, projects or spending levels. The acute condition on infrastructure needs voices from all political perspectives to understand the larger goals of fortifying communities, encouraging business growth and attracting and retaining residents -- all of which can prosper when infrastructure is prioritized.
3. **Revenue generation:** The City of Middletown leveraged its infrastructure facilities to generate revenue from out-of-town sources to lessen the tax burden on taxpayers. The city signed an agreement with Competitive Power Ventures Holdings to purchase effluent from the new wastewater-treatment plant being constructed in Wawayanda. Middletown expects to generate \$500,000 annually once the plant is constructed. The Department of Public Works' Wastewater Treatment Plant has saved \$288,000 by accepting septic waste from outside the city. In addition, the city has an agreement with Port Jervis to share a Sewer Vac Truck, Sewer Cleaning Jet and underground inspection-camera system. The equipment was purchased using a state grant of approximately \$500,000 with a 20% local match. This agreement has saved both municipalities thousands of dollars. This "hub and spoke" helps finances while serving the infrastructure needs of surrounding communities. Middletown also has an agreement to provide up to 1 million gallons of water per day to Amy's Kitchen, a frozen-meal factory being constructed in Goshen. Together, this joint supply of infrastructure saves municipalities the cost of construction and creates significant revenues for the provider community.
4. **Technology efficiency:** Though NYSDOT staffing levels are lower than in the past, the department said project delivery and construction have not been affected. That is due to innovative project-development strategies, improvements in technology and the use of consultants that provide needed expertise. The state should share these approaches with local municipalities and offer grants to assist these municipalities that wish to employ these techniques.

KEY RECOMMENDATIONS: TECHNOLOGY

1. **Maximize software:** Deeper use of project-management software can yield savings and efficiency. NYSDOT's use of such computer programs enables designers to manage project schedules. It also allows regional and statewide managers to view and analyze capital-program priorities to support staffing and financial decision-making. If the cost is too high for smaller municipalities, that would become a great opportunity for shared services.
2. **Design efficiency:** Maximized use of Computer Aided Design (CAD) can offer extensive efficiencies that promise to become even better as technology evolves. Three-dimensional modeling software, for instance, enables designers of bridge abutments and piers to visualize potential conflicts with utilities and other objects in the right of way.

3. **GPS tools:** Implement more frequent use of Global Positioning System (GPS) technology. It is used by NYSDOT in surveying, asset-inventory collection, and in guiding construction equipment's use and movement.
4. **Drones:** Accelerating potential use of drones for aerial surveys and bridge inspections can be an efficient way to gauge conditions without time and safety investments from having crews climb the structures.
5. **Standardized reports:** Leveraging technology across different levels of government will aid coordination. NYSDEC plans to launch a pilot program in 2017 to work with 10 to 20 communities across New York State on developing a computerized template to assist each community in implementing an asset-management program. DEC also has been developing electronic reporting tools like NetDMR, electronic notices to announce projects, and electronic-reporting tools to acquire and track permitting and compliance information.
6. **Information access:** As software uses expand, digital platforms should take into account how to make information more publicly accessible to developers, municipal officials, consultants and the public.
7. **Traffic application:** Sitraffic SmartGuard is a web-based traffic-control center compatible with mobile devices, desktop computers and tablets. Created by Siemens, this app utilizes OpenStreetMap to provide an overview of the entire traffic system, displays locations of buses and emergency vehicles, and the status of traffic, parking and traffic lights in a list or on a map. Smaller communities, not just bigger ones, should invest in technology that can save money. Tyler, Texas (population 109,000) was experiencing growth downtown. But clogged traffic frustrated residents, and business owners suffering lost sales. Another Siemens traffic-control software product, ACS Lite Adaptive Control Solution, analyzed the congestion and coordinated traffic signals. Travel time is down by 22 percent; delays were cut in half. Savings in gas were about \$1.6 million and pollution was reduced because vehicles idled less. Businesses have seen more sales. (<http://sie.ag/2legOWV> or contact Siemens at (512) 837-8300.)
8. **Pavement application:** Total Pave software allows users to collect pavement conditions via smartphone technology. The Pavement Condition Index calculator determines the degree of “distress”. The International Roughness Index mobile app will determine the “roughness” as drivers pass by. The Sidewalk Liability Manager app documents sidewalk issues. All data can be shared through GIS, which can generate maps. It was first used in the City of Fredericton (population 50,000) in New Brunswick, Canada, in 2015. (TotalPave.com.)
9. **Grant-tracking program:** Developing a computerized system at the county level for monitoring the status of infrastructure grants can provide good coordination of efforts. It may be advantageous to offer greater shared services and coordination with smaller municipalities in return for additional funding.
10. **Mapping technology:** Such software is improving quickly. Expertise in this type of software can offer data on trends related to traffic, development and population shifts. The portability that such software offers encourages sharing among several municipalities. That can save money and provide a larger view of traffic that stretches, as traffic does, beyond municipal borders.

- 11. Digital coordination:** While traffic-signal coordination is not necessarily a new tool, it can tie together numerous digital solutions. Real-time analysis of traffic trends, and routing suggestions displayed on information signs, can aid use of high-traffic or bus-only lanes. It also can allow speed limits to be temporarily increased to aid traffic flow. The advent of technology provides other capabilities. All data can be communicated to drivers via cars' technology, social media, apps such as Waze and others. NYSDOT Region 8's Transportation Management Center in Hawthorne constantly monitors the region's transportation system, responding to incidents and taking action to minimize disruptions to travelers. It could be a hub for experimentation with this technology. Discussions should be taking place with car manufacturers to determine how packaging could be offered, and standardized and integrated into cars.
- 12. Connected cars:** The trend of more "connected cars" will grow. "Connected cars" refer to the presence of technology in a vehicle that can connect, via the Internet, to other vehicles, networks and services. These may include homes, offices or infrastructure, and can provide updates, in real time, on everything from severe weather to traffic backups to news bulletins or community alerts. Municipalities should have experts who understand how to maximize this technology. This expert, for instance, could help document traffic trends from collecting and analyzing data regarding precise counts of vehicles using particular roads or bridges, peak traffic times and shifts in commuting habits. Such estimates can then inform maintenance planning with more preciseness.
- 13. Water-management software:** Miami-Dade, Florida's parks department transformed its operations due to technology. It went from manually inspecting its pipelines to using IBM's Smarter Cities software to provide comprehensive management of a system that uses 360 million gallons a year. The software's immediate notifications of leaks and water-consumption rates provided more efficient use of repair crews, cut water usage 20 percent and saved \$860,000 per year. (<http://bit.ly/2kWJIJP>)
- 14. Drone inspections of sewer lines:** Floating drones use laser, sonar and high-definition photography to scan sewer pipes and provide reports on pipe condition. Potential blockages are currently being tested in Arlington, Texas. The Multi-Survey Inspection Profiler is manufactured by Redzone Robotics. Data will be compiled over time, helping frame repair schedules, costs and maintenance needs. (<http://bit.ly/2lPEd1p>)
- 15. Camera-truck monitoring:** In Mount Vernon, Indiana, a camera the size of a toy tank inspects city sewer lines. It provides a 360-degree view within a pipe. Live video is transmitted to employees at street level who perform visual inspections from the camera view. A recent leak 10 feet below the street surface was detected, giving early warning before a larger repair was needed. (<http://bit.ly/2kCnI9e>)

KEY RECOMMENDATIONS: LEGISLATION

- 1. Surface Transportation Bill:** Pattern believes it is important to encourage support for a five-year Surface Transportation Bill. Such an approach provides a longer-term strategy for improvements and can bring clarity to budgeting. President Obama signed such a bill into law, giving stability to funding expectations for municipalities. In an era of difficult budgeting on local levels, and an administration in Washington enacting change, a firm commitment can help attract and retain residents and businesses.
- 2. Infrastructure tax:** There is potential benefit in adopting the recommendation of City of Mount Vernon Mayor Richard Thomas, who called for a “local infrastructure tax,” similar to the New York State excise tax, of eight cents. Incremental approaches such as these offer sustained funding mechanisms. They do require clear communication to residents to reinforce the fee's need, value and long-term benefits. It is best to identify specific projects that would benefit, allowing the public to understand, and buy into, exactly how money will be spent.
- 3. Sales-tax allocation:** Legislation to consider sales-tax revenue for infrastructure needs, to complement money raised from toll collections, is recommended by the UCLA Institute of Transportation Studies. Toll collections, it says, extracts money from users. Sales taxes are a way to generate money from all who benefit, directly or indirectly, from the value of solid, reliable infrastructure.
- 4. Mileage fees:** Mileage fees, also known as mileage-based user fees, promise more stable revenue than fuel taxes. They also spread costs to users with greater precision. Paul Sorensen, associate director of the Transportation, Space and Technology Program at the RAND Corporation, in an article for Access magazine, suggests using GPS and wireless technology to track mileage. This, he says, would have the biggest users of roads pay the most. Less-frequent users would pay less. Tied to travel rather than fuel consumption, the revenue stream, he says, is immune to changes in vehicles' improving fuel economy or even fuel type. Mileage fees must still be increased periodically to account for inflation, but the increases wouldn't be as frequent or as large as with fuel taxes. New York City's planned DriveSmart initiative, Rand reports, envisions the deployment of sophisticated in-vehicle equipment that could be used to levy the fees. Trials are being done in places such as Washington state, Oregon and Minnesota. Concerns such as driver privacy and collection rates are being analyzed for solutions.

KEY RECOMMENDATIONS: IMPEDIMENTS

Pattern fully realizes that visions and priorities can be overtaken by unplanned circumstances or lack of resources. The list below is designed to arm municipal officials with caveats to consider.

- 1. Prioritize planning:** Staffing constraints limit the ability for smaller communities to establish long-term plans. However, long-term planning is a critically important tool and should be an ongoing priority. Managing infrastructure requires ongoing and long-term attention regarding scheduling of maintenance, costs, finding funding, navigating layers of government for requisite approvals, coordination and ensuring public notification. Effective prioritization and planning decrease the risk of surprise regarding emergency situations. Lack of planning complicates processes, results in delays, potentially increases costs and, for the public, can mean possibly dangerous roads and bridges, or unsafe water systems, that ordinarily would have been tended to.
- 2. Uniform definition of infrastructure:** Without a concise and consistent definition of infrastructure, it is difficult to promote funding for capital projects that may or may not be considered traditional infrastructure. A uniform understanding is important, as is the ability to separate categories and address each strategically.
- 3. Gas-tax future:** The federal gas tax has remained stagnant at 18.4 cents per gallon since 1993. It has not been adjusted for inflation but has been a major source of revenue for transportation projects since the passage of the Highway Trust Fund. However, the federal government has run an annual deficit since 1993; it has spent \$50 billion per year on transportation projects while receiving only \$34 billion from gas taxes. Municipalities should seek other funding sources to supplement money or projects paid for by the Highway Trust Fund, or, to ensure the gas tax as a future revenue source, be willing to support an increase in the per-gallon tax amount.
- 4. Population variations:** Seasonal populations in communities should be considered when anticipating the need for increased capacity for existing infrastructure systems. This should also play a role in funding projects.
- 5. Shifting tax base:** A decrease in the tax base and the resulting revenue loss pose a problem for smaller municipalities to fund large capital projects. Population shifts must be monitored, as well as numbers of local businesses, the migration patterns of residents and new trends in business types.
- 6. Resourcefulness in finding expertise:** If staffing and expertise must be reduced due to budget issues, find ways to obtain that expertise elsewhere. Otherwise, longer-term projects are at risk, endangering potential revenue and safety.
- 7. Technology access:** A lack of funding that prevents access to new technology can be a detriment over time. Smaller municipalities should creatively seek ways to access the technology to keep projects on track and to gain efficiencies.
- 8. Communication models:** Most county planning departments should be aware of smaller municipalities' efforts. Increased transparency could allow for more collaboration and shared services.

- 9. Federal review:** Submitting documented needs to the Environmental Protection Agency Five-Year Needs Survey is not mandated. Perhaps that warrants review. The information helps Congress, state legislatures, communities and others make informed investment decisions about clean-water infrastructure and pollution-control methods. Submissions also help municipalities stay in compliance with the Clean Water Act.
- 10. Problematic environmental reviews:** Inefficient permitting processes and environmental reviews create project delays and cost burdens. In an article by the Berkeley Political Review, report author Jeffrey Wirjo cited the Bayonne Bridge roadway project in New Jersey. He wrote that this project "had no significant environmental impact. Yet the government required what turned out to be a five-year, 20,000-page environmental assessment, only to be found after completion that the review was inadequate." (Source: <http://bit.ly/2oX0WpG>) Hudson Valley Pattern For Progress also has been advocating for efficiency in such reviews. NYSDEC announced draft modifications in January to the State Environmental Quality Review Act. The changes Pattern recommended (many of which were not included), and has worked on since 2009, can make New York State more business-friendly -- and speed up regulatory consideration of prospective projects without sacrificing meaningful environmental review. A comment period is now open on the proposals.

CONCLUSION

Hudson Valley Pattern For Progress hopes this information will be useful for municipal leaders and further our effort to discuss the importance of improving and advocating for our regional infrastructure, and identifying collaborative solutions to fortify it for the future.

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Pattern for Progress is the Hudson Valley's public policy and planning organization that creates regional solutions to quality-of-life issues by bringing together business, nonprofit, academic and government leaders from across nine counties to collaborate on regional approaches to affordable/workforce housing, municipal sharing and local government efficiency, land use policy, transportation and other infrastructure issues that most impact the growth and vitality of the regional economy. To read this report and others please go to

<http://www.pattern-for-progress.org/what-we-do/libraries/reports/>

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