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Caution Ahead: Overdue Investments for New York's Aging Infrastructure

While Superstorm Sandy focused much-needed attention on key pieces of New York City's infrastructure, the city faces a number of other infrastructure vulnerabilities that have little to do with storm-preparedness—from aging water mains and deteriorating roads to crumbling public schools. If left unchecked, they could wreak havoc on the city's economy and quality of life.

by Adam Forman

The following are the introduction and recommendations to Caution Ahead.

Click here to read the full report (PDF).

Following the devastation of Superstorm Sandy in October 2012, New York City's essential infrastructure needs were made a top policy priority for the first time in decades. The scale and severity of the storm prompted numerous studies to assess the damage and led policymakers to take steps to shore up the city's coastal infrastructure weaknesses. Although that work remains imperative, New York City faces a number of other infrastructure vulnerabilities that have little to do with storm preparedness or resiliency. If left unchecked, they could wreak as much havoc on the city's economy, competitiveness and quality of life as the next big storm.

New York City's core infrastructure is in dramatically better shape than it was in the 1980s, when the city closed the Williamsburg Bridge for fear of collapse, track fires were a regular occurrence in the subway system and the Brooklyn Bridge, FDR Drive and West Side Highway all experienced structural failures. Yet, as we detail in this report, much of the city's roads, bridges, subways, water mains, sewer systems, school buildings and other public buildings are more than 50 years old, and many critical components are past their useful life and highly susceptible to breaks and malfunctions.

Over 1,000 miles of New York City water mains are more than 100 years old, leading to frequent and disruptive breaks. More than 160 bridges across the five boroughs were built over a century ago, and in 2012 47 bridges were deemed both structurally deficient and fracture critical, a designation engineers use for bridges that have little structural redundancy, making them prone to failure and collapse. The subway's aging signaling system—with 269 miles of mainline signals

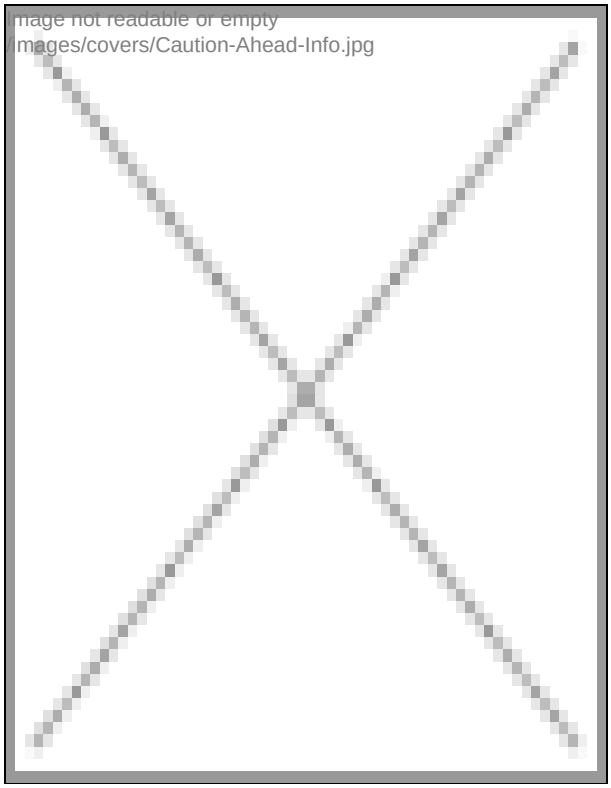
exceeding their 50-year useful life—slows the movement of trains and forces maintenance workers to build their own replacement parts because manufacturers no longer make them. Additionally, more than 200 of the city's public school buildings were built before 1920.

Simply put, too much of the city's essential infrastructure remains stuck in the 20th Century—a problem for a city positioning itself to compete with other global cities in today's 21st Century economy.

While the Bloomberg administration increased capital spending significantly and made great strides on a number ofimportant fronts, it put more emphasis on new construction than bringing older assets into a state of good repair. The city Department of Transportation (DOT) fell behind on street repaving, for instance, while the Department of Environmental Protection (DEP) lost ground on its own water main replacement targets—even as the city funded the first new water tunnel in nearly a century. Although the School Construction Authority dramatically increased the number of public school seats, the maintenance and repair of many older buildings suffered during this period.

This report finds that city agencies and authorities will have to invest approximately $47.3 billion to maintain the safety and functioning of New York's infrastructure—leaving a $34.2 billion capital funding gap at the city, Port Authority, New York City Transit, Housing Authority and CUNY over the next five years. This funding gap includes only the replacement and repair of existing infrastructure—not new structures or increased capacity.

To remain a magnet for global businesses and talent, and to ensure the high quality of life current residents have come to expect, Mayor Bill de Blasio, Governor Andrew Cuomo and other government officials will need to make investing in the city's aging infrastructure a major priority. Although it will not be easy in an era of diminished federal funds, this report outlines several achievable solutions for addressing New York's critical infrastructure needs.



This report provides a comprehensive examination of New York City's current infrastructure vulnerabilities. It goes beyond the coastal infrastructure challenges that were exposed after Super Storm Sandy and offers a new level of detail about the current state of the city's infrastructure in a broad range of critical—but often neglected—areas, including roads and bridges, subways, airports, the electricity distribution system, natural gas service pipes, water mains, sewage pipes and the

broadband network. Additionally, the report takes a close look at the state of New York's civic infrastructure, including parks, schools, homeless shelters, CUNY facilities, public hospitals, libraries, public housing and courthouses. Based on extensive data analysis and interviews with more than 100 infrastructure experts in New York and around the nation, the report also puts forth a number of recommendations on what city and state officials can do to address the infrastructure deficiencies outlined in the report.

> "In some cases, the infrastructure in New York is so old we don't even know where it is under the street"

Much of New York City's skeletal infrastructure dates from the first part of the 20th century. As a result, many structures have been in continual service for over half a century. The average age of New York City's 6,400 miles of sewage mains is approximately 84 years, for example. Its 6,800 miles of water mains are approximately 69 years old, and its 6,300 miles of gas mains are 56 years old. Over 41 percent of city bridges were built before 1950.

"In some cases, the infrastructure in New York is so old we don't even know where it is under the street," notes city planner and historian Alexander Garvin. "There can be a water main break in lower Manhattan and our engineers won't be able to find it."

Many of the city's gas, steam, sewer and water lines are made of old and outmoded materials like unlined cast iron, making them highly susceptible to leaks and breaks. Largely because of leaks, over 2 percent of the gas Con Edison sends to customers every year never makes it to its final destination. The difference between the amount of water that enters the city's water delivery system and the amount consumed by customers is a staggering 24 percent, about double the 10 to 15 percent industry standard.

Since 1998, New York has experienced at least 400 water main breaks in all but one year; in 2013, there were 403. Although most of the breaks are minor, serious ruptures are an annual occurrence. Already this year, a major water main break on 13th Street in Manhattan flooded the street and nearby subways. (In 2013, a similar incident paralyzed the subways at 23rd Street in south Midtown and, in 2012, a major break occurred near Penn Station.)

"We're probably going to see more water mains that burst because of fatigue cracks," notes Sam Schwartz, a renowned transportation engineer and former New York City traffic commissioner.

The city's 1,445 bridges and 19,000 lane miles of roads and highways also concern engineers. Eleven percent of New York City bridges—162 in all—have been deemed structurally deficient, and 47 bridges have been found to be both structurally deficient and fracture critical. The bridges in this latter category not only suffer from significant distress, they lack sufficient redundancy to withstand that distress. According to engineers, if a single span, beam or joint of such a bridge fails, the whole thing could come tumbling down.

Meanwhile, the city DOT has deemed 30.4 percent of the city's roads to be in "fair" or "poor" condition, up from 15.7 percent in 2000. Roughly 43 percent of all roads in Manhattan are considered substandard, followed by Staten Island (40 percent), the Bronx (34 percent), Queens (31 percent) and Brooklyn (28 percent). This is cause for concern: The longer the pavement goes without rehabilitation, the faster it begins to deteriorate and the more costly it becomes to fix.

"Arguably city streets are in the worst shape of any of our transportation infrastructure—and that says a lot." says Elliot Sander, former executive director of the Metropolitan Transportation Authority (MTA) and current president and CEO of the HAKS Group, a construction management firm. "While a lot of resurfacing our streets has been done, they need to be fully reconstructed on a much wider scale, rather than just having asphalt poured on top as a patch. The resurfacing program is helpful, but it is basically an overused Band-Aid, which anyone who uses the city's streets can attest to."

The city's transit infrastructure has undoubtedly come a long way since the 1980s when subways broke down at a much

higher rate than they do now, but the MTA's 659 track miles of subway demand substantial attention, particularly with antiquated subway stations and outmoded signals that regulate the movement and spacing of trains. Of the system's 728 miles of mainline signals, 269 have exceeded their 50-year useful life and 26 percent are more than 70 years old.

With over 2,600 buildings bigger than 10,000 square feet, New York City is one of the largest landlords in the world. And as with the city's horizontal infrastructure, a large percentage of these buildings suffer from old age and serious physical defects. For example, with over 370 of the city's 1,200 public school buildings predating the Great Depression, temperamental heating and cooling systems, leaky roofs, and broken elevators are common. Citywide, 36 different building exteriors, 4 electrical systems and 69 mechanical systems are in need of immediate preventative maintenance.

Similarly daunting capital challenges exist at many of the city's 24 CUNY campuses, where the average building is 52 years old.

NYCHA's physical needs were in the spotlight in the wake of Super Storm Sandy when tens of thousands of residents spent weeks without heat or running water. But NYCHA's problems go beyond storm resiliency. With an average age of nearly 50 years and a long history of underfunding, the majority of the authority's 2,600 buildings suffer from serious physical distress. A staggering 1,500 or 58 percent do not comply with the Department of Building's façade standards, as detailed in Local Law 11. Extreme temperatures, collapsed ceilings and persistent mold have left nearly 800 units vacant and uninhabitable—and 319 of these have been empty for over seven years.

In addition, the average public hospital in the city is 57 years old, over half of the clinics operated by the city's Department of Health and Mental Hygiene were built before 1950, 61 percent of city-owned courthouses were constructed prior to 1940, and the 55 shelters operated by the city's Department of Homeless Services are more than 70 years old, on average.

Bringing all these physical assets into a state of good repair will require a nearly unprecedented investment by the city, state and federal governments. According to the city's Asset Information Management System (AIMS) report, just 18 city agencies have $6.3 billion worth of so-called state of good repair needs over the next four years, including $3.2 billion at DOT, $1.3 billion at the Department of Education (DOE), $471 million at the Department of Parks, and $282 million at the Health and Hospitals Corporation (HHC). In a recent building condition assessment survey, CUNY itemized $2.5 billion in immediate capital needs, 11 times more than what is outlined in the city's FY2014 AIMS report. And, in their five-year capital plans, NYCHA, New York City Transit and the Port Authority identified $15.5 billion, $16.3 billion and $6.8 billion in state of good repair needs, respectively.

That comes to a total cost of $47.3 billion over the next four to five years. And this only reflects repairing and maintaining current infrastructure—not needed service expansions such as building new sewers or bus rapid transit lines.

The enormous backlog of needs goes back decades and is partly attributable to the lack of adequate investment over many years. Between 2002 and 2013, Mayor Michael Bloomberg increased city capital spending significantly over what the three previous mayors spent during their tenures. At the DEP, the construction of Water Tunnel 3 was reinvigorated after years of neglect, and the School Construction Authority expanded public schools by 126,000 seats. Major new parks were built and the number 7 train will be extended to the far west side of Manhattan using city capital dollars.

Still, when it came to maintaining existing assets, a number of New York City agencies lost ground during the Bloomberg administration. According to AIMS, between Fiscal Year 2009 and Fiscal Year 2014, capital needs at the Department of Correction grew by 181 percent, at HHC by 72 percent, DOE by 71 percent and the Department of Homeless Services by 47 percent. According to its own assessment, CUNY's backlog of needs went from $1.7 billion in 2007 to $2.5 billion in 2012, a 47 percent jump.

Though DOT capital needs increased by a more modest 8 percent over the last five years, the agency has resurfaced an average of only 852 lane miles of road a year since 2000, even though an estimated 1,000 lane miles fall out of good repair

every year. Similarly, to stave off water main breaks, experts believe that the DEP should follow a 100-year replacement cycle, which would mean replacing the equivalent of 68 miles of water mains every year. But the agency has failed to reach this target a single time over the last decade.

There is a huge gap across the board between the backlog of the city's capital needs and funding levels. Based on accumulated funding gaps and shortfalls in upcoming capital plans, unmet "state of good repair" needs will reach $34.2 billion over the next five years. This includes deferred capital maintenance at the New York City Transit Authority ($10.5 billion) and CUNY ($2.5 billion) and projected shortfalls at NYCHA ($14 billion), Port Authority ($3.9 billion) and 18 city agencies ($3.3 billion).

To overcome this enormous backlog, the report urges Mayor de Blasio to make a significant new infrastructure investment and refocus the city's capital spending on state of good repair needs. Ramping up the city's investment will not be easy without additional resources from Albany and Washington, something that seems unlikely at the moment given the paralysis in Congress. But the report suggests that a major public works program to tackle the city's aging infrastructure could be one of the most effective ways to create middle-income jobs in the five boroughs, a clear policy goal of the de Blasio administration.

The report recommends several possibilities for new dedicated revenue sources to pay for infrastructure projects—including a Surface Water Management Fee, tolls on the East River bridges and a residential parking permit program—as well as new mechanisms to capture the value created by infrastructure projects. It calls on city and state officials to end the practice of diverting existing dedicated revenue streams from the transit system, airports and the water system.

To ensure that the city's limited capital dollars go farther, state and city officials will also need to reduce the cost of construction on capital projects. Public sector construction projects in New York cost more and take longer than equivalent work in the private sector; they also tend to cost significantly more than equivalent work by public sector agencies in other cities. For instance, in 2012 replacing or repairing public school electrical and mechanical systems in New York City cost 67 percent more than in Denver, 46 percent more than in Seattle and 18 percent more than in Chicago. In Tokyo the cost of building a new subway line is approximately $448 million per mile; in Paris, it is roughly $368 million per mile. By comparison, New York's Second Avenue subway and 7 train extension have each cost the MTA well over $2 billion per mile.

The report recommends a number of changes to state and city contracting laws and practices that could bring down construction costs.

The massive scale of infrastructure needs also requires a more comprehensive capital planning process. While the Office of Management and Budget (OMB) commissions the Asset Information Management System report, some experts say that its assessments are often cursory and it excludes huge portions of the city's assets such as water mains, treatment plants and sewer pipes. Rather than basing capital allocations on the needs outlined in the report, OMB has tended to base funding levels on a mixture of precedent, persuasion and debt capacity.

"The city needs more sophisticated and practical long-term planning," says Stephen Berger, former executive director of the Emergency Control Board and an expert on capital budgeting.

There also must be more coordination between capital and maintenance spending. When buildings are not maintained properly on a day-to-day basis—when the snow isn't cleared off the roof and routine malfunctions are not taken care of in a timely fashion—properties become distressed and capital costs increase.

Coming to terms with New York's huge state of good repair needs is an immense challenge, but the city's health, quality of life and economic competitiveness depends on it. "If New York City wants to maintain its presence in the world, among other leading global cities, we have no choice but to maintain this infrastructure," says Mary Ann Tighe, New York Tri-State Region CEO for real estate firm CBRE. "We're selling talent above all in New York. But the talent won't come here without a strong

infrastructure and environment."

"It's an issue of competitiveness and livability," adds Elliot Sander. "If our infrastructure is not advanced to an acceptablelevel and then maintained, these systems will degrade. We know from the 1980s that these systems will fall apart. It came very close to killing the city and region. You probably need to double the investment to both bring all the elements up to a state of good repair and to deal with the added demand from the growth we have had, and then put it on a regular replacement cycle. We also need to get more for our money. It will be difficult to do all of this financially and politically. But if we continue on the current course, it is likely New York will be substantially diminished as a global leader, with enormous environmental, social, political, and financial implications that far outweigh the cost."

This report is intended to prompt a serious discussion among community leaders and the general public that the infrastructure vulnerabilities discussed here must be addressed if New York City is to remain a dominant global urban destination. While the report is a deep dive into the state of disrepair of the backbone infrastructure of what makes New York work, it is not a substitute for the study and documentation of the respective expertise of each of the discussed infrastructure systems. Our study is intended to shine a light on what their needs truly are.

This was the introduction to Caution Ahead. Click here to read the full report (PDF).

Recommendations

Though New York's essential infrastructure has improved over the past 25 years, a look under the hood reveals a number of critical vulnerabilities. From structurally deficient bridges and deteriorating roads to leaking water pipes, antiquated airport terminals, decaying school buildings and fraying copper telecom wires, too much of New York's infrastructure is unworthy of a growing and global city facing increased competition for talented workers and business investment.

To be sure, we do not expect New York policymakers to address every one of the city's infrastructure vulnerabilities at this time. Policymakers will need to prioritize. But if a significant chunk of the city's critical infrastructure is not brought to a state of good repair in the years ahead, it could seriously undermine the city's economic competitiveness and quality of life—and lead to substantial long-term costs.

In Caution Ahead, we lay out more than a dozen recommendations for city and state policymakers to address these challenges. Our ideas fall into four key areas: 1) Increasing Infrastructure Investments; 2) Bringing Down Infrastructure Costs; 3) Improving Infrastructure Planning; and 4) Developing New Infrastructure Innovations.

Increasing Infrastructure Investments

Make investing in NYC's aging infrastructure a key part of the de Blasio administration's plans to create middle-income jobs

With 35 percent of working adults in New York City in "low-wage jobs" and nearly one in ten working New Yorkers earningtoo little to officially climb above the federal poverty line, it's refreshing that Mayor Bill de Blasio is looking to develop new strategies for creating middle-income jobs. The de Blasio administration should consider a sizable public works program. It's hard to think of any other city action that could generate more blue-collar jobs than an increased and sustained investment in repairing the city's aging infrastructure. Such a program could include new apprenticeship programs and job training to ensure that a diverse mix of New Yorkers can access these jobs and build long-term skills in the construction trades.

Refocus capital spending on state of good repair needs

During the 12 years of the Bloomberg administration, city infrastructure investment reached new highs but the overwhelming focus was on expanding capacity—developing new parks, schools, water infrastructure, subway extensions, etc.—rather than on repairing aging assets. It's now time to focus on preserving existing infrastructure. The de Blasio administration should devote a larger share of the capital budget to state of good repair work and favor new infrastructure projects that explicitly relieve overburdened assets, thus extending their useful life.

Identify new dedicated revenue sources to pay for infrastructure projects—and stop diverting money from existing "dedicated" funding streams

To finance the city's growing state of good repair needs, the city must develop new dedicated revenue sources. Forexample, the New York Building Congress has suggested the city implement a residential parking permit program, with the revenues going to transportation infrastructure projects. Another possibility is environmentally sound Waste to Energy facilities which, according to the Building Congress and the Citizens Budget Commission, would reduce waste disposal costs and create a potential revenue stream to support the city's sanitation operations. But policymakers should look to identify other opportunities. In the years ahead, if the state ultimately decides to legalize fracking, it should consider dedicating a share of the potentially lucrative new tax revenues for infrastructure projects.

In addition, city and state officials should refrain from diverting or dipping into the already-insufficient dedicated revenue streams, a practice that has been all-too-common in recent years.

Implement East River tolls or congestion fees

City and state policymakers should get behind plans to establish a fairer bridge toll system to reduce vehicle congestion in the city's central business districts and create a needed mechanism for funding transit infrastructure projects. Though prior efforts to impose tolls on the East River bridges—including Bloomberg's congestion pricing initiative—were dead on arrival in the state legislature, there are indications that newly designed bridge tolling proposals could gain broader support. For instance, while Sam Schwartz's "Fair Plan" would add new tolls on the East River bridges that bring vehicles into the central business district, it would sharply reduce tolls on bridges that don't enter the Manhattan's business district. Most importantly, Schwartz's plan would result in $1.2 billion annually for transit projects and regional highway improvements. At a time when transit ridership is at record levels but the MTA's precarious finances have left the authority without funds to maintain and improve the system, Mayor de Blasio, Governor Cuomo and other city and state policymakers must throw their full support behind this—or some alternative—bridge tolling plan.

Introduce a Surface Water Management Fee to incentivize capture of rainwater before it enters sewers

To address the roughly 27 billion gallons of raw sewage and polluted stormwater that enter local waterways each year, the city has increased the number of green elements in New York City streets and parks, absorbing rainwater before it enters the sewer system. To incentivize similar rainwater capture on private property, the DEP should consider introducing a Surface Water Management Fee. Customers would be billed based on the percentage of their lot featuring impervious surfaces. The more green elements added—such as grass, gardens, green roofs and permeable concrete—the lower the fee.

Over 500 utilities currently apply stormwater charges, including Philadelphia, Washington DC, and Seattle. Sophisticated

Geographical Information Systems (GIS) programs enable these utilities to track impervious surface area in order to maintain accurate assessments. This new revenue source could be coupled with a credit program to help customers finance the installation of green elements on their property; repaid each month via the utility bill.

Create new mechanisms to capture value from infrastructure projects

Over the past 15 years, much of the public investment in new parks, transit, schools and other infrastructure across the five boroughs has led to significant increases in nearby property values. But as Chris Ward, former executive director of the Port Authority, laments, “We’ve lacked the capacity to capture that wealth” to help underwrite the cost of those public investments. One example is the development of the Hudson River Park, where hundreds of millions of dollars of investment by city and state agencies has sparked a wave of new housing and commercial development in the surrounding blocks, creating financial windfalls for the property owners. City officials should consider ways that those benefitting most from the improvements could contribute to their financing.

In London, for instance, the Community Infrastructure Levy helped finance major infrastructure improvements, including the city’s ambitious Crossrail, a new commuter rail line connecting the suburbs to central London. Surrounding neighborhoods were assigned to one of three zones, depending on their proximity to the new line. In areas that are closest to the new rail line, new development is taxed at £50 per square meter. In the next two zones, the levy falls to £35 per square meter and £20 per square meter.

New York City could introduce a similar mechanism for residential construction around new parks, bus rapid transit, subway lines and any other infrastructure that bolsters real estate values. The city has experimented with forms of value capture at Hudson Yards and Brooklyn Bridge Park. London’s Community Infrastructure Levy offers a more systematic and ambitious model.

More federal support

While America’s global competitors invest in new airports, transit systems, schools, telecommunications networks, smart energy grids and highways, the United States government is providing less and less infrastructure funding to America’s most important global city. This needs to change. New York and other cities simply do not have the resources to tackle their aging infrastructure alone. In his 2014 State of the Union address, President Barack Obama urged Congress to provide ample revenues for “rebuilding our roads, upgrading our ports, unclogging our commutes.” Then, in February 2014, President Obama proposed a $302 billion dollar transportation spending package to address the nation’s deteriorating infrastructure. Congress should embrace the challenge and develop a bipartisan framework to significantly increase resources for fixing and modernizing the nation’s infrastructure. Such a plan should help cities and states repair the oldest bridges, highways, airports and schools; upgrade public housing that was built by the federal government but is now rapidly deteriorating; and modernize transit infrastructure in cities where ridership levels are growing rapidly. It should consider competitive grants that empower cities to come up with innovative infrastructure solutions. Mayor de Blasio should team up with other mayors, business leaders and labor officials to put urban infrastructure needs on the national agenda and lobby Congress to fund a meaningful investment.

A lift from Albany

Governor Cuomo made infrastructure investment a key part of his 2014 State of the State speech, noting, “We have to rebuild our infrastructure because we need a 21st century infrastructure to build on.” The governor proposed major state investment to modernize JFK and LaGuardia airports and build new Metro North stations in parts of the Bronx that are underserved by the subway system. He called for a referendum that, if passed by voters, would provide $2 billion to upgrade the technology infrastructure in schools across the state. This is a very important start, but the state must do far more to support New York City’s infrastructure needs.

Given that New York City is the state’s economic engine, the governor and legislature have a responsibility to helpmodernize its aging infrastructure. Albany leaders can start by upping its investments in New York City highways that are managed by the state Department of Transportation and which have seen declining levels of maintenance in recent years. It should also

provide more stable support for the Metropolitan Transportation Authority's (MTA's) capital plan and honor its capital commitments to City schools mandated in the Campaign for Fiscal Equity litigation. Beyond this, Governor Cuomo and the legislature should introduce a much larger package to modernize bridges, roads, transit systems, schools and energy infrastructure from Brooklyn to Buffalo.

Officials in Albany could follow the lead of several other states that recently developed innovative approaches to funding infrastructure. For instance, Pennsylvania legislators recently approved a package of tax and fee changes that will raise $2.3 billion a year for transportation infrastructure. Maryland raised the gas tax for the first time in 20 years, passed a measure to index the tax to keep pace with inflation and levied a new sales tax on gasoline—all of which will enable the state to pump $4.4 billion into transportation infrastructure projects over the next six years. In Massachusetts, the legislature approved a transportation infrastructure financing bill that includes a three-cent per gallon hike in the gasoline tax and a $1 per pack cigarette tax increase. All together it will provide up to $800 million in new annual revenue for transportation by 2018. And in January 2014, the state's governor proposed an additional $12.4 billion package to modernize the state's infrastructure by pumping billions of dollars into transportation.

Stop diverting airport revenue

JFK and LaGuardia airports both require significant infrastructure investments, yet hundreds of millions of dollars in revenues generated by these airports have been diverted to other Port Authority assets, such as the PATH train system. Federal regulations require airport operators to reinvest all revenue into their facilities to prevent cities from irresponsibly using their airports as a "cash cow." The Port Authority is the only major airport operator in the nation that has been granted an exception to this mandate. With the city's airports in need of significant new investment, de Blasio and other city and state policymakers should push the Port Authority to end this practice—or commit to a ceiling on how much can be diverted from each airport—and reinvest funds into the modernization of JFK and LaGuardia.

Create an infrastructure bank to help select and finance projects with high strategic and economic potential

When structured appropriately, and provided sufficient resources, government infrastructure banks can be an effective wayto stretch funding while continually targeting new needs. Effective banks like California's Infrastructure and Economic Development Bank (I-Bank) are able to make their initial capitalizations go much further in terms of loans by securitizing bonds with loan repayments; the I-Bank, for instance, started out with approximately $180 million in 1999 and has since made over $400 million in loans to a wide variety of agencies, authorities and nonprofits. But rather than using the bank to finance projects chosen by other entities—whether an agency or elected official—California's I-Bank uses a competitive application process to select only those projects with an economic return. As Chicago's relatively new Infrastructure Trust demonstrates, this model could also help the city or state tap into private funding sources. Chicago's Infrastructure Trust has so far raised $1.7 billion in funding from Citibank, JP Morgan and other banks, and as with the I-Bank, loans are to be repaid through revenue generating and cost savings opportunities. As we demonstrate in this report, New York has no shortage of such projects: Building retrofits at NYCHA and the city's libraries could generate significant energy savings, for example, while an expansion of fiber in the city's former manufacturing areas, where tech start-ups are often stymied by poor broadband service, would create a clear source of new revenue.

Bringing Down Infrastructure Costs

Authorize Design-Build and public-private partnerships

In 2011, at Governor Cuomo's initiative, the legislature authorized a handful of state agencies to pursue Design-Build contracts, but excluded municipalities. The law is set to expire at the end of 2014. Given the results to date, including the positive impact this approach had on the projected cost of replacing the Tappan Zee Bridge and in expediting the reconstruction of major upstate roads severely damaged by Hurricane Irene, the state should renew the legislation, but also expand its scope beyond horizontal infrastructure (such as roads and bridges), authorize both Design-Build and Design-Build-Operate-Maintain contracts and allow municipalities to participate. Streamlined procurement could reduce costs and shorten

delivery time frames. New York City's procurement process and the long-term quality of its infrastructure would be significantly improved.

Avoid "Low Bids" from unqualified contractors

Construction delays and cost overruns are often traced to inexperienced contractors who fail to live up to their "low bid." In 2009, Albany authorized cities to pre-qualify public works contractors based on credentials, experience and past performance, thus ensuring that selected contractors are capable of providing quality construction. While the DDC, HPD, DOT and DoITT have begun to implement pre-qualification lists for select contracts, thus far the emphasis has been on reducing the length of the procurement process. Moving forward, pre-qualification lists should be used for more complex projects with a focus on screening out unqualified candidates incapable of honoring their "low bid."

"Low bids" also become inflated when they underestimate the cost of relocating underground utilities for a project. To avoid these oversights, the State Legislature authorized "joint-bidding" in Lower Manhattan. This practice requires bidders to provide separate prices for municipal and private utility work, with the contract awarded to the lowest responsible bidder for the combined work. Utility companies, by separate agreement, reimburse the City for additional costs if the low bidder on the municipal work is not the same as the low bidder on the combined work. To avoid cost overruns and delays, these provisions should be extended to the rest of the city.

Reduce the time to design and approve construction contracts

As they develop new sources of funding, city and state officials should also take immediate steps to address the high cost of building. The cost of construction is extremely high across the board in New York City, but public projects are in a league of their own. They take much longer to complete and cost consistently more than similar work in the private sector. The city could start by reducing the time it takes to design and approve construction contracts, particularly for smaller projects and those with a history of on-time and on-budget construction. For any project over $25,000, agencies typically need approvals from the Office of Management and Budget, the City Comptroller, the Law Department, the Department of Finance and the Mayor's Office of Contract Services. This exhaustive process can last anywhere from 162 days to two years. Introducing procurement software that allows agencies to simultaneously, rather than sequentially, review proposals could expedite approval. The city's Environmental Quality Review process is another source of expensive delays that could be avoided if the city adopted time limits on reviews similar to those at the state level.

Renew Project Labor Agreements

The city should renew project labor agreements (PLAs), which are due to expire on June 30, 2014. These PLAs providelabor-cost certainty and exempt the city from the state's Wicks Law, a cumbersome and expensive regulation that requires agencies to issue separate contracts for plumbing, electric and HVAC on any construction project exceeding $3 million.

Repeal the Scaffold Law

Albany elected officials should repeal the nation's last remaining "Scaffold Law," which significantly inflates insurance costs compared to other states. The Scaffold Law holds builders responsible for "elevation related" injuries regardless of fault. Determining compensation based on comparative liability, as is done in most other states across the country, could save agencies like the School Construction Authority tens of millions of dollars in insurance premiums every year.

Improving Infrastructure Planning

Create a more effective capital planning process

With at least $34.2 billion in unfunded infrastructure needs, New York will have to make intelligent choices about which projects to fund and which can be delayed. To do that effectively, the de Blasio administration should invest in a more accurate and complete survey of the city's state of good repair needs and commit to funding future projects based on explicit and rigorous social and economic goals rather than historical precedent. It also should go beyond OMB and involve planning

and economic development agencies to a greater extent than has been the case. The administration might draw lessons from the MTA and Port Authority. The MTA has significantly reformed its asset management strategy in recent years, favoring component rather than full systems replacement and introducing sophisticated cost, risk, performance and resource analysis through the new Strategic Assets Lifecycle Value Optimization program. The Port Authority too has refined its capital planning using a "comprehensive planning process and risk-based prioritization that considered asset condition, operational and revenue impact, threat assessment, customer service, regional benefit, and regulatory or statutory requirements."

Establish a more accurate and thorough survey of the city's infrastructure assets and their state of good repair

Each year, the Office of Management and Budget (OMB) releases the Asset Information Management System (AIMS) report surveying city-owned buildings, parks, bridges and piers and detailing the investment needs of individual city assets. The inspections are incomplete and the report cursory. It excludes the city's water and sewer systems, public housing and East River bridges, among other things. It also overlooks handicap accessibility, asbestos abatement and modernization measures. Those assets that are surveyed are subject to only visual inspections, without any probing or specialized equipment.

High-quality capital planning depends on a high-quality assessment of conditions. This is especially important for smaller agencies, which cannot afford rigorous inspections by private consultants. Assessment data should be open to the public, allowing residents to track the city's progress toward state of good repair, identify funding gaps and recommend more effective capital investment management strategies.

Better align infrastructure investments with economic development goals

When individual agencies and authorities develop their capital plans they don't normally consider the city or state's broader economic development goals. The MTA's projected investment in a new train storage facility in Long Island City, for example, is based largely on the operational needs of the agency, not the development opportunities of the surrounding business district and neighborhood. Other cities and states have begun to invest in initiatives that better align these otherwise distinct spheres of deliberation and planning. The Oregon Business Plan initiative, for example, has led to strategic investments in bridges and transit infrastructure as a part of a broader plan to increase exports. Unlike a citywide capital plan or attempts to align capital plans across different agencies and authorities, this approach has the benefit of linking specific infrastructure projects with human capital investments to achieve important and measurable economic goals.

Take a census of underground utilities

In 2010, the MTA inspector general investigated cost overruns on the Second Avenue Subway and found that the discovery and rerouting of public utility lines drove up costs by more than $80 million and delayed the line's completion by at least six months. To prevent future confusion and construction delays, New York needs to take a citywide census of public utility lines. The technology to perform this survey is already available. Con Edison experimented with Ground Penetrating Radar (GPR) around the World Trade Center site and along 149th Street and Southern Boulevard in the Bronx, discovering old trolley tracks running along high-voltage transmission lines. Because the radar is expensive, there should be a central repository of images, allowing public and private entities to pool their findings to assemble a comprehensive map.

Developing Infrastructure Innovations

Expand the MTA's Small Business Mentoring Program

Beyond funding and track access, the greatest impediment to updating MTA's signal system is the dearth of qualified contractors. Only three to four contractors are qualified to install and modernize signals. This limits competition, increases expenses and caps the amount of signal replacement that can be performed at any one time. To address this, the MTA recently began a small business mentoring program for training contractors. It should expand this program.

Invest in real-time bridge sensor technologies

Every year, New York City bridges are thoroughly inspected and assessed. Their condition ratings alert the city Department of Transportation to the most distressed bridges, helping them prioritize capital and maintenance needs for the coming years. While these inspections are known for their rigor, they are also time-consuming, expensive and inherently limited, relying on visual inspections that often identify problems only after internal cracking has occurred and rebar corrosion has begun. Oregon is piloting a real-time bridge sensor program. The sensors monitor temperature and moisture, collect chloride concentrations at multiple depths within the concrete and assess corrosion. New York's city and state departments of transportation should invest in these technologies as well.

Lease space on city street lights, traffic signals and pay phones for telecom company cell sites

New Yorkers in every borough are hampered by patchy cell service and slow mobile broadband. In the city's dense neighborhoods, signals often are blocked by buildings, water and reflective glass. To circumvent these physical barriers, telecom companies are shifting to "small cell technology," opting for cell sites close to street level rather than macro towers on top of buildings. Companies like Verizon are considering all available locations, including payphones, streetlights and traffic lights. The city should rent these spaces to telecom providers, tapping into a new source of income while improving cell service. The new revenue source could be dedicated to the Economic Development Corp.'s ConnectNYC program, which provides fiber internet connectivity in commercial districts.

Reassign agency tech engineers to DoITT

In October 2010, Mayor Bloomberg issued Executive Order 140, a plan to consolidate the city's outmoded and fractured IT systems. The Department of Information Technology and Telecommunications (DoITT) would assume control of data storage, application hosting, procurement and technology policy. Thus far, progress has been slow. City agencies have been reluctant to relinquish control over their tech operations, foregoing efficiency gains from centralized procurement and storage. To expedite this process, technical employees responsible for infrastructure in individual agencies should be reassigned to DoITT. There they would work on modernizing and integrating the city's old and fragile information technology systems. Such an ambitious effort to overhaul tech infrastructure could attract young engineers to replace those currently maintaining legacy systems who are nearing retirement.

These were the recommendations in Caution Ahead. Click here to read the full report (PDF).

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