A BOLD DIRECTION for LEADING TRANSPORTATION in THE NEXT 100 YEARS
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Letter from Governor Cuomo

This Commission needs to fundamentally reframe our subway system to meet these needs and expectations.

In the last three years the MTA has taken many steps to improve its service and respond to safety concerns, and we have committed an extra $3.5 billion to overhaul the system after Superstorm Sandy. Maintaining the system is a task of good repair continues to be a top priority, which is why since I took office the State has provided unprecedented financial support to the Authority, investing more than $15.2 billion through the budget and dedicated funding.

The next step is a broader examination of the MTA’s challenges and goals for the next century that will give New Yorkers a modern transit network that is prepared for the threat of extreme weather and provides a new and better experience for riders. Despite the scope of the challenges we face, I believe this is a real opportunity to build a new New York State MTA that will be an example for the nation and the world.

Sincerely,

Governor Andrew M. Cuomo
MTA Transportation Reinvention Commission

REPORT / NOVEMBER 2014

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Letter from Governor Cuomo

This Commission needs to fundamentally reengineer our subway system to meet these needs and expectations.

In the last three years the MTA has taken many steps to improve its service and respond to safety concerns, and we have committed an extra $3 billion to overhaul the system after Superstorm Sandy. Maintaining the system in a state of good repair continues to be a top priority, which is why since I took office the State has provided substantial financial support to the Authority, investing more than $15 billion through the budget and dedicated funding.

The next step is a broader examination of the MTA’s challenges and goals for the next century that will give New Yorkers a more reliable subway network that is prepared for the extreme weather patterns and provides a new and better experience for riders. Despite the scope of the challenges we face, I believe this is a real opportunity to build a new New York State MTA that will be an example for the nation and the world.

Signed:

Governor Andrew M. Cuomo

MTA Transportation Reinvestment Commission Report
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Transmittal Letter from the Co-Chairs

Dear Chairman Prendergast:

The future of this great region is tied to the MTA’s ability to continue to deliver a fully functioning, resilient, world-class regional mass transit system. This system and its recent successes are in jeopardy unless the MTA reimagines itself and those who benefit from this regional asset invest more in this reinvented MTA. Over the past century, the MTA system has been a catalyst for the economic growth that has made New York the center of the regional, national, and global economy. The sheer volume of MTA services – which carry 70 percent of all subway riders in the United States, 40 percent of all commuter rail trips, 20 percent of all bus riders, and have nearly as many stations as all other systems in the country combined – illustrates MTA’s leadership role in moving people and driving economic growth.1

New York’s economic well-being is inextricably linked to the MTA’s ability to continue to deliver a fully functioning, resilient, world-class regional mass transit system. Its rise to preeminence as one of a handful of true global cities—with very few peers outside of London, Hong Kong and Tokyo—was made possible by the MTA and its predecessor agencies. It is headquarters for a large and significant concentration of multinational corporations. It is a dominant international, financial, trade, technology and media center. And it is an epicenter of ideas, economics, culture, and politics. The New York region’s growth and its economic prosperity was not inevitable but is attributable—in large part—to the decisions that generations of political, business and civic leaders have made to build and then revive a world-class transportation system. That same vision and bold decision-making is needed now.

Stakeholders in the region, including Federal, State, regional, and city governments, road users, riders, businesses, developers, and the public, must seize the opportunity and make the investments necessary to enable the MTA to carry the region into its next century of prosperity. The MTA must evolve to reflect the changing needs of the region and characteristics of a world-class institution, including growing population, shifting travel patterns and needs, and stresses from unforeseen emergency events, particularly extreme weather. Through this report, the Commission has provided a range of strategies and actions to help meet the challenges the transportation system will face over the next 100 years. These strategies and actions are presented with particular attention to strengthening the system’s resiliency to ensure that it can withstand whatever stresses it confronts. The region’s stakeholders can choose to implement some or all of these strategies and investments, which in turn will determine what sort of transportation system the region will have in the future. The region’s peers around the world, when faced with these same issues, have chosen to invest aggressively in transit, seeing it as the path to their most prosperous futures.

Over the next 100 years, the New York region will face challenges that will test its transportation system. Paramount among these will be more frequent extreme weather events like Superstorm Sandy, significant population growth and demographic shifts, changing travel patterns, the evolution of the 24/7 economy, customer demand for more and higher quality service, as well as growing expectations for greater connectivity and real-time passenger information. Understanding these challenges and how they can be met will allow MTA to be proactive in leading change, instead of reactive to internal and external forces.

1 Based on 2019 National Transit Database data of passenger trips for national systems with common modes.
At the urging of Governor Andrew Cuomo, the MTA Transportation Reinvention Commission was empanelled to assess these challenges and we have worked collaboratively to craft a menu of bold actions to address them. Our recommendations call for the MTA to:

- Commit to reengineering how it does business to create a more efficient, integrated, transparent, and accountable MTA—one that gets the right work done, and does it faster and cheaper.
- Accelerate and sustain core infrastructure investments to optimize reliability, expand capacity and maximize resiliency.
- Deliver a high quality customer experience consistent with and reflecting New York’s stature as a world-class city.
- Make the critical investments necessary to accommodate ridership growth and to serve existing and emerging centers underserved by the existing system.
- Reach out to and actively engage the wide range of stakeholders who benefit from this robust transit system, both directly and indirectly, to seek their help and support.

This report responds to the Governor’s charge that the Commission consider the challenges facing the MTA over the next century and develops recommended strategies to address those challenges to ensure the success of MTA—and the region. A goal of this report is to identify and explore the key challenges facing the region and outline a strategic vision for the MTA through a number of actionable recommendations. It is the hope of the Commission that these recommendations will inform the dialogue that the MTA will have with its various stakeholders in coming months about the content and size of the MTA’s next Capital Program. The report is seeded with relevant national and international examples of how these strategies have been implemented successfully by New York’s competitors on the world scene, particularly funding and financing approaches for implementing the vision and actions outlined in this report.

By adopting an ambitious vision for the future of transit and working collaboratively with City, State, and regional leaders to achieve it, the MTA can continue to fulfill its central role in sustaining the region’s economic competitiveness and enhancing the quality of life of all its citizens.

We look forward to working with and supporting you as you take the next steps to keep New York moving.

Sincerely,

Ray LaHood, Co-Chair  
Jane Garvey, Co-Chair
Commission Members

Co-Chairs
Ray LaHood, Former Secretary, US Department of Transportation
Jane Garvey, Former Administrator, Federal Aviation Administration

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Robert D. Yaro, President, Regional Plan Association

MTA Transportation Reinvention Commission Report
Executive Summary

The Challenge and Opportunity

In many ways, the history of the success of the region over the last 100 years is the history of its subway, bus and commuter rail systems, which have been one of its great economic drivers. In particular, the past thirty years of dramatic growth and vitality of the New York region was not inevitable. It was based on bold decisions to invest in order to secure that future. The development of the region followed the construction of the transit infrastructure and the region’s recent renaissance has depended on reinvestments in the reliability of that system.

Today, the New York metropolitan region accounts for 60 percent of the population of the State and 80 percent of its tax base, and contributes nearly 10 percent of the nation’s Gross Domestic Product. Yet despite the value of the system that enables this success, even a cursory glance at peer regions around the world makes it clear that New York is significantly under-investing in its public transportation infrastructure. The past is not prologue to the future: if New Yorkers want to continue to live in a world class region they must envision and develop a world class transit system. That means reinventing the MTA as guided by the strategies in this report and aggressively investing in that reinvention. That is the path to New York’s future prosperity.

The MTA Transportation Reinvention Commission is a broad-ranging 24-member group of international, national and regional experts representing diverse viewpoints, co-chaired by former United States Transportation Secretary Ray LaHood and former Federal Aviation Administrator Jane Garvey. The Commission was convened this summer upon the recommendation of Governor Andrew Cuomo. Governor Cuomo called upon the MTA to create the Commission to help it develop a plan for its future that prepares it to face the challenges of a changing world, a changing state, a changing region and a changing climate.

This report outlines the strategies and actions the MTA should take to ensure a prosperous future. It includes an in depth focus on successful national and international examples of recommended strategies, particularly examples of funding and financing approaches for implementing the vision and actions outlined in this report.

While no one can predict all of the challenges the MTA will face over the next 100 years, in order to continue to drive the region’s economy, the MTA must reinvent itself to tackle two distinct external forces that are reshaping the region’s landscape at a pace more rapid than ever before. An emphasis on resiliency - the MTA’s ability to withstand shock and stresses while maintaining its essential functions - will be critical to addressing these two forces.

The first force - climate change - was made powerfully clear by Superstorm Sandy, which was seen in real-time coverage around the world. The approximately $5 billion of unprecedented damage wrought by Sandy drove home as never before the unique vulnerabilities of a coastal transportation system in an era of extreme weather events. This event also brought into sharp focus—to the people who live here and to local, state and national leaders—that New York’s public transport system is vital not just to the regional economy, but to the nation’s economic well-being as well, and that both were significantly impacted when the region shut down.

The second force is more subtle, yet equally far-reaching in its impact. Changes in population, demographics (the growth in Millennials and the aging of Baby Boomers) and the consequent shifts in ridership all threaten to swamp America’s largest transit system and stall the economic growth and quality of life for the region. This force is underscored by the MTA’s recent record ridership, changing
travel patterns, 24/7/365 customer expectations, and the prospect of up to two million additional people projected to live in the greater New York region by 2040.

The Commission has identified seven strategies fundamental to creating a resilient system that can meet the challenges of the next century. The change in existing weather patterns is leading to higher and more volatile temperatures, rising sea levels, and increasing severe precipitation. The changes in these day-to-day conditions, along with heightened frequency of extreme weather events, puts the New York regional economy, its assets, residents, and visitors at risk. We must develop resilient systems that can quickly respond to, and rebound more effectively from these extreme weather events and other emergencies. The seven strategies outlined in this report are essential to achieving that goal.

By implementing these strategies, the MTA will reinvent itself into a more resilient system as defined by these critical characteristics:

- **Spare capacity and redundancy**, which will ensure that when the MTA system is under stress, from sudden or severe weather events for instance, there are adequate and effective back-ups, alternatives, or reserves to respond;

- **Flexibility and responsiveness**, which will allow the MTA to readily adopt alternative approaches in response to changing conditions, particularly during emergencies;

- **Managing for safe failure**, which will ensure that emergencies do not take down the whole system and that service disruptions are minimized; and

- **Recovering quickly from emergencies and evolving over time**, which will allow MTA to thrive, not just survive major disruptions.

The recommendations of the Commission reflect the breadth and complexity of creating a resilient system, with some aimed at MTA’s physical infrastructure, some designed to improve the quality and availability of information – both for planning and in times of crisis– and still others directed towards the policy and regulatory reforms needed to encourage and empower institutions to act in ways that reduce vulnerability.

Finally, MTA’s resiliency is founded on its ability to mobilize assets, including financial, physical, regional, organizational, technological, information and human resources, in flexible ways to find new solutions as conditions change. The strategies of the Commission are designed to help the MTA do so.

The Commission has developed seven key strategies and a broad range of implementing actions that reflect their vision for how the MTA can reinvent itself into a more resilient system to best meet its challenges with the highest standards of customer service, safety and reliability. These strategies and actions reflect a number of choices that the MTA, the Governor, the State Legislature, the City, the federal government and indeed all stakeholders in the system should consider. These strategies are not ordered by priority; they interrelate and all are important elements of an MTA reinvention. The implementation actions provided for each strategy are the priorities identified from many more actions considered by the Commission. The seventh strategy, which addresses funding, draws on national and international approaches for funding transportation infrastructure.

Actions are divided into short-, medium-, long-term, and ongoing, recognizing that the tasks are substantial and continuous, and sustained improvement will be essential. The strategies, described below, include:

1. **The MTA must reengineer its way of doing business by creating a “new MTA,” that gets the right work done faster and cheaper and that is more efficient, transparent, and accountable to the public.** This will allow the MTA to accelerate the resiliency investments recommended in this report and to expedite recovery from emergencies. The MTA currently employs

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innovative project delivery methods such as Design-Build and it should continue to look for opportunities to expand the use of these tools across a multitude of projects. These options, while not a panacea, provide the opportunity to transfer risk and optimize the expertise of the private sector to expedite project implementation and reduce costs. The MTA must immediately empower and deploy an Innovative Delivery Unit to reform project delivery by reengineering procurement, contract provisions and project execution to be best in class; and to identify opportunities to use more alternative delivery and non-traditional project, financial, and organizational structures. Every project must be evaluated to identify the most cost-effective delivery option, such as alternative delivery methods and other risk sharing mechanisms where appropriate. The Unit should apply these reforms to early action proof of concept projects. This Unit must coordinate among internal delivery partners and work with regional partners to overcome cross jurisdictional and regulatory delays as well as statutory and regulatory impediments to necessary reforms. These reforms will enable the MTA to more effectively manage its system, deliver service and enhance the trust of its riders and stakeholders, particularly during times of emergency. They will also allow MTA to attain a position on a global stage as the “Public Partner of Choice.” MTA must review and update its work practices and internal processes; preserve and secure internal capability through workforce development programs and use such programs to foster a customer-centric culture, and bring its human resources and business processes to world-class standards. Partnering with local firms and universities and transforming data and information sharing by making MTA information more accessible to third party developers and more timely, accurate, and customer-friendly will unlock efficiencies in the way the agency does business.

2. The MTA must accelerate core capital investment in good repair and sustain investment in the future to maximize the system’s safety, reliability and resiliency. Indeed the federal government has made investments in core infrastructure an imperative as well. The MTA can achieve this by building a substantially more aggressive and sustained core capital investment program. As investments are made, they must reinforce the importance of dealing with extreme weather events using improved design and resiliency standards to ensure that the region is prepared for those events over the next 100 years. While the prior five-year capital program investments have largely lifted the MTA from its nadir in the 1970s and ’80s to a much higher standard of safe and reliable service, much more remains to be done. Depreciation of the MTA’s nearly trillion dollar asset base is far outpacing investment in maintaining its core infrastructure, putting MTA at best on a path of continual catch-up struggling to balance between critical maintenance needs and meeting demand for more service. Accelerating core infrastructure investment and providing for sustained investment should be the foundation of an ongoing and resilient capital program. This objective will require the commitment of all stakeholders to ensure that funding and investment priorities do not deviate from this fundamental objective.

3. The MTA must create a 21st-century customer experience for all riders, by implementing the responsiveness and ease of access characteristic of a resilient system. This starts with a customer charter that will form the backbone of the MTA’s commitment to its customers, focusing on their basic needs for safety, security, communications, connectivity, accessibility and resiliency throughout the system. Through such a charter, the MTA can begin to develop an accelerated action plan for immediate, tangible improvements to stations. Well-maintained, information-rich, accessible, safe and secure stations as well as reliable, frequent and easy to use services are fundamental to a resilient system and the quality of life New Yorkers, as residents of a world class city, should expect. The shifting needs of a diverse ridership base, including both Millennials and Baby Boomers, combined with the ubiquity of technology – including engaging more efficiently with customers through instant feedback – present an opportunity for the MTA to usher in a new era of quality service and responsiveness. Meeting such a standard will require systematically identifying and promoting future technological and digital data enhancements through a new Office of Technological Opportunity; implementing technological solutions to climate events; advancing a universal fare payment system compatible with other systems in the region; and increasing ADA\(^3\) accessibility throughout the

\(^3\) ADA refers to American Disabilities Act.
system. Improvements that will enhance the customer experience, such as temperature control and platform doors, should be pursued.

4. The MTA must aggressively expand the capacity of the existing system both to alleviate constraints and to meet the needs of growing ridership, thereby providing greater redundancy and limiting service disruptions, which are key to resilient service. Target expansion investments to growth areas throughout the region that tax the existing system to create reserves in emergencies and ensure the region leverages that investment to maximize economic development. More capacity is essential in order to continue to accommodate the extraordinarily large Central Business District (CBD) bound market, projected ridership growth and to maximize system resiliency and service flexibility. The region’s success in weathering emergencies, and continuing economic growth and prosperity depends on investing in and developing additional capacity and providing for new and flexible types of services. This will involve working with other regional rail providers (such as Amtrak and the Port Authority) to increase overall system capacity. The MTA must also prioritize capital investments to address significant CBD-bound growth (like the far west side); and identify locations where other types of transit (light rail transit, bus rapid transit) or partnerships (ferries) can alleviate capacity constraints on existing lines. These improvements must not only eliminate single points of failure but also provide seamless connections throughout the region’s transportation network. Making investments to increase core capacity through Communications-Based Train Control, expanding track capacity, and leveraging available off-peak commuter rail line capacity will increase the MTA’s ability to effectively serve the region’s growing populations that rely on the core system and to respond better in emergencies.

5. The MTA must make investments designed to serve existing and emerging population and employment centers not well served by the existing system in order to ensure service alternatives and flexibility characteristic of a resilient system. This includes investing in circumferential transit, reverse peak, through running service, and non-rail modes. These new services are essential to make best use of the existing network, especially for the population that isn’t necessarily travelling to and from the Manhattan CBD every day. The MTA, in partnership with the City, should implement a true, dedicated bus rapid transit route within the next three years. The dramatic growth of inter- and intra-borough trips, suburb-to-suburb, state-to-state, and reverse commutes, and the emergence of employment centers in new locations are straining a system originally designed for trips to and from the Manhattan CBD. Experimenting with creative and bold surface rapid transit concepts such as bus rapid transit or light rail transit, exploring international examples of agencies that have leveraged existing rail lines and unused right-of-ways to add new rail services, implementing run-through service between different regional systems, improving bus routes by standardizing Select Bus Service features, forming results-oriented partnerships with private on-demand/shared car services, better leveraging water-borne transit, and supporting the expansion of airport access should be the hallmarks of MTA’s resilient service vision for the future.

6. To drive the region’s economic growth and maximize its capacity to respond to and recover rapidly from emergencies now and into the future, the MTA must forge the partnerships that will (1) bring together economic development and planning partners, as well as the private sector; and (2) establish more collaborative working relationships with other transit agencies. In partnership with the appropriate regional players, over the next three years the MTA should implement a showcase project in each of its service territories that ties an improvement in transportation to local economic development plans, ensuring that growth areas have access to transit, particularly during emergencies. The Commission recommends reforms that will seamlessly knit all of the MTA agencies into a more unified and cohesive whole. This MTA, as one of the few agencies with a regional view, must then work with its partners to strengthen regional coordination, eliminate institutional silos, identify growth areas, increase transit-oriented development (TOD) and determine transportation priorities, essential to evolving regional resiliency plans. The MTA needs to foster a decision-making culture that is regional in focus. Fully linking transportation

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4 Select Bus Service is the brand used by New York City Transit to describe bus rapid transit-like services in New York City. It has been implemented along busy limited-stop corridors, often with a dedicated lane and a proof-of-payment fare system.
EXECUTIVE SUMMARY

investments to the region’s goals for economic growth ensures that those investments deliver their optimal value, both by implementing the transportation needed to support the planned growth and by creating a value-added revenue stream to fund them. A baseline regional plan, co-locating staff across the MTA and partner agencies, working closely with the Governor’s regional economic development councils (REDCs), integrated regional data sharing and more frequent review of interagency operating agreements are also important elements to delivering these ambitious but essential recommendations.

7. All those who benefit from the region’s robust transit system must invest more revenue if the system is to become a resilient, world-class operation, even as MTA delivers significant efficiencies and generates more creative revenues. There are many different groups who benefit from the MTA’s service — Federal, State, regional, and city governmental partners, riders, road users, businesses, property owners, developers, and the public. All should contribute to supporting the MTA system. There are many examples of successful funding strategies both nationally and internationally. These can be considered as potential funding sources as the region makes its investment choices.

A Call to Action

The Commission recognizes that this report is only the first step in a long journey. The hard work of choosing amongst these strategies, and developing the institutional and financial underpinnings crucial to their success, begins now. An ongoing and durable commitment to relentless improvement by the MTA has to be paired with the political and financial support that will make it possible.

The beneficiaries of New York’s prosperous future promised by these investments have a choice to make as they read this report as to which investments they are ready to embrace and willing to pay for. Those strategic decisions will determine the extent to which MTA will be able to serve the future needs of the region and overcome the challenges to come. As other world class cities face those choices, they have decided that sound, resilient transit infrastructure reinforces their prosperity. Hopefully, the New York region will do the same.

When the system opened 110 years ago, it underscored the value of investing in the region’s transportation system for a better tomorrow—and this investment was made at considerable cost, through much more difficult economic times than we are experiencing today. Now it’s our turn to pay it forward, to do the same for our children and the generations to follow. The members of the MTA Transportation Reinvention Commission accept this challenge, and urge you to do the same.
Introduction

As the largest public transportation network in the nation, the MTA system not only drives the regional economy, it is also vital to the nation’s economy. It serves the over 15 million people who live, work and do business in the 5,000-square-mile area fanning out from New York City through Long Island, southeastern New York State, and Connecticut.

When New York’s first subway opened to the public on October 27, 1904, it was an innovative marvel. Thousands of people lined up at stations across the city to witness a mass transit advancement that for years had been dismissed as merely a dream. The way that the public and private sectors came together to invest in the system was the impetus for much of the development around the region as we know it today. The development of New York’s five boroughs and the economic reach of the region would not have occurred without the transit system. It is the region’s most powerful economic tool.

No other transportation system in the world has the breadth of the MTA. It has 738 stations, across two states and twelve counties with 529 in New York City alone. The diversity of service types it offers, from commuter rail to urban bus and subway, with both express and local service, is unparalleled in the world. No other system in the United States serves as many people—roughly one in sixteen Americans. The people who work and live in New York—and those who own and operate businesses here—rely on it 24 hours per day, 7 days per week and 365 days per year. It is the City’s great equalizer, a truly democratic shared space. It is a critical regional asset that yields dividends to every person who lives here and every company and corporation, large and small, that conducts business here. It is the region’s most powerful social tool.

Clearly, those that use the system benefit directly, but so do many others. Motorists, businesses large and small, property developers, land owners in the region, and citizens of New York State and the nation all benefit from New York’s prosperity and success. Today, the New York metropolitan region accounts for 60 percent of the population of the State and 80 percent of its tax base, and contributes nearly 10 percent to the nation’s Gross Domestic Product. And MTA has enabled that success; every dollar invested in the MTA system is a dollar invested in the health of the economy.

The MTA provides other economic benefits as well. Its capital program creates jobs throughout New York State and the nation. Much of its rail rolling stock rehabilitation and new rail vehicle assembly has taken place in Upstate communities such as Elmira, Plattsburgh and Hornell, providing thousands of jobs in these areas as an example. MTA’s investments also yield environmental benefits, creating a healthier, more livable and inclusive region and advancing New York’s stature as a world-class city.

Continued and sustained investment is vital to building critically needed capacity projects that will meet the needs of a rapidly growing and shifting

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<th>MTA’s Vast Reach</th>
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<td>Seventy-one percent of New York City’s population lives within 1/2 mile of a subway station and 97 percent within a 1/4 mile of a bus stop. For commuter rail, 73 percent of the suburban population in Long Island Rail Road’s service area lives within 2 miles of a station, while 51 percent of the suburban population in the Metro North service area lives within 2 miles of a station.</td>
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<td>Data Sources: Caliper, US Census 2010, MTA</td>
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A Bold Vision for Transforming the MTA in the Next 100 Years

Vision: The MTA will provide a world class resilient 21st century metropolitan transportation system for a world class region.

A world class resilient 21st century system will reliably, comfortably and seamlessly take customers where they want to go. It is accessible, provides customers with service information when and where they need it. It is resilient to extreme weather events and meets the needs of ever growing ridership.

The region will never have this world class resilient system or be able to maintain its world class status unless the MTA re-invents itself and its many beneficiaries invest dramatically in this re-invention.

Strategy: To re-invent itself into this world class resilient system, the MTA must:

- Re-engineer its way of doing business by creating “a new MTA,” that is more efficient, transparent, and accountable to the public and that gets the right work done faster and cheaper.
- Accelerate core capital investment in good repair and sustain investment in the future to maximize safety, reliability, and resiliency.
- Create a 21st century customer experience for all riders.
- Aggressively expand the capacity of the existing system both to alleviate constraints and to meet the needs of growing ridership.
- Make investments designed to serve existing and emerging population and employment centers not well served by the existing system.
- Lead the way with local, state, and federal economic development and planning partners, as well the private sector to maximize the power of the transit system to drive the region’s economic growth and resiliency; and establish more collaborative working relationships with other transit agencies to better integrate regional transit operations.
- Receive more revenue from all who benefit in order to become a world-class resilient operation, even as MTA delivers significant efficiencies and generates more creative revenues.

demographic and economic base. The MTA must continue to evolve, both as an organization and as a system, to meet the needs and ambitions of the region by providing 21st century service, ensuring customer comfort, and creating and maintaining assets that are resilient to a range of challenges facing the region.

The MTA Capital Program has been and must continue to be a crucial element for turning that vision into a reality. Since the advent of the Capital Program in the 1980s, the MTA has fundamentally transformed the transit system, making investments that took the system from one that was graffiti-scarred, unreliable, unsafe and avoided by many, to today’s system that is widely used and breaking decades old ridership records. The Capital Program has renewed the rail and bus fleet, rebuilt track, improved stations, and invested in the core system to restore reliability and create the foundation for the region’s economic renaissance. Since the Capital Program began:

- System ridership has nearly doubled.
- Mean distance between failures has increased twentyfold on the subway, tenfold on Long Island Rail Road and fivefold on Metro-North Railroad.
- Subway delays have been reduced by 94 percent.
- MTA’s bus fleet is now 100 percent accessible.
- A safer environment has been created and serious crime has fallen dramatically.

Over the next 100 years, MTA must reinvent itself and its system by leveraging this strong history of success. It must challenge itself and the region to rethink how transit service is provided and how it is funded—and it must drive growth and change. Its goal must be to provide high quality service to the millions of people who rely on it daily. In order for New York to succeed and remain competitive in a rapidly evolving global economy it must invest in this future vision.

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5 http://www.mta.info/news-subway-ridership-l-r-g-b-d-4-7/2014/03/24/2013-ridership-reaches-65-year-high
A bold vision is required. This report outlines a large-scale strategic vision for the agency, the external challenges it faces, and the steps it can take to overcome these challenges and advance this vision. The region has changed in unprecedented ways over the past century and will continue to transform in the next hundred years. Hence, this is a strategic and policy-oriented document that presents a range of choices for the MTA and its national, state, and regional partners, as well as all other stakeholders to consider in addressing these future challenges.

Challenges

The MTA has had to address a number of significant challenges at the start of the 21st century:

- **Climate change.** Superstorm Sandy manifested the real and present threat of extreme weather events and exposed critical shortcomings in the capability of the MTA network to withstand these events that are likely to recur more frequently in the future. The MTA system is an essential public facility that, as Sandy illustrated, is the region’s lifeline. It is critical to ensuring that the New York metropolitan economy—and by extension, the national economy—functions. In the aftermath of Superstorm Sandy, MTA immediately made it a high priority to identify the investments and strategies necessary to protect the system and ensure its resiliency to the effects of extreme weather events as well as other events that might threaten the system in the future.

    The risks of projected climate change to the MTA system are profound and severe. Increased flooding could damage assets throughout the system, as parts of the region served by the MTA lie within FEMA’s 100-year coastal flood zone. Flooding not only affects low-lying subway tunnels, rail and bus storage yards, and maintenance facilities, but also leads to flooded roadways and increased congestion, compromising the ability of personnel to access and protect valuable assets within the system. The corrosive effects of seawater on MTA’s complex infrastructure are devastating, requiring extensive rehabilitation work over many years with ongoing impacts on service.

    Flooding is not the only climate change risk to the system. Extreme temperatures, particularly rising temperatures in the summer months, can stress the MTA system. At higher temperatures, expansion joints on bridges and highways are stressed, and instances of rail track stresses and track buckling increases. Already hot underground subway platforms and stations could become even hotter. The MTA has made resiliency a key priority in its planning and investment strategies, and the Commission’s recommendations affirm the need to continue to shape future investments through this lens. These recommendations will call on the MTA to increase capacity and redundancy, be flexible and responsive during events, isolate failures to limit their impact on the system, quickly recover service, and effectively mobilize assets around the region to respond to challenges.

- **Population growth, record ridership and demographic change.** The MTA system has reached record ridership levels, carrying two-thirds of the nation’s rail riders, more than 802 million annual bus trips and 1.7 billion subway trips. More than two million more people are expected to live in the region by 2040, putting increasing pressure on a system that is already at capacity on many of its existing lines. Along with that growth, the MTA also needs to adapt to fundamental demographic shifts and changing travel patterns. At opposite ends of the demographic spectrum, Millennials (those born between 1980 and 1991) and Baby Boomers (those born between 1946 and 1964) each have new and evolving expectations, service needs and accessibility requirements that the current system is simply not fully equipped to meet. Amenities and services that were once regarded as luxuries—like reliable real-time information and access to transit throughout the region—are the new norm that riders demand from transit services around the world and expect from the MTA.

    As the type of riders using the system is changing, so are the economy and land use patterns. New centers of employment throughout the region are joining the traditional Manhattan Central Business Districts, Lower and Midtown Manhattan, as major destinations for the MTA’s riders. The demand for off-peak travel is nearly as high as the demand for peak travel, leading to...

crowded trains all day long, on the weekends and even late at night. These changing travel patterns are fundamentally altering the premise underlying where, when and how MTA provides service to its customers.

As ridership surges and the traditional rider profile and travel patterns shift, MTA’s challenge will be its ability to safely and reliably serve and meet customer needs. Increasing demand for non-peak, 24/7 travel leaves MTA with less time in which it can perform maintenance and repairs without causing significant customer inconvenience. The predominantly hub and spoke network of rail lines designed decades ago to move customers into and out of the traditional Manhattan Central Business District is no longer sufficient to meet demand. These changes shaped the Commission’s recommendations for how to meet capacity and offer a quality customer experience in the future.

- Institutional barriers. Internal and external institutional and jurisdictional barriers, a legacy of how the system has evolved over the last century, have led to redundancies and disconnects that impede the MTA’s ability to deliver projects and service as efficiently as possible. Lack of full integration within the MTA is simply inefficient and ineffective. And the region’s complex and multi-faceted jurisdictional arrangements make it challenging not just to establish regional priorities but to collaborate on them as well. The MTA must have a seat at the table in land use and economic development planning and decision-making in order for regional developments to be successful.

As many have said, “customers don’t care whether they’re using the service of one agency or another,” riders want to travel between their origin and destination as efficiently and effectively as possible. The Commission’s recommendations recognize that breaking down institutional and jurisdictional barriers is critical for increasing the effectiveness and geographic reach of the MTA’s capital plan, realizing efficiencies, and improving operations and service.

- Retrofitting the MTA system to incorporate technological innovation. Technological innovation has grown exponentially in the past 20 years and the pace of change is accelerating. This has dramatically altered MTA customers’ expectations about service provision, leading to demands for access to real-time information across a variety of devices and connectivity to facilitate better decision-making about travel and ease of interaction with their devices while using the system.

Equally important is the availability of technology that can help MTA not only increase capacity but also better manage its business, assets and operations. Just as technology can help customers make better decisions about travel, new tools at the system level will help the Agency make and implement better strategic and investment decisions about system performance that may save time and money. The challenge facing the MTA is to systematically develop and introduce these new tools, both at the customer and business levels, while not falling behind the pace at which these tools are changing. Failure to implement new technologies, or to remain behind in deploying them, will reduce the Agency’s ability to provide effective and reliable service at the standard that customers expect of a world class system. Many Commission recommendations address this challenge.

These challenges are discussed in greater detail in the Appendix. Tackling these challenges depends on MTA building and maintaining a more resilient system, one that is sufficiently safeguarded from the shock and stresses of unforeseen events so that it can continue to provide basic service to all of its customers. This objective is complex, and requires more than just hardening of physical equipment to protect the system. It will require the coordination of regional partner agencies, the use of information technology and planning resources, and strategic decision-making to create and implement quick.
acting and effective recovery plans. The characteristics of a resilient system include:

- **Spare capacity or redundancy**, which provides adequate and effective back-ups, alternatives, and reserves to respond to situations like extreme weather events, security threats, and unforeseen failures in the system. This means expanding capacity and creating redundancies across multiple modes, eliminating single points of failure in the system and providing alternatives for customers and response personnel during emergencies.

- **Flexibility and responsiveness**, which allow MTA to be nimble to changing needs and adopt alternative approaches for responding to challenges. This means creating systems that allow MTA to communicate with partner agencies and customers quickly and effectively, investing in more flexible transportation alternatives and utilizing alternate systems and modes to ensure the network’s resiliency during times of stress.

- **Managing for safe failure**, which ensures that even in the most stressful scenarios, the entire system does not go down, and failures are contained and limited. This requires that the MTA have plans and alternatives to identify and mitigate instances of failure. This means understanding where failure might happen in the system, planning for quicker, targeted, and more effective response and making investments to overcome these potential failure points.

- **Recovering quickly from emergencies and evolving over time**, which requires MTA to have robust transportation alternatives for customers and operating procedures for how to quickly recover from unforeseen shocks and stresses in the region. This means ongoing planning and decision-making with regional partners to best utilize resources to help everyone bounce back from stresses quicker.

Creating a world class resilient system requires mobilizing assets, including financial, physical, regional, organizational, technological, information, and human resources. These assets must all be brought to bear to accomplish this goal. This means making investments and decisions that will continually make the system more resilient and building strong partnerships across public and private sectors in the region to implement these strategies.

In light of these challenges, on May 7, 2014, Governor Andrew Cuomo requested that the MTA empanel a Transportation Reinvention Commission to examine its existing network and develop a plan to address the challenges it will face over the next 100 years. To that end, the MTA selected a panel of 24 international, national, and regional experts, led by two nationally prominent co-chairs. Although diverse in background—spanning academia, business, the not-for-profit community, transit agency management, advocacy, and engineering—Commission members were united in their commitment to proactively rethink how the MTA can best serve its customers and fulfill its mission.

**Approach**

The Transportation Reinvention Commission, under the leadership of its co-chairs—Ray LaHood, former United States Secretary of the Department of Transportation, and Jane Garvey, former Administrator of the Federal Aviation Administration—led the Commission to fulfill this mission through five subcommittees:

- Operating and Maintaining the Existing System
- Meeting and Exceeding Customer Needs
- Spurring the Continued Growth of the New York Economy
- Expediting Processes, Procedures, and Project Delivery of Capital Infrastructure
- Funding Investments into the Future

In addition to the many working sessions of the Commission and the subcommittees, this effort was also informed by significant public input.

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Feedback was garnered both in person and on-line and consisted of the following elements:

- Three public sessions featuring over 25 invited speakers representing regional and city agencies, the regional business community, and regional transportation advocates.
- Three sessions held exclusively for the Commission to hear the perspectives of the general public.
- Additional feedback was gathered via social media, including MTA's website, conversations over Facebook and Twitter, and opinions and ideas collected via online surveys.

A review of relevant literature and MTA studies, as well as front line perspectives from MTA staff were also key inputs to this report. Illustrative examples of successful national and international actions similar to those recommended by the Commission populate the report and specifically inform the finance strategy.
Recommendations

Overcoming the challenges facing the MTA requires a bold vision for change and a targeted and sustained effort to implement it. To help MTA meet these challenges, the Commission has developed a *Bold Direction for Leading Transportation in the Next 100 Years*, as articulated in the Introduction. Supporting the seven strategies we are recommending is a menu of actions that can be undertaken over three time periods: 0–5 years, 5–10 years, and more than 10 years. Each strategy and supporting action is outlined on the following pages. Options for the funding strategy were gleaned from national and international entities.

**Legend:**
- **Short-term:** Implement recommendation within 0 to 5 years
- **Medium-term:** Implement recommendation within 5 to 10 years
- **Long-term:** Implement recommendation beyond 10 years
- **Ongoing:** Phased/multi-stage implementation within 0-5 years to beyond 10 years
- **Study:** Conduct a study on recommendation options to explore viability
- **Planning:** Evaluate through planning process prior to implementation
- **Implementation:** Implement final result of planning
RECOMMENDATIONS

Strategy One:

Reengineer MTA’s way of doing business by creating “a new MTA” that is more efficient, transparent, and accountable to the public and that gets the right work done faster and cheaper.

To more effectively build and manage a resilient system, deliver service, preserve the trust of its riders and stakeholders, and maintain its position on a global stage, the MTA must first ensure that its house is in order. This means implementing business process improvements and organizational efficiencies, large and small, with a focus on continuous improvement in all areas from internal business processes, to operations, and capital improvements. This work on the back office of the system will translate to better planning and investment decisions, more expeditious project delivery, more effective provision of service, and consequent benefits to the customer. More effective and efficient investments will lead to a more resilient system, one that is flexible and responsive to implementing projects and using alternative approaches during unforeseen events, and able to recover quickly from stresses on the system. Better spent dollars across all areas means the ability to allocate resources towards increasing capacity and more reliable and resilient service.

To this end, MTA has been actively working to reduce costs, integrate services and adhere to project budgets and schedules. To provide better transparency to the public on the status of its efforts, MTA implemented the Capital Program Online Dashboard and Performance Management Program. The creation of the Small Business Mentoring Program (SBMP) and Small Business Federal Program (SBFP) have brought in more contractors and increased competition for the Capital Program.

The MTA has also undertaken a number of initiatives to reengineer its budget and financial process for greater transparency and to rethink how it implements its capital program. New strategies include the component repair program, post-Sandy “on-call” procurement strategies, the “FASTRACK” approach of targeted shutdowns to gain time for key maintenance while minimizing customer inconvenience, line closures, and piggybacking capital projects to get more done at once. Through its “Gates” strategy, MTA now reviews every capital project at each stage of development to ensure that the project is on track to deliver intended benefits at the lowest cost and to avoid delays and cost overruns. The MTA has moved to reliability-centered maintenance programs throughout the agencies to ensure that assets continue to perform to their full value before they are replaced, while the ongoing Enterprise Asset Management system will ensure that integrated decision-making and priority investments continue to be made. Building upon these efforts, the MTA must remain diligent in wringing efficiencies from its operations, and capital programs must become more externally responsive.

This first strategy focuses on further ways to improve the way MTA delivers projects and provides customers with measurable value. To achieve this objective, the MTA must continue to employ more alternative delivery and non-traditional project, financial, and organizational structures to maximize the use of private sector expertise and more efficient procedures where they are most appropriate. To assist with implementing more efficient procedures, the MTA should empower an Innovative Delivery Unit to reform business processes across the spectrum from selecting the project through to the project’s delivery. The MTA’s goal should be to become the “Public Partner of Choice,” by all those competing for MTA projects so as to maximize competition and reduce costs. It will do so by addressing barriers to success in procurement, contracts, regulations, and project execution. A key component of this strategy is investing in the Agency’s workforce for the future, partnering with local firms and universities, and making information more accessible and customer-friendly. Strategy One addresses key challenges facing MTA’s future by.
## RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Response</th>
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<tbody>
<tr>
<td>Climate Change</td>
<td>Improving the Agency's ability to deliver capital projects that will increase the resiliency of the system against the effects of climate change.</td>
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<tr>
<td>Growth</td>
<td>Improving business processes to increase the Agency’s ability to deliver expansion projects.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>Reviewing regulations and processes across the operating agencies and with involved local agencies to reduce redundancies and improve the ability to effectively and efficiently deliver projects.</td>
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<tr>
<td>Retrofitting the System for Technological Innovations</td>
<td>Relying on the expertise of project delivery partners to increase knowledge-sharing and incorporation of efficient technologies for project execution and operation.</td>
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Strategy One Implementing Actions

- Establish a dedicated Innovative Delivery Unit that will enable the MTA to more efficiently and effectively implement investments in its system, accelerate resiliency, and enhance the trust of its riders and stakeholders.
  - Reform project delivery by reengineering procurement, contract provisions, and project execution to be best in class. (Medium-term)
  - Identify opportunities to use more alternative delivery and non-traditional project, financial, and organizational structures. (Short term)
    - Every project must be evaluated to identify the most cost-effective delivery option, such as Design-Build, public-private partnerships, and other risk sharing mechanisms where appropriate. (Short term)
    - While encouraging risk sharing with the private sector and encouraging private investment, the MTA must improve its approval processes on private development projects and private construction of improvements to MTA facilities. MTA should consider including mechanisms such as seeking additional fees for expedited reviews. (Short-term)
  - Establish Integrated Project Teams to coordinate among internal delivery partners, optimize the contractual and working relationship between the MTA agencies, its contractors and involved local agencies, overcome cross-jurisdictional and regulatory delays, and foster knowledge sharing and innovation. Provide incentives for achieving goals and reducing risks and costs. (Short-term)
- Create early actionable improvements. Pilot improvements through capital projects as "proof of concept," then use results to re-engineer processes throughout the agencies. Engage customers and industry for regular feedback for recommendations and impact of changes. (Short-term)
  - Spur MTA’s emphasis on innovation and collaboration with an Innovative Infrastructure Global Competition. (Short-term)

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Public Commentary: Twitter
"@Reinvent Transpo/#MTAreinvention: @MTA should adopt #Transparency as core value. Financials, bonds, contracts, real estate as open data."

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Denver Regional Transportation District (RTD) Alternative Project Delivery

**Eagle P3 Project:** Denver RTD is in the process of delivering one of the most ambitious expansions of public transit in the United States in recent history. The Eagle Public Private Partnership (P3) project is the first transit-related P3 project in the United States and is considered the national model for transit-related P3s. Denver RTD entered into a 34-year design-build-finance-operate-maintain (DBFOM) concessionaire agreement to deliver the entire Eagle P3 project, including 36 miles of new commuter rail lines, by 2016. This P3 project allows Denver RTD to retain all assets while transferring the risk for construction delays and cost overruns and the costs of long-term operations to the private sector, which accelerated project delivery and lowered project costs. During construction, the Eagle P3 project incurred substantial cost overruns. Based on the arrangement, DTP covered the cost overruns without any additional financial commitments from Denver RTD. Denver RTD was able to deliver the massive project by 2016, within 8 years of issuing the RFP, and at a total cost of at least $300 million less than original agency estimates. In addition, the private concessionaire arranged around $450 million of private financing for the project, allowing RTD to spread out large upfront costs over 30 years.

**T-REX Project:** In addition to this experience, Denver RTD also has prior experience with alternative delivery through a unique partnership with the Colorado Department of Transportation (CDOT). The Transportation Expansion Project (T-REX) was a multimodal project that included light rail and interstate widening on the I-25 corridor. The project was the largest multi-modal transportation infrastructure project in the history of Colorado, the first occurrence of a partnership between a regional transit agency and a state department of transportation, and one of the largest design-build transportation projects in the United States at the time. The T-REX project was completed in 2006, a total of 22 months ahead of schedule and 3.2 percent under budget, which was 2 years earlier and $39 million less than original agency estimates.
Vancouver TransLink Evergreen Line DBF Project

Design-Build (DB) project delivery (DB, DBB, DBOM, and DBFOM) has been identified as the Province’s “traditional” project delivery method because it ensures a greater level of cost and schedule certainty when compared to multiple contract scenarios. Under a DB contract, a single partner assumes greater project risk throughout the process and is incentivized to deliver the project faster and cheaper. One of the Province’s most successful DB projects to date is the Evergreen Line, an 11-kilometer extension of the existing SkyTrain Light Rail Transit (LRT) system in Metro Vancouver, currently under construction and estimated to open to revenue service in 2016. In 2012, the Province entered into a performance-based, fixed-price Design-Build-Finance (DBF) agreement with a single partner. The agreement allowed for optimal risk transfer to the partner and the implementation of a partner-led innovative tunnel boring technique that reduced construction costs, reduced schedule risk, and allowed for an accelerated 3.5-year timeframe for project delivery. The agreement included performance-contingent funding, which will only be awarded to the partner if various performance measures such as traffic management and environmental protection requirements are achieved. The partner also agreed to cover the additional risk of geotechnical conditions in the tunnel as part of its fixed-price contract. The 889 million CAD (787 million USD) fixed-price agreement includes a 255 million CAD (225 million USD) private financing component, which achieved additional savings of 134 million CAD (118 million) by matching cash flows during construction, reducing interest payments, and decreasing interest costs.

- Hold a global competition employing new procurement methods and seeking new technologies for transit systems. Build on this opportunity for a fresh look at innovative solutions. (Short-term)

- Update standards, by providing a mechanism for both internal staff and industry to review and challenge historical standards that are not relevant to modern capital programs. (Short-term)

- Preserve and secure essential internal capability, now retiring in record numbers, to deliver the MTA’s vast and complex capital program through Workforce Development. (Ongoing)

- Develop an internal “MTA Academy” focusing on skills that will be lost due to retirement (i.e. signal maintenance) and skills that present a significant challenge to MTA (i.e. technology). Bring in the appropriate expertise to develop these skills among professional and semi-skilled staff. Review internal processes to bring human resources and business processes up to date. (Short-term and ongoing)
  - Ensure that MTA has the best transit professionals in the world by creating an MTA Review Group to conduct market review of those positions that are hard to fill due to private sector competition (such as Program Managers), or that require highly specialized skills. The Group would also identify ways to foster a customer-centric culture within the organization, keep staff engaged and motivated and establish recruitment and retention mechanisms geared to attract and retain professional staff at all levels. (Short-term)
  - Conduct a top-to-bottom review, revision, and modernization of job descriptions, operating regulations, union contracts, union boundaries, and any other related business practices and processes in order to promote a human resources process that is world-class, effective, efficient, and creates an integrated service that allows operations to be flexible across jurisdictional boundaries. (Short-term)

- Leverage transparency and data sharing to unleash the innovative capability and process enhancements available from third party technology partners. (Short-term)

- Build on hugely successful data sharing to improve real-time rider information and trip planning, and other innovative, online, customer services by third party developers. (Short-term)

Opportunities include information on board budget packets, real estate holding and transactions, contracts, spending and professional service agreements, which should be published online in a machine-readable format.
RECOMMENDATIONS

- Conduct an MTA-wide review of available databases with the aim of encouraging creativity, accountability and efficiency. (Short-term)

- Make MTA information timelier, accurate, and customer friendly. (Short-term)

- Make it much easier to track the progress of capital projects; provide accurate budgets, timetables, and the ability to sign up for electronic project updates. Utilize these data to anticipate and predict problems. (Short-term)

- Optimize internal spending by partnering with universities and technology firms to perform optimization studies and explore and develop future technologies (R&D). (Medium-term)

Data Sharing: London TFL:
TfL publishes all board papers, contracts, consultations, complaint reports, internal audits, performance data, and common Freedom of Information (FOI) requests on its “Transparency” website. The TfL Rail and Underground Annual Benchmarking Report identifies best practices and compares TfL’s performance measures with other international metros. This annual report is designed to increase efficiency, transparency, and accountability. According to its 2012 report, recommendations from detailed benchmarking studies over the past year are expected to create £90 million (141 million USD) in additional efficiencies.

Achieving Efficiency: London TfL
In 2009, TfL launched the Savings and Efficiencies program, which has committed to savings of £16 billion (25 billion USD) by 2021. The program emphasizes the importance of reducing the bottom line by primarily focusing on cash savings. According to the 2013 Business Plan, TfL has already secured nearly £12 billion (18 billion USD) in cash efficiency savings, effectively freeing up cash for the agency to make future strategic decisions to expand existing service or improve upon its core infrastructure. The remaining £4 billion (6 billion USD) in savings will be achieved by reducing back-office expenditures and driving out inefficiencies in front-line services and capital investment programs over the next seven years.

One of the program’s most notable successes includes a number of secured efficiencies related to the phased implementation of the Oyster card payment system. The contactless smart card technology began phased implementation in 2003. Today, customers can use the Oyster card to purchase fares on the TfL’s transit system as well as most National Rail services in London. The technology was widely successful, sparking a number of efficiency savings for the agency. Wide use of the Oyster card altered customer purchasing patterns, drastically reducing the need for ticket offices. In an effort to address this inefficiency and improve customer service in the stations, TfL advanced front-line staff to more visible roles and removed unnecessary operational roles primarily in the London Underground network. In addition, the agency implemented direct Oyster card procurement, terminated a large private fare collection and ticketing contract for the London Underground and London bus services, and removed cash fare payments on buses.
Strategy Two:

Accelerate core capital investment in good repair and sustain investment in the future to maximize the system’s safety, reliability, and resiliency.

Transit infrastructure – much like a house as it ages – requires constant attention, maintenance, and investment to ensure that it is resilient against unforeseen events, safe, secure, reliable, and equipped to handle the next wave of innovations and improvements. The MTA Capital Program – the set of investment projects the MTA undertakes in each five-year cycle – consists primarily of these types of investments that are designed to ensure that the system is resilient, and is maintained at a level that allows the system to perform its basic operations. Staying ahead of the continuing need for core investment in the system is fundamental to keeping the system running on a day-to-day basis, and providing sufficient capacity and redundancy to ensure that the system can be flexible during emergencies and recover quickly. Knowing the challenges the region faces, including the physical threat of climate change, preserving a steady level of investment in the system – and making that investment the number one priority – is fundamental to ensuring that current and new riders can reliably use the system on a daily basis as well as during emergencies.

Since the establishment of MTA’s Capital Program in the 1980s, bringing its core infrastructure into a state of good repair has been a primary objective. The graffiti-filled, unreliable system of the 1970s was transformed into what it is today, made possible by investments made through the Capital Program. Due to those investments, today key assets are in good repair, such as subway cars, mainline tracks and switches. These complex infrastructure rehabilitation and replacement projects have been implemented while maintaining service, as exemplified by the complete rehabilitation of the Long Island Rail Road’s Atlantic Avenue Viaduct. Because of this investment, the existing system has been able to accommodate significant increases in ridership and changing patterns of travel.
RECOMMENDATIONS

But even as assets are brought into good repair, ongoing investment must be sustained to keep them healthy and maintain a resilient system. Unfortunately Superstorm Sandy destroyed many assets that had previously been replaced. However, repairs to these and other core assets are now being made to enable them to withstand future severe weather events. (MTA has already begun implementing its Sandy repair projects, incorporating many of the recommendations from Governor Cuomo’s 2100 Commission.) As assets are replaced, the MTA has been enhancing the system’s resiliency through increased design standards in order to address future extreme weather events. Investments are made to optimize capacity and redundancy in the system to ensure that operators can respond flexibly during emergencies and avoid failure points and to provide riders with adequate and effective alternatives. Through the introduction of new technologies like Communications-Based Train Control (CBTC) and Positive Train Control (PTC), that improve capacity, reliability, and safety, the MTA is replacing older, mechanical systems resulting in increased flexibility and responsiveness across the system.

Despite this regular investment, the core repair needs of the MTA’s trillion dollar asset base on an ongoing basis are currently estimated to cost between $5–$8 billion per year, a figure which has always exceeded the MTA’s available funding. MTA, like all urban rail systems, has assets that are operating well beyond their useful life. This can compromise the reliability of the system, increase daily delays, and prevent the system from realizing its full capacity. These assets often require ever more frequent maintenance to ensure safety and ongoing functionality, placing a growing burden on the operating budget. Ultimately, the customers bear the consequences of this underfunding of investment needs.

With its implementation of an Enterprise Asset Management system, MTA will be better able to prioritize among the thousands of assets needing replacement, but investment in these assets must accelerate. This second strategy focuses on prioritizing a substantially more aggressive and sustained program of core infrastructure investments and making those priorities the ironclad foundation of the MTA’s capital program. This can only be accomplished by accelerating capital investment to bring and maintain all assets in good repair, ensuring ongoing annual investment levels to maintain core infrastructure and ensuring that investments are designed to withstand expected extreme weather and to serve the public in emergency situations. Strategy Two addresses key challenges facing MTA’s future by:

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<td>Climate Change</td>
<td>* Adopting resiliency standards into accelerated and sustained core infrastructure investments so the system can withstand climate change impacts.</td>
</tr>
<tr>
<td>Growth</td>
<td>* Ensuring the ongoing reliability of the existing system to handle existing ridership, freeing up capital investment for expanding system capacity.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>* Fostering interagency consistency and priority setting through enterprise asset management.</td>
</tr>
<tr>
<td>Retrofitting the System for Technological Innovation</td>
<td>* Replacing core assets with ones that offer technological benefits that increase operational and maintenance efficiencies and improve communications.</td>
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**Capital Program Benefits in the State**

Dollars spent on core capital investment projects benefit not just the MTA region, but the entire State of New York. Much of MTA’s rail rolling stock rehabilitation and new rail vehicle assembly has taken place in Upstate communities such as Elmira, Plattsburgh, and Hornell, providing thousands of jobs in these areas.
Strategy Two: Implementing Actions

- Bring and sustain the MTA system in a state of good repair and ensure safety, reliability, and resiliency by annually meeting its core capital investment needs. (Ongoing)

- Accelerate implementation of capital investments to bring all assets into good repair. (Ongoing)
  - Improve the process of selecting, prioritizing, and delivering capital and core infrastructure investment projects to address asset condition as well as meet customer expectations and save time, especially by using line closures and similar techniques. (Ongoing)
  - Continue to apply improved design and resiliency standards to investments to strengthen the system's ability to withstand extreme weather events. (Ongoing)
  - Subway line closures should be undertaken where MTA can ensure decent, reasonable, reliable alternative means of transportation. Given the challenges of line closures (identifying sufficient alternate service and customer impacts), NYCT must take full advantage of closure by planning and scheduling all capital work required in the area of the closure. (Ongoing)
  - Conduct a survey or a referendum of riders to confirm their preference for shorter-term line closures versus longer term off peak and weekend disruptions to gain regional support for such closures. (Short-term)
  - Communicate the benefits of core capital investment projects to riders, the public, elected officials, and other stakeholders. (Short-term)

- Design infrastructure improvements to withstand expected climate change, as discussed in the Introduction and Appendix of this report, and to serve the public in emergency and other situations. (Ongoing)

- Build system resiliency and protect transit assets against severe weather events by adopting and implementing worldwide best practices to target investments to improve resiliency of the MTA network. (Ongoing)

- Continue adoption of specific 2100 Commission recommendations and report regularly to the public on status of those efforts. (Short-term and ongoing)

Select 2100 Commission Recommendations:
- Relocate sensitive equipment in subway tunnels
- Reinforce water penetration points in stations
- Seal electrical equipment against water infiltration
- Install mechanical below-grade vent closures to prevent water from entering ventilation shafts
- Ensure the availability of high-capacity mobile pumps to respond to unpredictable flooding situations

Incorporate information about the level of investment required to maintain and replace MTA’s core infrastructure into the annual discussion of MTA’s Financial Plan so all stakeholders have an understanding and appreciation of the system’s requirements. Currently it is MTA’s practice not to anticipate the cost and impact of capital expenses until there is an approved Capital Plan. (Short-term)
Years of underfunding and tremendous regional growth have resulted in underinvestment and significant deterioration of the Washington Metrorail’s core transit infrastructure and assets, creating substantial obstacles to consistently delivering safe, reliable, and resilient service to its customers. In an effort to bring the system up to a state of good repair, WMATA created Momentum, a strategic 10-year plan that has set short-term and long-term actions to accelerate core capital investment in state of good repair and sustain investment into the future. Momentum identifies a $6 billion list of immediate and critical capital investments, called Metro 2025, aimed at (1) maximizing the existing rail system by operating all 8-car trains during rush hour, (2) improving high-volume rail transfer stations and underground pedestrian connections, (3) enhancing bus service, (4) restoring peak service connections, (5) integrating fare technology across the region’s multiple transit operators and upgrading communication systems, (6) expanding the bus fleet and storage and maintenance facilities, and (7) improving the flexibility of the transit infrastructure. With the first capital investment alone, WMATA estimates a capacity increase of 35,000 more passengers per hour during rush hour, which is the equivalent of building 18 new lanes of highway in Washington, DC. The second investment is a “quick win” to relieve crowding in the system’s largest bottlenecks and bring its most valuable core infrastructure up to a state of good repair.
Improving the System: Régie Autonome des Transports Parisiens (RATP) and Transport for London (TfL)

Major cities around the world, notably London and Paris, are investing in their core system by maintaining and renewing their assets. RATP implemented a massive renovation and renewal program known as Métro2030, which includes the renewal and renovation of stations, rolling stock, tracks, and facilities to improve timeliness, reliability, comfort, and service to passengers. TfL has implemented a series of programs focused on modernization of assets and state of good repair. These systems realize the importance of making a continuing investment in their core infrastructure.

RATP:

**Stations:** Through a sub-program known as “un metro plus beau” (English translation: a more beautiful metro), RATP is modernizing 273 of its 303 stations by improving access, fluidity, functionality, connections, infrastructure, signage, seating, lighting, and replacing tiles. The purpose of the program, discussed in detail in Strategy 3, is to enhance the customer experience and preserve the network’s historical heritage.

**Rolling Stock:** By 2020, RATP will complete renovation and renewal of 55 percent of its rolling stock. Three lines already feature new trains and deployment has begun on an additional line. By 2030, 85 percent of rolling stock will be replaced and renewed. New rolling stock will be eco-friendly and designed to reduce energy emissions while offering greater comfort to passengers. For example, the RER A line is gradually being replaced with innovative two-level trains that offer energy savings ranging 20 to 55 percent and a colorful design, softer lighting, and cool air ventilation. New stock on metro lines 14 and 1 and tram lines T7 and T8 include energy-efficient braking systems. According to the 2013 Activity Report, RATP will dedicate €793 million (990 million USD) to the renewal of rolling stock in 2014.

**Assets and Infrastructure:** As part of the Métro2030 program, RATP is renovating or replacing assets and infrastructure such as platforms, engineering structures, tracks, platforms, networks, and technical equipment. The Infrastructure Management department dedicated around €700 million (875 million USD) to these activities in 2013. In 2016, 112 ventilation facilities will be renovated or replaced and an additional 18 ventilators will enter service with an overall investment of approximately €85 million (105 million USD).

**System Automation:** Three lines will be fully automated with communications-based train control (CBTC) from 2022 onwards. The new automated systems, discussed in detail in Strategy 4, will increase capacity, reliability, security, and comfort. New platform screen doors were installed in all stations on fully-automated lines (2 existing; 1 planned) to improve safety on platforms.

TfL:

**State of Good Repair:** With its creation in 2000, TfL inherited a transportation system with significant backlog in state of good repair. TfL estimates a total of £1.5 billion (2 billion USD) in deferred state of good repair and hopes to reach satisfactory state of good repair within the next 22 years. To meet this goal, the agency established a three-step, structured methodology for determining state of good repair for all assets:

1. Condition Assessment determines the residual life of the asset.
2. Life Costing determines the cost for the remaining life of the asset and its individual components.
3. Risk Analysis determines the resulting action for the component, which includes maintenance, replacement, or upgrade.

The methodology has successfully identified cost savings and guided agency state of good repair policies. For instance, the risk analysis found that the agency would incur less costs if buses were replaced at 3 years of age instead of maintaining them for their 9 to 12 year useful lives. As a result, TfL implemented a policy to sell buses after 3 years of age. The replacement cycle provides the added benefits of maintaining a clean, safe, and updated bus fleet that attracts ridership and improves customer experience.
RECOMMENDATIONS

Strategy Three:

Create a 21st-century customer experience for all riders with investments designed to increase responsiveness and ease of access, characteristics of a more resilient system.

Creating a world class system is fundamentally about creating a high-standard customer experience that is, at a minimum, on par with the best systems in the world. While difficult to achieve, this standard should prioritize a resilient system that embraces: well-maintained, information-rich, accessible, and safe stations, reliable, frequent and easy to use services, and a workforce fully committed to the customer, all consistent with the quality of life New Yorkers, as residents of a world-class city, expect. The first step in creating a 21st century customer experience is reaffirming MTA’s partnership with its riders and building trust that their needs and expectations are being considered and met through the improvements and investments that are being made. It also means creating a culture at every level within the MTA that is customer-focused.

Customer expectations are evolving with a shift in riders’ profiles, travel patterns, environmental conditions, and needs. Millennials—those born between 1980 and 1991—represent a fast growing demographic in the New York region and are characterized by a reliance on technology and transit to meet their mobility needs. Meeting their needs means providing customers with access to information, ensuring connectivity with devices throughout the system, employing the technological innovations that have become the norm in their public and private lives – as well as being nimble to embrace cultural changes in the future. Baby Boomers born between 1946 and 1964 will increasingly be more dependent on accessibility features such as elevators, escalators, bus lifts, and information services for the vision or hearing impaired. These expectations, no longer seen as luxuries but requirements for a basic trip on the MTA system, will require upgrades to the system and service and will require an organizational culture that puts customer needs first. To ensure a resilient system, technology and information networks should be put in place that give both riders and the Agency the tools to communicate with one another, to guarantee flexibility and responsiveness, and to quickly implement alternative plans and recover from stresses on the system.

On the Go Screen at Grand Central
Source: MTA
MTA’s Capital Program has made many strides in bringing 21st century customer improvements to a system designed for the 20th century. Over 200 subway stations now have real-time countdown clocks. All 121 Long Island Rail Road branch line stations have real-time information displays, and by 2019 every Metro-North (MNR) station in New York will have them as well. MTA Bus Time gives real-time information on every bus in New York City. MTA’s franchise with Transit Wireless will deliver Wi-Fi connectivity to all MTA’s underground stations, as well as support for MTA operations and increased revenue. Starting in 2011, the MTA began rolling out “Help Point” communication systems throughout subway stations to provide riders with well-lit, easy to use, quick access to emergency response if needed. All of this information is supplemented with new real-time applications, text message alerts and station information displays, with the upcoming capital program promising to deliver even more information to customers.

New fleets of equipment bring better customer amenities, with high quality audio and visual information. Today’s bus fleet is 100 percent ADA accessible, and elevator and escalator reliability has improved significantly, increasing access to subway and commuter rail services for riders in need. The MTA has begun to develop an agency-wide new technology fare payment system. While these steps toward improvement are closing the gaps in meeting customer needs, the challenge of achieving the 21st-century customer experience is far greater and far from done.

This third strategy emphasizes MTA’s role as a customer service agency with a focus on meeting and exceeding customer expectations for an accessible, safe, secure, reliable, and resilient system. This presents MTA with an opportunity to usher in a new era of quality service, starting with a customer charter that outlines the Agency’s commitment to all its users and to the community it serves. Actions to improve customer service include improving communication tools and flow of information to ensure flexibility, responsiveness, and quick recovery in the event of an emergency; fostering a sense of comfort and safety in the system; prioritizing station improvements that increase safety and comfort and offer more amenities; making the system more accessible for all users; identifying and promoting technological enhancements throughout the system; and making seamless travel throughout the region possible by implementing integrated fare policies supported by a modern fare payment system. Strategy Three addresses key challenges facing MTA’s future by:

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>Climate Change</td>
<td>* Addressing environmental impacts of climate change and helping customers navigate the system during disruptions or times of extreme weather.</td>
</tr>
<tr>
<td>Growth</td>
<td>* Incorporating investments to meet the needs of new demographic trends and optimizing access to the system to better manage growth.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>* Fostering interagency consistency in meeting customer expectations and mitigating the challenge of navigating the system that is delineated by separate operating agencies.</td>
</tr>
<tr>
<td>Retrofitting the System for Technological Innovation</td>
<td>* Increasing focus on connectivity and access to real-time information to improve technological capabilities and operations throughout the system.</td>
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Strategy Three Implementing Actions

- Establish a permanent Customer Charter that addresses customer expectations, establishes performance timelines, commitments and standards, and reconfirms the Agency commitment to customer service and meeting yearly service goals. The charter must be centered around the provision of customer comfort, service reliability, safety, security, real-time service information, system connectivity, accessibility and resiliency throughout the system. The charter should be created and updated with public input, reported in a transparent manner to ensure public feedback is incorporated and that the public has a sense of ownership in it. (Short-term)

- Implement early and visible infrastructure improvements that demonstrate tangible action to the public, such as station improvements like painting, improved lighting and more frequent cleaning. (Short-term)

- Create an MTA Office of Technological Opportunity led by a Chief Innovation Officer, responsible for identifying and promoting future technological and digital data enhancements to the MTA system. (Short-term)

- Improve and expand availability of real-time information on expected arrival times for all modes of transportation. (Short-term)
  - Provide Wi-Fi access and digital display screens that, where appropriate, are located both before and after the fare collection area. (Short-term)
  - Provide system-wide real-time information at rail stations, on buses and on subway/rail vehicles. (Short-term)

- Increase accessibility of the entire system. (Long-term)
  - Develop an ADA station accessibility program to include all subway and commuter rail stations. (Short-term: planning)
  - Incorporate accessibility as a requirement of development adjacent to or near inaccessible stations. (Short-term: planning)

- Improve operational efficiency, enhance the customer experience, and foster safety and resiliency by investing in system technology, such as flood control technologies, intrusion detection or platform door systems. (Medium-term)

- Make implementing a new, open fare system (i.e., single fare media) to facilitate seamless travel across the region a high priority. (Short-term)

- Explore and test energy efficient technology to control temperature fluctuations within stations and create a comfortable atmosphere throughout the system, particularly in the face of longer heat waves from climate change. (Long-term)

<table>
<thead>
<tr>
<th>Toronto Transit Commission (TTC) Customer Charter</th>
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<tr>
<td>The TTC annually publishes a Customer Charter that outlines the agency’s commitment to and completion of quarterly initiatives to improve the customer experience. The Customer Charter is the focal point of the TTC’s Five-Year Corporate Plan, which features strategic objectives geared toward transformation and modernization of the agency. The first Customer Charter, published in 2013, focused on five themes: “cleanliness, better information, improved responsiveness, more accessible and modern, and the renewal of vehicles.” The charter successfully bound the agency to a new minimum standard of performance, set and met realistic incremental goals, and fostered the development of a more customer-focused agency. Quarterly progress reports define interim commitments and describe actions taken to accomplish those commitments. If a commitment is not met, the quarterly report gives a detailed explanation of why TTC was unable to accomplish its objective. In its first year, the agency focused on creating quick wins, communicated through an online dashboard, to show that it was serious about modernizing the agency and improving customer service.</td>
</tr>
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</table>

The Customer Charter is now in its second iteration, continuing initiatives from the first charter such as holding frequent town hall meetings, public forums, and “meet the manager” sessions, publishing performance data of surface routes and subway on its website, and conducting customer surveys and mystery shopper surveys. In total, the second Customer Charter details 39 initiatives designed to transform TTC into “a transit system that makes Toronto proud.” Early benefits of the Customer Charter include positive media coverage and improved customer satisfaction scores.

A single-fare medium would enhance regional mobility and connectivity. MTA’s effort could be expedited through exploration of use of existing fare technologies. The next evolution of fare media would allow integration with other operating agencies and transit providers in the region and ultimately integration of fare pricing.
RATP Customer Service Improvements

In 1998, RATP began a 25-year sub-program to the Métro2030 program, known as the “Un métro plus beau” (English translation: a more beautiful metro) program. The station beautification program focuses on the modernization of 273 of its 303 stations with an annual budget of nearly €500 million (623 million USD) entirely financed by the RATP. The program has invested a total of €3.6 billion (4.48 billion USD) into the RATP system since 2007. The program focuses on the oldest stations in the system, some that have not been refurbished since the 1930s. Through the program, station platforms, corridors, and concourse areas are being renovated with new flooring, wall coverings, tiles, lighting, seating, and signage. The program also takes into account interior design, historical heritage, and improving the customer experience. Signage is designed to be easier to understand, intermodal, and tourist-friendly. New tiles mimic past tile work in color and design, reflect and diffuse artificial light, are easier to maintain, and are designed with a greater life span; Paris RATP estimates that nearly 23 million tiles will be required to cover the 272,000m² of the 273 stations in the program. Renovated stations are cleaner, brighter, and more accommodating due to an increased emphasis on improving the customer experience. As of March 2014, 249 stations have been renovated.

As part of the larger Métro2030 program, RATP is implementing the following:

Real-Time Information: RATP is in the trial period for IMAGE project: the deployment of 3,000 new passenger information screens that provide multi-modal and real-time travel information on the RATP network. The project also includes a data management system to centralize and share this information. In addition to providing waiting times, traffic conditions, and safety advice, screens will display commercial information. Since 2012, 155 stations have been equipped and 850 displays have been installed. Screens will be linked to existing information systems until the multi-modal real-time information system is rolled out in 2015.

Mobile Coverage: By the end of 2016, all RATP lines will have at least 3G (and some 4G) mobile coverage. This project is a 3-year, complex operation that will ensure interoperability between four French operators (e.g. Orange, SFR, Bouygues Telecom, and Free) and the upgrade of a fleet of 2,500 antennae within confined areas that were not originally designed for internet connections.

Cleaning Contract: RATP has a stringent €70 million (87.2 million USD) annual cleaning contract between four professional contractors and RATP, including over 1,800 cleaning staff and 6,000 RATP staff improving cleanliness and customer comfort. The contract ensures daily cleaning services, periodic property maintenance, and deep cleaning services such as ceiling, lighting, and painting maintenance and incrustation removal across the RATP network (including stations, track, and rolling stock). RATP implemented station cleaning during daytime operations to maintain cleanliness throughout the day and to increase visibility of the extensive cleaning contract.

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- In the interim, adopt London’s approach and treat heat production as a form of pollution that needs to be controlled and minimized in everything MTA does or purchases (e.g. rail cars, train acceleration, lighting fixtures, etc.). (Short-term)
- Develop new methods for customers to provide feedback that exceed current efforts, allowing for quick, but detailed, complaint filing in order to complement current survey methods. (Short-term)
- Capture instant feedback from customers by encouraging them to file comments, suggestions, or complaints directly through a multi-purpose MTA app with both ticketing and scheduling that will also be able to “crowd source” complaints and responses. (Short-term)

The MTA currently uses a simple system to lodge complaints through an all-agency Customer Relationship Management System, which provides customers with a tracking number to track the status of a complaint and comply with recording requirements.
**TfL Customer Service Improvements**

**Cooling the Tube Program:** In 2005, TfL established the Cooling the Tube program to address steadily increasing temperatures in the London Underground network. The program created several quick wins across the London Underground network by upgrading out-of-service ventilation shafts and strategically installing fans and cooling units in stations and tunnels. The agency established a comprehensive database of temperature and humidity measurements to aid decision-making and strategically prioritize capital improvements for the program.

Prior to establishing the program, train breaking was the single largest source of heat emissions, contributing to 50 percent of total heat emissions in the London Underground network. TfL significantly reduced train breaking heat emissions from 50 percent to 18 percent by installing regenerative breaking technology on the majority of the London Underground’s rolling stock. This advancement alone achieved a 32 percent reduction in overall heat emissions in the London Underground network. Approximately 80 percent of the London Underground network will operate regenerative breaking technology by 2016. The program was well-received by the media and the public, shining a positive light on the agency’s proactive measures to address customers’ concerns and improve customer comfort across the network.

**Rolling Stock Improvements:** TfL introduced new walk-through trains (i.e. no barriers or doors between train cars) featuring, improved ventilation, wider doors, and Wi-Fi. Audio-visual technology displays real-time information on new and refurbished trains and all 8,600 buses.

**Real-time information:** In addition to signage in stations, real-time information is available on mobile phones and other devices, roadside signs, schools, and shopping centers. Over 2,500 bus stops feature real-time arrival boards.

**Contactless Payment:** Contactless payment is now available on all busses and will be implemented across the TfL system by 2014. Customers will be able to use credit cards in addition to Oyster cards for fare payment.
RECOMMENDATIONS

Strategy Four:

Aggressively expand the capacity of the existing system both to alleviate constraints and to meet the needs of growing ridership, thereby providing greater redundancy and limiting disruptions, which are key to resilient service.

Like many older transit systems across the country, the MTA operates a traditional "hub and spoke" system focused on moving people from residential communities to high-density employment centers, typically what is known as Central Business Districts (CBDs). This approach reflected historic land use and employment patterns and was quite effective in meeting the region’s needs. Riders traveling to and from jobs in Manhattan remain one of the MTA’s largest customer markets and CBD-bound travel is expected to grow by 26 percent by 2040. An increase in capacity is required to meet this growth and growth in other areas that burden the existing core system.

Expanding service oriented around bringing more riders onto the existing system requires improving capacity and reliability in order to carry more customers and increase the resiliency of the system. Increasing capacity creates redundancies in the system that are critical during emergency events by providing alternative travel options for riders and limiting stresses and failures during these events to isolated parts of the system. It also requires better serving new markets, e.g. former industrial sites along the waterfront now emerging as residential centers. It requires partnerships between local constituencies within greater New York, New Jersey, Connecticut, as well as among operating agencies to provide seamless service within, to, and from the CBD.

Significant progress has been made in this area. As new CBTC signal systems have been installed as part of system renewal, they have boosted capacity, for example, with installation on the Canarsie (L) line serving one of the fastest growing areas in New York City. LIRR added late night and weekend service from Atlantic Terminal to serve 3300 new customers on game/event nights at Barclays Center. MTA has made investments in stations to accommodate this increase in riders, with new and improved station access like the new Fulton Center, station capacity improvements at Times Square, and upgrades to allow fare control areas to meet increased demand. MTA has also invested in bus service to accommodate capacity problems caused by increases in travel, with expansion of Select Bus Service (SBS) and the use of articulated buses to carry additional passengers on well-travelled bus corridors.

Over the next two years, two new subway links — to the burgeoning Midtown West and to the densely populated Upper East Side — will be in operation extending subway’s reach for the first time in over 50 years. And the region is 8 years away from the first addition to the LIRR network since the Pennsylvania Railroad opened Penn Station and the East River Tunnels in 1910, linking the LIRR to East Midtown Manhattan. The proposed MNR Penn Access project would expand rail access for those in the Bronx, Westchester County, and Connecticut, add redundancy to Metro North’s service and eliminate the single point of failure posed by the Harlem River Lift Bridge, the loss of which could bring down the entire MNR system.

This fourth strategy focuses on making additional investments to increase the core capacity of the existing system to: accommodate the extraordinarily large
CBP bound market and its projected ridership growth; maximize economic development in emerging employment and residential centers reliant on the existing system; and create system redundancies that will maximize resiliency of the system by providing additional capacity and mitigating the risk of complete failure of critical portions of the system. It will also provide seamless connections through the regional network. This strategy can be achieved by accelerating signal upgrades, expanding track capacity, and adding flexibility via waterborne, bus, and other means of surface transit in constrained areas. Other investments that focus on bringing world-class bus rapid transit to dense corridors, leveraging off-peak capacity on available commuter lines, and working with regional transportation agencies such as Amtrak and the Port Authority to provide more efficient and frequent trans-Hudson service can increase core capacity in the system as well. Strategy Four addresses key challenges facing MTA’s future by:

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<tbody>
<tr>
<td>Climate Change</td>
<td>* Creating additional capacity and redundancies in the system that will increase resiliency and mitigate failure points in the event of extreme weather.</td>
</tr>
<tr>
<td>Growth</td>
<td>* Increasing operational capacity on the existing system and creating new opportunities for transit service that will address future growth needs.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>* Negotiating agreements between operating agencies and other jurisdictions in the region in order to provide seamless service.</td>
</tr>
<tr>
<td>Retrofitting the System for Technological Innovation</td>
<td>* Implementing expansion projects using current and future technological standards and innovations.</td>
</tr>
</tbody>
</table>
Strategy Four: Implementing Actions

- Prioritize capital investments where the region has significant density or is experiencing significant growth, thereby overburdening the existing system (e.g., far west and east sides of Manhattan, western Queens). Maximize system redundancy, service flexibility and resiliency, especially where value capture strategies can help fund the project. (Short-term)

- Use expansion opportunities to support economic development objectives and improve quality of life, as well as create additional options during emergencies and eliminate single points of failure. (Short-term: study)

- Identify locations where flexible modes (like true bus rapid transit, ferry) could alleviate capacity constraints and where redundant services are needed to address single points of failure on existing lines, such as bus rapid transit on Queens Boulevard. (Short-term: planning)

- Increase connectivity between MTA and other regional transportation providers to increase overall system capacity and flexibility, and enhance opportunities to respond in emergencies. (Short- to Medium-term)
  - Work with Amtrak, the Port Authority, and NJ TRANSIT to create new trans-Hudson rail capacity and improvements at both the current Penn Station and its planned expansions. (Short-term: planning; Long-term: implementation)
  - Work with New York City, other interested municipalities and private ferry providers to bolster ferry service that can expand capacity, serve new waterfront markets, and create redundancies to avoid single points of failure. (Short-term: planning)

- Make investments to increase core capacity on existing subway lines through: accelerating CBTC signal system upgrades (and the associated investments in power and station capacity necessary to capture the service benefits of CBTC); expanding track capacity on commuter rail; adding travel options in constrained areas like that provided by a completed Second Avenue Subway and the Main Line Second Track and Third Track projects on Long Island; and eliminating single points of failure like the Harlem River Lift Bridge, which will be addressed by the Penn Access project. (Medium- to Long-term)

- Where feasible, leverage available off-peak commuter rail line capacity for more frequent (rapid transit-like) service. (Medium-term to Long-term)

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**Berlin BVG Spiderweb Strategy**

The Berlin BVG has succeeded in optimizing the existing system to increase capacity through a network restructuring strategy called the “Spiderweb.” In 2003, BVG undertook a comprehensive, corridor-by-corridor analysis of all traffic patterns in the city and of the strengths and weaknesses of the public transportation system, with the goal of increasing customers by 2 percent while simultaneously cutting operations by 3 percent. The objective of this strategy was to make better use of the existing system in a way that was efficient and cost-effective. The result of this effort was to support the core network of the commuter rail (S-Bahn) and metro (U-Bahn) systems through the development of newly created MetroLines, which are trams and buses that connect major axes and rapid transit corridors. These MetroLines, which provide 24-hours services at daytime frequencies of 10 minutes or less, represent a spatial expansion of the core network by “filling in” previously under-served areas in between major transit corridors. This transit system, taken in its entirety, has come to be known as the “Spiderweb.”

The result has been an operations savings of €9.5 million (12 million USD) and an increase of 24 million new trips per year. It has also had ancillary benefits, including greater revenues for the S-Bahn, which, without changing its own services, has benefitted from improved feeder lines and the elimination of parallel bus lines.
London Underground System Capacity Enhancements

**Signaling Improvements:**
- A new automatic signaling system will transform all four subsurface London Underground lines to semi-automated communications-based train control (CBTC), which allows trains to run closer together at greater frequencies. The system will be phased in by 2018, increasing capacity by 33 percent.
- Recent signaling system improvements on the Victoria line have already delivered an increase in capacity of 21 percent. By installing a new signaling system, TfL will increase peak trains from 33 per hour to 36 per hour on the Victoria and Jubilee lines. Once work is complete on the upgrade of the Northern line’s signaling system, capacity on the busiest line on the London Underground network will be increased by 20 percent.

**Reducing Service Disruptions in the London Underground**
- TfL has adopted a “predict and prevent” approach to maintenance in an effort to reduce the likelihood of service disruptions in the London Underground. The program includes the installation of condition monitoring equipment on-board trains and at key locations in the London Underground. The new monitoring equipment has improved service reliability and enhanced existing capacity by predicting maintenance issues in real-time and dispatching staff before a service disruption occurs. The approach has also improved incidence response times by strategically dispatching staff with the required skill sets that are closest to the disruption.

RATP System Capacity Enhancements

In 2012, RATP launched OCTYS, a new automation technology on Line 3. OCTYS features a semi-automated system that maintains train acceleration and breaking, while still requiring the presence of an operator to close and open doors and to operate the train in the event of a disruption. The semi-automated system allows trains to operate at closer distances, improving efficiency, reliability, and increasing overall system capacity. Together, with the use of a single central control room, OCTYS has already increased the reliability of trains on Line 3 during peak hours. OCTYS is currently being deployed on lines 5 and 9. RATP plans to deploy OCTYS on two more lines in the near future, with staged network-wide deployment by 2030.

In 1998, RATP became the international leader in automation technology, equipping the first wide-gauge metro line in the world with fully-automated, driverless technology. Today, Line 14 can operate at 85 second headways compared to its previous maximum of 105 seconds. RATP has full automation (no operator) on two lines and approved a plan to implement similar automation on another busy line by 2022. Fully-automated technology has the potential to significantly increase the capacity of an existing line; however, the technology is costly to implement, requiring more advanced rolling stock technology and full installation of platform screen doors. For these reasons, RATP’s busiest lines have been targeted for full-automation and all others have been identified for semi-automation deployment.
### TfL System Capacity Enhancements

**Rolling Stock:**
- An extra carriage will be added to London Overground trains by 2014, increasing capacity of the network by 25 percent.
- New fleet on the London Underground’s Circle and Hammersmith & City lines that are longer than outgoing fleet will increase capacity by 17 percent.
- The introduction of new fleets in 2011 and 2012 decreased train-related delays on the London Underground’s Victoria and Metropolitan lines by 50 percent.
- The introduction of 191 walk-through trains (no barriers between cars) covering 40 percent of the London Underground network on four sub-surface lines (Metropolitan, Hammersmith & City, Circle, and District) by 2016 will result in a 17 percent increase in capacity.

**New Service:**
- Crossrail, discussed in detail in Strategy 7, is a new rail line running east-west through central London opening in 2018. It will increase London’s rail capacity by 10 percent, reduce congestion at many London Underground stations, and reduce travel times across the city. TfL estimates that Crossrail will reduce congestion by up to 60 percent on many Underground lines.
RECOMMENDATIONS

Strategy Five:

Make investments designed to serve existing and emerging population and employment centers not well served by the existing system in order to ensure service alternatives and flexibility characteristic of a resilient system.

The traditional hub and spoke pattern of today’s system does not address all of the new and still-evolving live-and-work patterns in the New York region. To be sure, Manhattan remains an important regional employment hub, but job centers are continuing to crop up in the outer boroughs and outside of the City, from Downtown Brooklyn to Long Island City in Queens, to the Route 110 corridor in Long Island and biotech sector in Westchester County. These changes are producing new patterns of business and travel across the system. For example, reverse peak service linking people who live in New York City to suburban jobs in Westchester and Connecticut continues to be Metro-North’s fastest growing market. These new travel patterns reflect new residential centers, zoning practices, emerging economic centers, employer types, and employee preferences. To respond to these shifts, MTA will need to transform into a dynamic system that accommodates a range of new travel patterns (such as circumferential and reverse peak), meeting the needs of employees and employers in the new global 24/7 economy and knitting these new investments into its existing services. Accommodating these new dynamic patterns of travel will strengthen the system’s resiliency by providing flexible service alternatives to all riders.

Many of the investments that the MTA is making to serve the CBD market described in the previous strategy are also critical to serving these new and emerging markets that are not focused around the traditional CBD, including optimizing capacity and creating even more redundancies throughout all parts of the system. The installation of CBTC promises to help provide additional capacity where needed. Improved passenger connections in stations recently completed, such as Jay Street – MetroTech, and complete station reconstructions, such as Stillwell Avenue Terminal in Coney Island and Atlantic Terminal in Downtown Brooklyn, serve areas of growing demand outside of the Manhattan Central Business District. Going forward, partnering with ferry operators to support ferry service and feeder service to ferry terminals between outer boroughs (transporting passengers between hubs in Brooklyn and Queens, for example) are other ways to serve these new and emerging markets.

Where capacity has allowed, the MTA has expanded service to address new ridership patterns, including all day NYCT No. 5 train service to Brooklyn, expanded bus service routes such as the NYCT Q8 extended to serve Gateway Mall, and new SBS across 125th street in Harlem to LaGuardia Airport. Similarly, the Third Track project on Metro-North has increased access for intermediary markets along the Harlem Line.

In 2009, commuter rail “through running” was introduced as a pilot in the form of Metro-North Railroad-NJ TRANSIT service to Secaucus Junction and the New Jersey Meadowlands accessing National Football League games on selected Sundays. “Through running” refers to service that carries people into a downtown and out the other side, creating a “single seat” trip with fewer transfers across multiple systems. MTA has been leading a collaborative effort among the MTA roadways, NJ TRANSIT and Amtrak to perform a computer-based simulation evaluation of through running regular commuter service during weekday peak periods to understand if additional service and benefits can be generated. This will serve the additional purpose of creating service redundancies in the region, a critical quality of a resilient system.

More must be done to build on this progress and continue to respond to these emerging travel patterns and markets, and ensure that they are part of the resilient transportation network. This fifth strategy focuses on meeting the needs of these existing and emerging markets not well served by the existing system. Using this strategy, surface rapid transit (i.e. bus rapid transit (BRT), light rail transit (LRT), etc.) in underserved areas can be implemented much more quickly compared to adding new heavy rail capacity. In addition, outfitting local bus routes with SBS features will improve service to these markets. Opportunities
may exist to leverage existing commuter lines and unused right-of-ways to add new rail service more expeditiously. Creating through-running service between different regional systems such as the MTA railroads and NJ TRANSIT will both allow more efficient use of current network capacity and create new links in service between outlying localities in the region. Finally, forming results-oriented partnerships with private on-demand/shared car services and expanding airport access through surface transit options are additional methods for filling gaps to regional hubs. Strategy Five addresses key challenges facing MTA’s future by:

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Response</th>
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</thead>
<tbody>
<tr>
<td>Climate Change</td>
<td>* Creating new service alternatives, particularly more nimble modes like bus rapid transit, to improve access across the system, a key resiliency feature.</td>
</tr>
<tr>
<td>Growth</td>
<td>* Focusing analysis and investments on outlying localities in the region to address changing demographics and new patterns of population and ridership growth throughout the MTA region.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>* Focusing on collaboration with other regional agencies to better serve emerging markets.</td>
</tr>
<tr>
<td>Retrofitting the System for Technological Innovation</td>
<td>* Investing in new signal and operating technologies to increase efficiency throughout the system.</td>
</tr>
</tbody>
</table>
RECOMMENDATIONS

Strategy Five Implementing Actions

- Improve bus service through a line-by-line review of bus routes and their particular constraints, with a goal of making SBS features the standard for all local bus routes, including faster fare payment, priority lanes, and transit-priority signals. Priority review should be given to routes in existing and emerging markets not well served by the existing system and that will increase the system’s resiliency. (Short-term)

- Implement bus rapid transit in emerging (non-CBD) markets, which can be implemented relatively quickly and at lower capital cost than rail services. Consider light rail or tramways when demand warrants higher capacity than can be served by BRT. In all cases, cost/benefit analyses should be used to determine the most cost effective means for meeting the anticipated demand. (Medium-term)
  - Work with New York City DOT and other relevant agencies to implement and showcase true, dedicated bus rapid transit. Develop a unique brand for the service that builds on lessons learned from Select Bus Service implementation and international experiences; for example, by providing a dedicated right of way with signal prioritization and eliminating the word “bus” from the service name to distinguish it as a more rapid alternative. (Short-term: planning; Medium-term: implementation)
  - Build a network of 20 Select Bus Service/bus rapid transit routes by 2020. (Medium-term)

- Study the viability of aboveground surface rapid transit concepts, which maximize available underutilized rights of way in the City to offer a new service that could run on a frequency comparable to a subway line. This service would be integrated into the existing subway system at feasible connection points and provide additional flexibility to enhance resiliency in the system. (Short-term: planning; Medium-term: implementation)

- Implement through service between the MTA railroads (LIRR and Metro-North) and between MTA railroads and NJ TRANSIT. (Long-term)

- Explore partnerships with private on-demand/shared car and van services to connect major activity centers and fill service gaps. (Short-term)

- Explore options to better connect with ferries as an option to connect emerging residential and employment centers. (Ongoing)

- Partner with the Port Authority and New York City to improve transit access to and from the airports. (Ongoing)
  - Explore options (BRT, LRT, etc.) to provide more convenient and direct transit options between major regional airports and key activity nodes to further bolster the region’s leading competitive position in the global economy and enhance system resiliency. (Medium-term)

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Bus Rapid Transit in South America

In Latin America, bus rapid transit (BRT) is a popular, highly efficient mode of transit in some of the region’s largest metropolitan areas. Curitiba, Brazil’s BRT system, known as Rede Integrada de Transporte [RIT/Integrated Transportation Network], was implemented in 1974, and is seen as the gold standard for BRT systems in the world. Curitiba’s BRT system is so successful in part because of the operational and capital investments made in the system – preferred signaling for buses that cuts down on delays, real-time information that allows riders to know exactly when the next bus is arriving, and design elements like off-bus payment and median-separated, dedicated lanes that guarantee the free flow of bus traffic. RIT has also been successful because planning for the system goes beyond placement of buses and stations. RIT is also an initiative that integrates long-term land use, transportation, and sustainability, matching transportation with residential, commercial, and environmental needs.
RECOMMENDATIONS

Bus Rapid Transit in Cleveland

Cleveland’s HealthLine is widely considered to be one of the most advanced BRT systems in the country. The HealthLine BRT runs along 6.8 miles of Euclid Avenue, a thoroughfare that connects two of Cleveland’s largest commercial districts – Public Square, the central business district in downtown Cleveland, and University Circle, a hub of education, medical facilities, arts and cultural amenities. The line has had a major impact on fostering equity in the area, as roughly 80 percent of riders on HealthLine are transit-dependent, and links the city’s largest employment centers to one of its poorest areas in East Cleveland. According to research conducted by the Institute for Transportation & Development Policy (ITDP), the HealthLine has generated $114.54 in economic development for every dollar spent on the BRT corridor.

The $200 million project was the result of an extensive collaborative effort among the Greater Cleveland Regional Transit Authority (GCRTA), local and state governments, two anchor institutions (the Cleveland Clinic hospital and Cleveland State University), business, and community members. The project’s design and construction phase spanned the terms of four different Mayors. The GCRTA was critical in educating each new administration on the value of BRT and the GCRTA CEO worked with each Mayor on aligning the project with the Mayor’s broader political goals. While each Mayor tweaked the project’s scope, the vision of the BRT line remained intact largely due to the GCRTA’s successful outreach efforts. The BRT opened to the public in 2008. Within three years the HealthLine operated at speeds that were thirty-four percent faster than bus; its ridership, at 15,000 passengers per day, exceeded that of Cleveland’s light rail system (11,000 passengers per day). An estimated $4.3 billion in new real estate investments have lined the Euclid corridor and its environs since the system opened, placing the HealthLine at the center of a significant urban renewal project.

Serving New Employment Centers: DLR and Jubilee Line Extension

London’s CBD has historically covered an area of approximately ten square miles, bordered by Kensington in the west, Aldgate in the east, King’s Cross and Euston in the north, and Elephant and Castle in the south. Fringes outside of the center city have been emerging as new employment hubs. Canary Wharf, in the eastern borough of Tower Hamlets, is a prime example of this, resulting from the re-activation of the London Docklands, formerly derelict industrial land along the Thames River that has been transformed as a hub for financial and business services.

Two examples of rapid transit that have been implemented to support and provide better access to Canary Wharf are the Docklands Light Railways (DLR), an automated light rail line network built in 1987, and the Jubilee Line Extension, built in 2000. Employment in Canary Wharf has multiplied as a direct result of the Jubilee Line Extension: in 1999, employment in Canary Wharf was 40,000, of which 9,000 was in the financial sector; by 2001, Canary Wharf financial sector employment surged to 24,000 and total employment to 62,000. Today, Tower Hamlets, the London borough in which Canary Wharf resides, is the fastest growing borough in London and is attracting a number of residents who are consciously choosing to live outside the city center.

The Greater Paris Express Project

The Greater Paris Express project is an effort to rethink connections among the major economic hubs in the Greater Paris region in part because of the growth of cross-suburban journeys, which now represent 70 percent of daily trips in the region. The project includes the construction of about 93 miles of automated metro rail – an orbital system with 57 stations and four additional lines serving the Greater Paris region. The project will improve connections between existing services and use multiple modes to connect passengers across the Île-de-France region. The blueprint was approved unanimously by the supervisory board of the Société du Grand Paris, the organization created in 2010 to oversee the project, and has representation from the State and the region through its eight departments. RATP played a major role in the planning of the project and will bid to operate components of the new framework.

The orbital footprint will provide better suburb-to-suburb travel options, taking pressure off of public transit connections going through Paris and congestion on roadways in the region. The project will also include the extension of existing metro lines, the first of which is expected to open in 2017. The first sections of the orbital metro are expected to open in 2018, and the project completed by 2025.
Connecting Outer Ring Hubs via Circumferential Transit: London Overground

TfL gave its customers the ability to circumnavigate the city without passing through its congested core by stitching together previously underutilized track along the outer rings of the city. In 2007, after suffering years of underinvestment and neglect, the railways of north and west London were integrated with new routes in east and south London to create a new orbital, suburban rail network known as the London Overground.

The London Overground has succeeded in connecting historically isolated parts of London, specifically in the south and east, while helping to facilitate the eastward shift of the city’s center of gravity. Between 2010 and 2012, the network was expanded to include four rail lines that connect 21 London boroughs and South Hertfordshire, all located outside of the central city. To date, 30 percent of all Londoners are within walking distance of one of London Overground’s 83 stations and over 136 million customers per year use the network. The London Overground, coupled with the opening of Crossrail later this decade, are quickly transforming London’s emerging population and employment centers outside of the central business district.
RECOMMENDATIONS

Strategy Six:

To drive the region’s economic growth and maximize its capacity to respond to and recover rapidly from emergencies now and into the future, forge partnerships that will (1) bring together economic development and planning partners, as well as the private sector; and (2) establish more collaborative working relationships with other transit agencies.

To drive the region’s economic growth and maximize its capacity to respond to and recover rapidly from emergencies now and into the future, the MTA must forge partnerships that will (1) bring together economic development and planning partners, as well as the private sector; and (2) establish more collaborative working relationships with other transit agencies. The MTA is a key player in the regional economy by providing the network that facilitates connections and drives economic growth. The location of an MTA transportation asset – be it a subway station, bus stop, or commuter rail station – influences the decisions people make about where to work, what apartment or house to buy, what shop to visit, or show to see. Although the MTA provides this regional backbone, it is rarely involved or consulted when economic development and land use decisions are made by local authorities. MTA must have a seat at the regional decision-making table so it can identify and leverage opportunities to drive growth in areas where the system is not operating at capacity or so it can identify expansion solutions where capacity is constrained. This will also facilitate emergency response and recovery planning across stakeholders in the region and maximize the resiliency of the transportation system.

By partnering with the City, NJ TRANSIT, the Port Authority, and private ferry operators MTA could expand capacity through ferry service and strengthen intermodal connections to the region’s airports. Strategies such as upzoning and coordinated planning (aligning plans with New York City Mayor Bill de Blasio’s goals for affordable housing, for example) will allow the MTA to make better use of existing assets, be more efficient and cost effective, and be a proactive driver of growth. Through more effective working relationships with regional transit agencies, the MTA can better meet its customers’ needs.

Some of the MTA system is at or over capacity, such as the Queens Boulevard or Lexington Avenue lines. Conversely, other parts of the system have the capacity to accommodate more users. Coordinating planning and actively expanding regional partnerships allow MTA to maximize the reach and effectiveness of its services. An example of effective regional coordination is Transcom, which is a coalition of 16 transportation and public safety agencies in the New York-New Jersey-Connecticut metropolitan region (MTA was a founding member). Transcom is dedicated to ensuring effective and coordinated communication by integrating traffic and service information across the region. This proved to be a critical resource during Superstorm Sandy and other emergency events.

MTA has worked with other local partners in New York City to coordinate planning with success. MTA’s partnership with NYC DOT was critical to the creation of the SBS program, which has brought increased capacity and speed of service to congested corridors in four of the five boroughs in City. The two agencies’ partnership was also key to the creation of MTA Bus in 2004, which consolidated the operation of seven private bus franchises formerly overseen by the City. Such partnerships also enabled the application of MetroCard to regional transit providers and will be critical to the region’s adoption of the new fare payment system.

The most recent partnership, making creative use of the City’s developmental and financial powers and the MTA’s transportation capabilities, has been on the Hudson Yards project, in which the development of a new community on the far Western side of Manhattan is being coordinated with the creation of new subway access. The project not only tied together transportation planning with land use

Public Commentary: Facebook

“City Hall, in conjunction with the MTA, Albany and Washington, D.C. needs to get this done together, put politics, community opposition and strings aside to build it up. It’s for the sake of the city, the state, the nation and for the infrastructure.”
planning but created a strategy for all stakeholders – including private developers – to contribute their fair share of the project costs and to later share in the economic and financial benefits of the project.

Transit-oriented development (TOD) is an important strategy for coordinating housing development with the availability of transportation resources. In the coming years, as the City deploys its affordable housing initiative, transportation must be at the table to ensure there are sufficient resources to support new residential centers.

Drawing on the positive results of these previous collaborations, this sixth strategy emphasizes the opportunity to support resiliency planning, economic growth, and regional development by strengthening the relationship between localities’ land use, housing, transportation, and economic planning departments and the MTA, as well improving collaboration across transportation providers in the region. This cooperation will facilitate responses to and recovery from emergencies, better integrate customer service and data sharing, as well as TOD development and the identification of growth opportunities. Furthermore, a more frequent review of interagency operating agreements will help optimize regional service provision. Strategy Six addresses key challenges facing MTA’s future by:

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Response</th>
</tr>
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<tbody>
<tr>
<td>Climate Change</td>
<td>* Coordinating planning to improve the region’s risk mitigation and recovery in the event of extreme weather events by strengthening inter-jurisdictional responses across entities throughout the region; investing in redundancy and expansion to drive economic development and enhance resiliency.</td>
</tr>
<tr>
<td>Growth</td>
<td>* Improving regional coordination to better match growth, land use development and transportation services in the region.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>* Coordinating planning in order to break down silos among entities in the region, provide seamless service and align goal-setting among the agencies and jurisdictions in the system.</td>
</tr>
<tr>
<td>Retrofitting the System for Technological Innovation</td>
<td>* Improving coordination among entities in the region to integrate data generated by different agencies, and provide a platform or dashboard of information that will allow individuals and agencies to assess and operate the system and region more effectively.</td>
</tr>
</tbody>
</table>
RECOMMENDATIONS

**Strategy Six Implementing Actions**

- Strengthen regional cooperation and integration in order to reconcile the status of the MTA as a State public authority with the need for more integrated regional planning and cross-jurisdictional funding, essential to evolving regional economic development and resiliency plans. (Medium-term)
  - In partnership with the appropriate regional players, the MTA should implement a showcase project in each of its service territories that ties an improvement in transportation to local economic development, ensuring that growth areas have access to transit. (Short-term: study)
  - Ensure MTA a seat at the regional economic development decision-making table, including the Regional Economic Development Councils (REDCs), so it can identify and leverage opportunities to drive growth in areas where the system is not operating at capacity or so it can identify expansion solutions where capacity is constrained. In suburban areas, this will require sitting with local towns, villages, and cities. (Medium-term)
  - Facilitate inter-agency capital planning and decision-making by establishing senior level commitment from regional economic development, city planning, and transportation agencies. In areas where land use and zoning are handled at the local level, develop a customized approach for each locality with support from experts within the MTA agencies who are knowledgeable about the localities. Consider both co-locating and embedding staff in similar functions across agencies or creating an inter-agency planning and policy task force that meets regularly to develop a cohesive regional agenda and align policy objectives, including coordinated emergency planning. (Short-term: study)

**Regional Partnership through TFL**

TFL secured full funding for **London Underground’s Northern Line Extension** to Battersea Power Station by facilitating a beneficial funding partnership with the business community, the boroughs, and the central government. The £1 billion (1.57 billion USD) extension, expected to open to revenue service in 2021, will improve access to the London Underground network and generate an estimated 18,000 new homes and 20-25,000 new jobs in the Vauxhall, Nine Elms, and Battersea area. In a spirit of regional collaboration, the boroughs agreed to authorize a new Community Infrastructure Levy (CIL) on new developments in the area, dedicating approximately £300 million (471 million USD) in development contributions to the extension. The developers agreed to pay the resulting development contributions in support of the Northern Line Extension, which was included as an essential piece of a major development of office, retail, and luxury residential properties on the Battersea Power Station site. Over £250 million (391.2 million USD) alone was secured from the major development at the Battersea Power Station site and the remaining was secured from a number of smaller developments in the area. To cover the remaining project costs, the central government created a tax increment financing (TIF) zone to capture value generated from future business rate growth in the area.

- With respect to New York City, establish a mechanism or office whereby the planning staffs of the MTA, Planning, Housing, and EDC can work together to identify and implement opportunities to marry transit expansion and investment with economic development and resiliency planning. (Short-term: planning)
RECOMMENDATIONS

DART as a Regional Collaborator and Economic Driver

Dallas Area Rapid Transit (DART) is a major catalyst for economic development in the region and is a national model of regional cooperation through partnerships with agencies such as the Fort Worth Transportation Authority (T) and the Denton County Transportation Authority (DCTA). As one example of collaboration, DART worked closely with DCTA on the A-train commuter rail by sharing its rail development expertise and leasing its right-of-way and rail diesel cars until the DCTA’s own permanent vehicles were launched. The Trinity Railway Express (TRE), a 34-mile commuter rail service that is jointly owned by the DART and the T, currently operates the A-train through a contract agreement. Collaboration between DART and its partner agencies have resulted in cost savings on shared management, dispatch, liability insurance and maintenance.

Two recent studies examining DART’s economic impact on regional development and the economy found that $4.7 billion invested in the light rail system expansion between 2002 and 2013 has generated $7.4 billion in economic activity, including the creation of approximately 700 new jobs within the agency. Much of this economic development is due to the increase in land value around stations (including $1.5 billion in developments around DART stations), higher commercial rents and increases in taxable contributions ($36.4 million in property taxes).

- Building on MTA’s existing Twenty Year Needs Assessment process, develop a baseline regional plan that identifies growth areas and transportation options to address gaps. Include analysis of forecasted population and employment growth based on active planning and feedback between MTA and local jurisdictions to identify service gaps and the most appropriate investments for filling those gaps. (Short-term)
  - Plan should identify where new or additional services will enhance the resiliency of the system.
  - Plan should incorporate a process to ensure that transportation investments are not playing catch up to land use development by ensuring that MTA stays abreast of development decisions. (Short-term)

- Increase TOD development throughout the region by institutionalizing planning and funding mechanisms (i.e., value capture). (Medium-term)
  - Create a new interagency task force to develop TOD guidelines and processes. Evaluate any barriers created by local, state, or federal laws and regulations, suggesting changes where needed. (Short-term)
  - In partnership with the appropriate regional players, over the next three years the MTA should implement a showcase TOD project in each of its service territories: NYC (such as Broadway Junction in Brooklyn or 125th Street in Harlem) and suburban municipalities that ties an improvement in transportation to local economic development plans with benefits for both players. (Short-term) This initiative should also identify longer term projects that provide obvious opportunities for private development and funding. (Ongoing)

- Recommend that the Governor prioritize TOD in the next round of REDC grants. (Medium-term)
  - MTA should concurrently pursue transit oriented development throughout its service territory by empowering those within its operating agencies who best understand the intricacies of each area to identify and drive such efforts within an MTA-wide development initiative. This approach maximizes opportunities while ensuring consistent application of best practices. (Short-term)

- Facilitate data sharing for better service and regional transportation planning. (Short-term)
  - Create a regional land use and transportation planning database that cross-cuts all agencies and could be a tool for regional decision-making and resiliency planning based on common datasets; inform capital investment planning and value capture opportunities; and quantify

The MTA prepares a Twenty-Year Capital Needs Assessment in advance of the Five-Year Capital Program to identify its core capital investment needs as well as opportunities for system improvement and expansion.

Revisions to interagency operating agreements should reflect public input and review of inter-jurisdictional service needs and help to facilitate operational efficiencies, capacity enhancements (particularly at major transit nodes), emergency response, and more effective use of capital assets such as buses and rail vehicles to support the overall economic health of the region. This will reduce barriers to operational integration across MTA agencies and between other regional transit systems to improve mobility and resiliency.
RECOMMENDATIONS

- benefits resulting from a regional approach to providing service and implementing improvements. (Short-term)
- Require more frequent review of interagency operating agreements (i.e., with ConnDOT and NJ TRANSIT) to facilitate regional mobility and inter-state coordination. (Short-term: study)
Strategy Seven:

All those who benefit from the region’s robust transit system must invest more revenue if the system is to become a resilient, world-class operation, even as MTA delivers significant efficiencies and generates more creative revenues. All those who benefit from the region’s robust transit system must invest more revenue if the system is to become a resilient, world-class operation, even as MTA delivers significant efficiencies and generates more creative revenues. A combination of Federal, State and local funding, as well as MTA bonds and revenues generated by the authority, has allowed the MTA to bring the regional transit system into its current state of improved service and reliability. Most funding sources for its capital program, including both system expansion and maintenance, are discretionary, making it difficult to carry out effective long-term planning and efficient project delivery – a situation that is only becoming worse as public budgets tighten. Today, the federal government funds about 26 percent of the MTA capital program, down from a 34 percent share in the past. Since 1991, the MTA has received a diminishing share of federal transit formula funds, despite the fact that MTA carries 70 percent of the subways riders in the country, 40 percent of the commuter rail riders, and serves a region responsible for nearly 10 percent of the nation’s GDP. Ensuring secure and adequate funding is crucial to the resiliency and economic well-being of the region and the nation.

Funding for the 2010-2014 Capital Program has relied more heavily on bonding than previous programs. Taking advantage of historically low interest rates, the MTA has been able to realize significant savings in debt service expenses, but new revenue sources must be identified to support future capital programs.

The MTA has a program in place to achieve significant recurring savings in its operating budget. In 2014, the MTA expects to achieve $1.1 billion in annual recurring savings and the Financial Plan calls for these savings to grow to $1.5 billion annually by 2017. The MTA Board has adopted a policy that non-recurring revenues, such as tax revenues from large real estate transactions, are used to pay down long-term liabilities, such as underfunded pensions, in order to generate more recurring savings.

Non-fare operating revenues generated by MTA currently account for 5 percent of the operating budget. This includes annual advertising income of $132 million and other rental income. Advertising revenues have increased 70 percent since 2003 and digital advertising shows promise for further growth. Retail revenues have also increased. In Grand Central Terminal, new leases are 50-200 percent higher than expiring leases. The MTA has been able to leverage significant benefits from actions like New York City’s upzoning of the far west side of Manhattan, where redevelopment of the Hudson Yards and creation of a new tax district will pay for the extension of the NYCT No. 7 subway line. This area redevelopment also enabled the MTA to maximize the returns from sale of the LIRR’s West Side rail yards, providing $1.2 billion to support the capital program. The MTA plans to relinquish its headquarters buildings on Madison Avenue through a long-term ground lease that will capitalize on the proposed rezoning of Vanderbilt Avenue. The MTA and New York City Economic Development Corporation have instituted a partnership to dispose of jointly-controlled property no longer needed for transportation purposes. Zoning requirements and bonuses in New York City have also provided important improvements to subway stations in the Central Business District.

In sum, a combination of self-generated revenues and savings, biennial fare and toll increases, the Payroll Mobility Tax (a new revenue source that went to effect in 2009), dedicated taxes, bonds, and federal grants have all contributed to financing the 2010-2014 program. But these existing sources fall short of what will be needed for sustaining a truly great regional transportation system in the years ahead. The MTA and its various divisions can be incentivized to undertake more aggressive entrepreneurial efforts and leverage public-private partnership initiatives to optimize value capture from its many assets. At the same time, projected revenues from all these sources will be inadequate to achieve the objectives identified by the Commission as essential to the continued growth and prosperity of the region.
As outlined in the following recommendations, there are structural and policy changes and new initiatives that can give the MTA the flexibility it needs to reduce costs and increase revenues, but the authority will still be heavily dependent for the bulk of its funding on expanded support from all those who benefit from a robust transit system – Federal, State, regional and city governmental partners, riders, road users, businesses, property owners, developers and the public. Expanded contributions will be required from all these sources if the region is to have the robust and resilient transportation system it needs and deserves. Numerous examples of creative funding techniques to generate additional resources from each of these sources abound, both on the domestic scene and around the globe. It was beyond the scope of this Commission to recommend a specific set of revenue-raisers, but as the five year capital plan for 2015-2019 is reviewed and debated, there is no question that these potential funding opportunities will need to be considered and a formula for balanced and stable funding will need to be put in place. This report seeks to set the stage for those very important deliberations. Funding actions gleaned from national and international experiences can inform those critical deliberations.

Strategy Seven addresses key challenges facing MTA’s future by:

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<tr>
<td>Climate Change</td>
<td>* Funding the recommendations discussed above furthers the mitigation of climate change and provides additional revenue to continue investing in the resiliency of the system.</td>
</tr>
<tr>
<td>Growth</td>
<td>* Identifying potential revenue sources that will allow the Agency to implement a balanced, predictable funding plan for a full framework of investments in the capital program to meet projected growth.</td>
</tr>
<tr>
<td>Institutional Barriers</td>
<td>* Coordinating an approach for generating fair returns to the transit system for the value it adds to real estate will require partnerships with regional entities. That will be a key enhancement to coordinated planning and ongoing relationships among municipal actors.</td>
</tr>
<tr>
<td>Retrofitting the System for Technological Innovation</td>
<td>* Implementing technological innovations that in turn will increase operational efficiency and effectiveness and also enhance revenue opportunities.</td>
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MTA Transportation Reinvention Commission Report
RECOMMENDATIONS

Strategy Seven Options

- A new funding formula for the MTA starts with cost reductions and a more entrepreneurial approach to revenue generation through optimization of all authority assets, such as MTA real estate and advertising. (Ongoing)
  - Opportunities in stations for retail and advertising, including digital signage, should be maximized. (Shorter-term: study)
  - The entire MTA organization must adopt a more entrepreneurial stance and better utilize public-private partnerships such as those described in this report’s recommendations to improve MTA processes and value capture opportunities. (Ongoing)
    - Approaches involving internal reorganization should be actively pursued, including an entrepreneurial operating unit within the MTA to identify potential new revenues of all kinds. While the MTA real estate office generates revenues from existing MTA owned real estate, advertising, transit oriented development and value capture, it is hampered by constrictive procedures and regulations. (Ongoing)
- Volatility in revenues should continue to be managed by establishing reserves to offset cyclical deficits and carefully spending cyclical surpluses on nonrecurring items or initiatives which will produce recurring savings. This includes pay-as-you-go capital investments and prepayment of pensions or other employee benefit costs. (Ongoing)
- All services should be examined for efficiency and sustainability, tapping external resources and expertise when appropriate. For example, prior to being re-engineered, the Access-A-Ride system was plagued with high costs and inefficiencies. It is moving to providing access to transit according to a hierarchy of need: first, by making more of the core system accessible to as many users as possible; second, by using both traditional and emerging commercial on-demand services; and finally, when these methods are not sufficient, with dedicated paratransit vehicles. Progress already made in this direction by MTA should be expanded upon. (Ongoing)
- Clarity and transparency must be the hallmark of financial presentations made to the public and decision makers. MTA finances are complex and, among other things, clear presentation will support the case for additional revenues. These documents must be machine readable to permit historical comparisons. (Ongoing)
- Beyond these MTA driven efforts, to achieve the level of investment necessary to achieve a resilient, world-class, 21st century system, all those who benefit from a robust transit system – Federal, State, regional, and city governmental partners, riders, road users, businesses, property owners, developers and the public– must contribute. Beyond existing revenue streams, MTA should consider examples of national and international funding approaches as described in this report for further revenue generation. (Ongoing)

Sizing the Investment

- Dedicated revenues from a variety of sources have always formed and must continue to form a significant portion of MTA’s funds. It is imperative to structure the MTA’s long-term revenue streams to meet the system’s investment needs, keep pace with inflation and manage volatility. This will allow for long-term planning and management of the system, ensure stable credit ratings, and enable the MTA to operate with far greater efficiency. (Ongoing)
- Establish a level of investment for the MTA at least large enough to meet the long-term reinvestment needs of the MTA asset base. It will not be possible to meet the service quality and customer experience objectives recommended in this report if the physical condition of the system is allowed to degrade. (Ongoing)
  - In providing resources to the MTA, policy makers should be aware that funding over and above historical funding levels are needed to accelerate investments to achieve and sustain assets in good repair, strengthen the core infrastructure and allow for improvements to the system and service expansions.