

# MTA Transportation Reinvention Commission

REPORT / NOVEMBER 2014



**A BOLD DIRECTION *for* LEADING TRANSPORTATION *in* THE NEXT 100 YEARS**

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# Letter from Governor Cuomo

## Letter from Governor Cuomo

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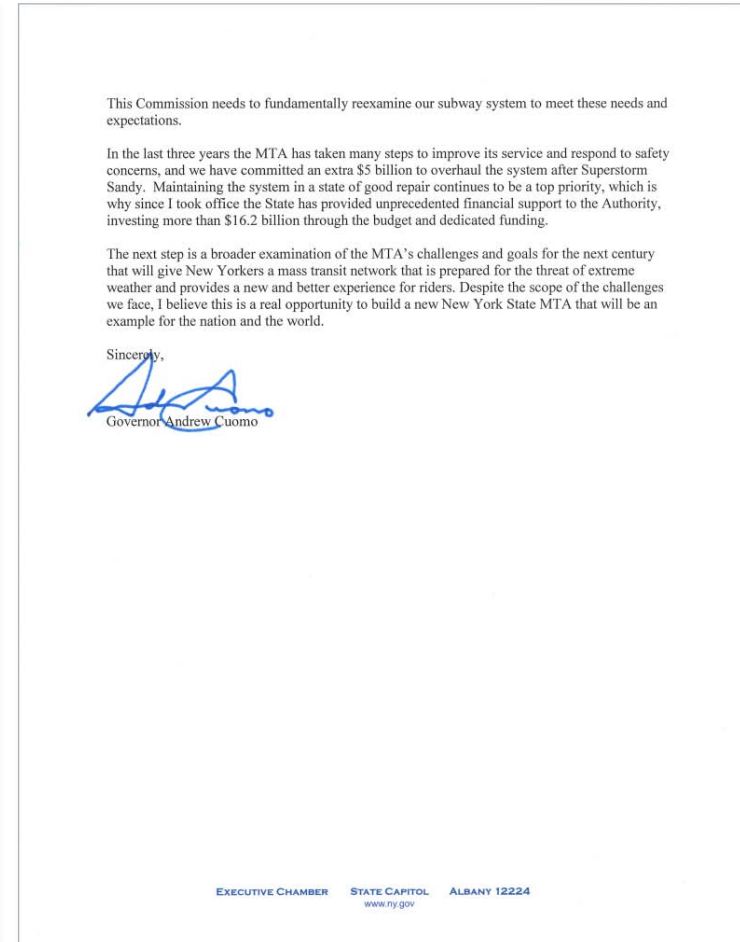
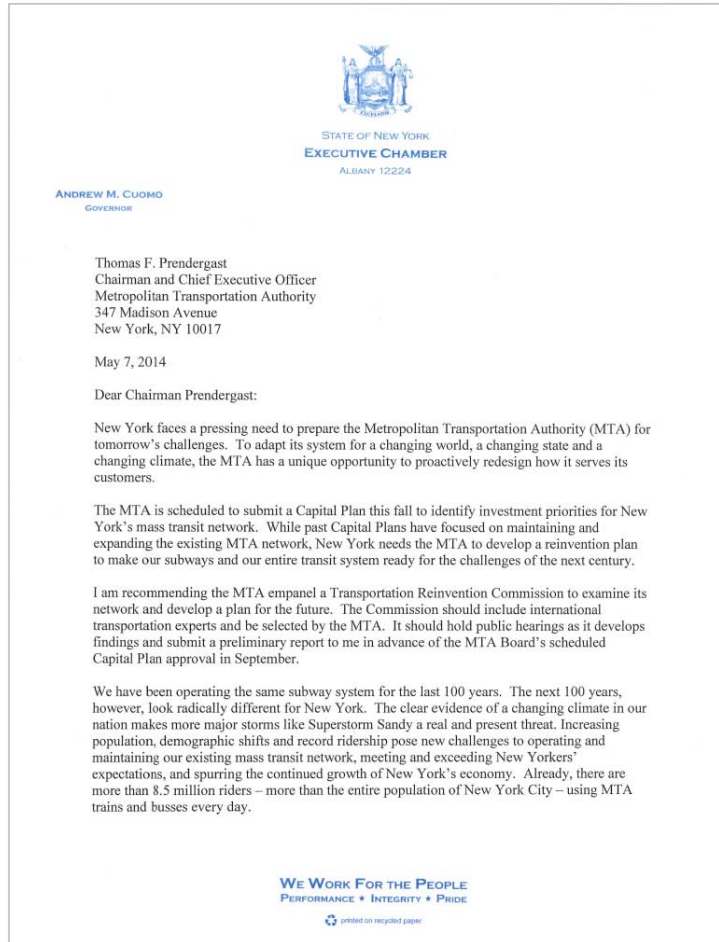
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# Transmittal Letter from the Co-Chairs

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 reinvents 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 nation, 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.<sup>1</sup>

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 the 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 were not inevitable but are 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 a growing population, shifting travel patterns and needs, and stresses from unforeseen emergency events, particularly extreme weather. Throughout this report, the MTA Transportation Reinvention Commission ("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, ensuring 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, and growing expectations for greater connectivity and real-time passenger information. Understanding these challenges and how they can be met will allow the MTA to be proactive in leading change, instead of reacting to internal and external forces.

<sup>1</sup> Based on 2013 National Transit Database data of passenger trips for national systems with common modes.

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At the urging of Governor Andrew Cuomo, the 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 and region.
- 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 with 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 the 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**



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# Commission Members

## Co-Chairs

**Ray LaHood**, *Former Secretary, US Department of Transportation*

**Jane Garvey**, *Former Administrator, Federal Aviation Administration*

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# Executive Summary

## The Challenge and Opportunity

In many ways, the history of the success of the New York region over the last 100 years is linked to the history of its subway, bus, and commuter rail systems, which have been one of its greatest economic drivers. In particular, the past 30 years of dramatic growth and vitality of the 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 its 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 New York State and 80 percent of its tax base, contributing to nearly 10 percent of the nation's gross domestic product (GDP). 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 the prologue to the future; if New Yorkers want to continue to live in a world-class city and region, they must envision and develop a world-class transit system. That means reinventing the Metropolitan Transportation Authority (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 ("the 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 last 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 city, regional, state, and national leaders — that New York's public transport system is vital not just to the regional economy, but also to the nation's economic well-being, 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 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 that are 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 the heightened frequency of extreme weather events, put 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.

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By implementing these strategies, the MTA will reinvent itself into a more resilient system as defined by these critical characteristics:<sup>1</sup>

- **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 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 its 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 of New York, the federal government and indeed all stakeholders in the system should consider. These strategies are not ordered by

priority; they inter-relate 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. These actions reflect the concurrence of the group as a whole; while there was not complete unanimity on all actions, those included in the report reflect the consensus of the group at large. 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 should look for opportunities to expand the use of design-build (DB), public-private partnerships (P3), and other innovative project delivery tools across a multitude of projects and apply best practice in their implementation. 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 a center of excellence within the MTA, armed with broad executive authority and access to senior executive leadership to reform project delivery by reengineering procurement procedures, to ensure contract provisions and project execution practices are best-in-class, and to use more alternative delivery and non-traditional project, financial, and organizational structures. The leaders of this center of excellence should develop and MTA should adopt common practices for procurement, contract provisions, and project management across all MTA agencies. 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. To the extent practicable, large projects should be sequenced across the MTA to maximize

<sup>1</sup> NYC 2100 Commission, “Recommendations to Improve the Strength and Resilience of the Empire State’s Infrastructure,” <http://www.governor.ny.gov/assets/documents/NYS2100.pdf>; NYC Special Initiative for Rebuilding and Resiliency, “A Stronger, More Resilient New York” <http://www.nyc.gov/html/sirr/html/report/report.shtml>

private sector competition. MTA should apply these reforms to early action “proof of concept” projects. The new center of excellence must take a leadership role in coordinating 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. And it should work with external and legislative oversight entities to reduce duplicative, time-consuming, and conflicting oversight of the Capital Program. To accomplish these changes, this group must improve communication with all partners to project delivery, including the design, engineering, and construction community, and embrace private sector expertise and involvement. 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 MTA does business, both on the capital and operating sides.

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 state and federal governments have 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 the 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 and region, 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<sup>2</sup> accessibility throughout the system. Improvements that will enhance the customer experience, such as temperature control and platform doors, should be pursued.

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<sup>2</sup> ADA refers to Americans with Disabilities Act.

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.** This strategy includes targeting expansion investments to growth areas throughout the region that challenge the capacity of the existing system. Through this strategy, the MTA will create reserves in emergencies and ensure that the region leverages that investment to maximize economic development. More capacity is essential in order to continue to serve the extraordinarily large central business district (CBD) bound market, to accommodate projected ridership growth, and to maximize system resiliency and service flexibility. The region's success in weathering emergencies and its continued economic growth and prosperity depend 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 of New York and New Jersey) 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 (LRT), bus rapid transit (BRT)), 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 making the 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 of New York, should implement a true, dedicated BRT 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 BRT or LRT, exploring international examples of agencies that have leveraged existing rail lines and unused rights-of-way to add new rail services, implementing run-through service between different regional systems, improving bus routes by standardizing Select Bus Service (SBS)<sup>3</sup> 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 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 and determine transportation priorities, essential to evolving regional resiliency plans. The MTA needs to foster a decision-making culture that

<sup>3</sup> 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.



is regional in focus. Fully linking transportation 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, including public input into the capital planning process, integrated regional data sharing, and more frequent review of interagency operating agreements are also important elements to delivering these ambitious but essential recommendations.

7. Finally, a resilient, world-class, 21st century system depends on having the funding to pay for on-going investments and improvements. **The MTA must have a balanced, stable, reliable long-term funding plan that includes dedicated revenues and contributions from all who benefit — directly or indirectly — even as the MTA implements a comprehensive program to cut costs and generate more revenue.** This means creating a plan that recognizes the close relationship between both operating and capital needs, and seeks to maximize efficiencies on both sides of the budget as part of a comprehensive funding program. The MTA must embrace a more entrepreneurial approach to revenue generation through optimization of all authority assets such as real estate and advertising while accelerating efforts to reduce costs and enhance public understanding of its budget. Stable funding for the MTA must include long-term revenue streams that are sized to meet the system's investment needs and provide consistent, predictable revenue sources. All those who benefit from the system — federal, state, regional, and city governmental partners, riders, road users, businesses, property owners, developers, and the public — must take responsibility for its financial support, and, in turn, have input on priorities included in the Capital Program. A menu of funding options is available for the MTA and stakeholders in the region to consider

to fund the investment plan. These options include maximizing existing revenue streams, including making the case for more proportionate federal funding, reviewing MTA's existing capital financing paradigm, and strengthening existing tax structures. New revenue sources should also be considered, including value capture, cap-and-trade programs, and vehicle user fees such as parking fees and congestion pricing. The report includes examples of systems, both domestic and international, that have been faced with similar challenges and employed a range of these options to meet their investment needs.

## A Call to Action

The Commission recognizes that this report is only the first step in a long journey. The hard work of choosing among 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 the 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 Metropolitan Transportation Authority (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 system. It has 738 stations — across two states and twelve counties — with 529 stations 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 nation 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 helps to offset the high cost of housing in the city by providing residents with a more affordable transportation option — allowing for a more diversified socioeconomic fabric.<sup>1</sup> 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 who use the system benefit directly, but so do many others. Motorists, businesses large and small, property developers, landowners 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

## MTA's Vast Reach

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 Railroad service area lives within 2 miles of a station.

Data Sources: Caliper, US Census 2010, MTA



New York State and 80 percent of its tax base, contributing to nearly 10 percent to the nation's gross domestic product (GDP). 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. For example, much of its rail rolling stock rehabilitation, new rail vehicle assembly, and new bus manufacture has taken place in Upstate and Western New York communities such as Plattsburgh and Hornell, providing thousands of jobs in these areas. The 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 region.

Continued and sustained investment is vital to building critically needed capacity projects that will meet the needs of a rapidly growing and shifting demographic and economic base. The MTA must continue to evolve 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.<sup>2</sup> The Capital Program has renewed the rail and bus fleet, rebuilt track, improved stations, and invested in the core system to restore

<sup>1</sup> New York City has the lowest annual transportation costs (\$5,752). [http://www.cbrcny.org/sites/default/files/REPORT\\_HousingAffordabilityVsLocation\\_08122014.pdf](http://www.cbrcny.org/sites/default/files/REPORT_HousingAffordabilityVsLocation_08122014.pdf)

<sup>2</sup> <http://www.mta.info/news-subway-ridership-l-r-g-b-d-4-7/2014/03/24/2013-ridership-reaches-65-year-high>

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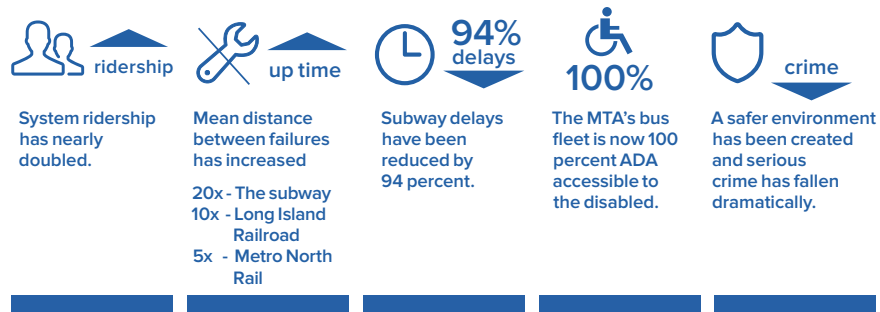
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Since the Capital Program began:



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 (LIRR), and fivefold on Metro-North Railroad (MNR).
- Subway delays have been reduced by 94 percent.
- The MTA's bus fleet is now 100 percent Americans with Disabilities Act (ADA) accessible to the disabled.
- 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.

**A bold vision is required.** This report outlines a large-scale strategic vision for the MTA, 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 100 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.

# 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 city and 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 reinvents itself and its many beneficiaries invest dramatically in this reinvention.

## STRATEGY:

To reinvent itself into this world-class, resilient system, the MTA must:

- Reengineer 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 the existing and emerging population and employment centers not well served by the existing system.
- Forge partnerships 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.
- Establish a balanced, stable, reliable long-term funding plan that includes dedicated revenues and contributions from all who benefit — directly or indirectly — even as the MTA implements a comprehensive program to cut costs and generate more revenue.

## 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, which 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 Sandy, the 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 and other events that might threaten the system in the future.

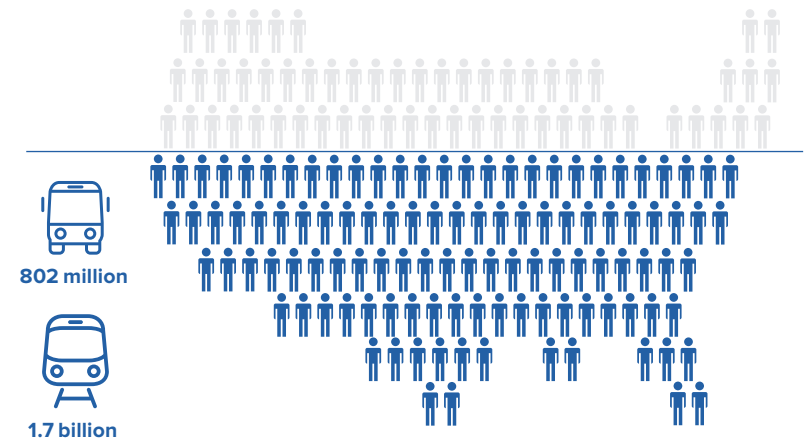
The risks of projected climate change to the MTA system are profound and severe. Increased flooding could damage assets throughout the system, as parts of the region served by the MTA lie within the Federal Emergency Management Agency's (FEMA) 100-year coastal flood zone. Flooding not only affects low-lying 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 increase.<sup>3</sup> 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 over two-thirds of the nation's heavy rail riders, more than 802 million annual bus trips, and 1.7 billion subway trips. More than two million additional 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.

### Record Ridership



Two-thirds of the nation's rail riders use the MTA system, more than 802 million annual bus trips, and 1.7 billion subway trips.

<sup>3</sup> <http://nca2014.globalchange.gov/report/sectors/>

transportation#fn:c41596dd-67b3-460a-8e7c-5b9e5c2a986a.

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 (CBD), 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 the MTA provides service to its customers.

As ridership surges and the traditional rider profile and travel patterns shift, the 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 the 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 CBD 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 services 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.<sup>4</sup> 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.

<sup>4</sup> Taken from several comments through MTA Transportation Reinvention Commission public listening sessions.

- **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 the 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 the 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 MTA 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 remaining behind in deploying them, will reduce the MTA'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 the MTA's ability to build and maintain 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:<sup>5</sup>

- **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.

<sup>5</sup> NYC 2100 Commission, "Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure," <http://www.governor.ny.gov/assets/documents/NYS2100.pdf>; NYC Special Initiative for Rebuilding and Resiliency, "A Stronger, More Resilient New York" <http://www.nyc.gov/html/sirr/html/report/report.shtml>

Public Commentary:  
Twitter

"4 Problems the MTA @ReinventTranspo Commission Must Tackle: debt, construction costs, regional integration, buses"

- **Flexibility and responsiveness**, which allow the MTA to be nimble to changing needs and adopt alternative approaches for responding to challenges. This means creating systems that allow the MTA to communicate with partner agencies and customers quickly and effectively by 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 failures might occur in the system, planning for quicker, targeted, and more effective responses, and making investments to overcome these potential failure points.
- **Recovering quickly from emergencies and evolving over time**, which requires the 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 the MTA 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. Feedback was garnered both in-person and online 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 the 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 frontline 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 funding strategy.







Letter from Governor Cuomo

Transmittal Letter from the Co-Chairs

Commission Members

Executive Summary

Introduction

Recommendations

Conclusion

Acknowledgements

Appendices



**MTA Metro-North Railroad**

MTA Open Data/Sustainability Pilot Project

Providing real-time Metro-North bus and subway arrival/departure information from 2 solar-powered kiosks at Woodlawn Station.

Over the coming year, MTA Metro-North Railroad is testing the performance and reliability of two solar-powered kiosks that provide real-time arrival and departure information and train status information to the North Star NYC Transit Station on the North Star NYC Transit Line. The kiosks are solar-powered and are designed to give MTA customers greater access to accurate, real-time information at Woodlawn Station, both on the Manhattan-bound platform and at the adjacent bus stop adjacent to the station. With the installation of these kiosks, there are thousands of hours, buses and subways, there are thousands of passengers who are already providing information that can be made available to help you get your way. This pilot is just one example of the MTA's efforts to meet your needs while reducing our energy consumption.

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# Recommendations

Overcoming the challenges facing the MTA requires a bold vision for change and a targeted and sustained effort to implement it. To help the 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 a menu of actions that can be undertaken over three time periods: 0 to 5 years, 5 to 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

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



## STRATEGY ONE

**Reengineer the 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 that is flexible and responsive to implementing projects, uses alternative approaches during unforeseen events, and is able to recover quickly from stresses on the system. Better spent dollars across all areas means the ability to allocate resources toward increasing capacity and more reliable and resilient service.

To this end, the 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, the 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, the 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 project to install an Enterprise Asset Management system across the MTA 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 program, while its capital programs must become more externally responsive.

### Recommendations:

#### STRATEGY ONE

#### STRATEGY TWO

#### STRATEGY THREE

#### STRATEGY FOUR

#### STRATEGY FIVE

#### STRATEGY FIVE

#### STRATEGY SIX

#### STRATEGY SEVEN



FASTRACK Brochures  
Source: MTA

This first strategy focuses on further ways to improve how the 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 implement more efficient procedures where they are most appropriate. To assist with implementing more efficient procedures, the MTA should empower a center for excellence within the MTA that is armed with broad executive authority and access to senior executive leadership 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 in order 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 MTA’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:

Challenge	Response
Climate Change	Improving the MTA’s ability to deliver capital projects that will increase the resiliency of the system against the effects of climate change.
Growth	Improving business processes to increase the MTA’s ability to deliver expansion projects.
Institutional Barriers	Reviewing regulations and processes across the operating agencies and with local agencies to reduce redundancies and improve the ability to effectively and efficiently deliver projects.
Retrofitting the System for Technological Innovations	Relying on the expertise of project delivery partners to increase knowledge-sharing and incorporation of efficient technologies for project execution and operation.

STRATEGY ONE

### Strategy One Implementing Actions

- Establish a dedicated center for excellence for innovative project delivery with broad executive authority to make change and access to senior executive leadership, which 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. The center of excellence will be empowered to enact reforms across the MTA.
  - Reform project delivery by reengineering procurement, contract provisions, and project execution to be best-in-class. (Medium-term)
  - Adopt common practices for procurement, contract provisions, and project management across all MTA agencies to uniformly provide the most cost-effective approach. (Short-term)
  - Identify opportunities to use more alternative delivery and non-traditional project, financial, and organizational structures and apply best practices in their implementation. (Short-term)
  - Every project must be evaluated to identify the most cost-effective delivery option, such as design-build (DB), public-private partnerships (P3), or other risk-sharing mechanisms where appropriate. (Short-term)
  - While encouraging risk-sharing with the private sector and private investment, the MTA must improve its approval processes on private development projects and private construction of improvements to MTA facilities. The 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 relationships between 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)
  - To the extent practicable, coordinate and sequence schedules for major projects among MTA operating agencies and other large, capital project intensive city agencies to maximize private sector competition. (Ongoing)
  - 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)

Recommendations:

STRATEGY ONE

STRATEGY TWO

STRATEGY THREE

STRATEGY FOUR

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN

Public Commentary:  
Twitter

“@Reinvent Transpo/#MTAreinvention: @MTA should adopt #Transparency as core value. Financials, bonds, contracts, real estate as open data.”



### Denver Regional Transportation District (RTD) Alternative Project Delivery

**Eagle P3 Project:** 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 P3 project is the first transit-related P3 project in the United States and is considered the national model for transit-related P3s. In 2010, 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. Under this agreement, RTD was able to retain all assets and transfer 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, the concessionaire covered the cost overruns without any additional financial commitments from RTD. RTD will be able to deliver the massive commuter rail 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, RTD had previously formed a unique partnership with the Colorado Department of Transportation to deliver the Transportation Expansion Project (T-REX), 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 nation 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

DB project delivery (i.e., DB, DBB, DBOM, and DBFOM) has been identified as the Province’s “traditional” project delivery method because it consistently 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 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 be awarded to the partner only 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 fixed-price agreement includes a \$255 million private financing component, which achieved additional savings of \$134 million by matching cash flows during construction, reducing interest payments, and decreasing interest costs.

- Work with external and legislative oversight entities to reduce duplicative, time-consuming, and conflicting oversight of the Capital Program. (Ongoing).
- To accomplish these changes, the center of excellence must improve communication with all partners to project delivery, including the design, engineering, and construction community, and embrace private sector expertise and involvement.
- Create early actionable improvements. Pilot improvements through capital projects as “proof of concept,” and use results to reengineer 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)
    - Hold a global competition that employs new procurement methods and seeks new technologies for transit systems. Build on this opportunity for a fresh look at innovative solutions. (Short-term)
- Preserve and secure the ability of existing employees, 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 (e.g., signal maintenance) and skills that present a significant challenge to MTA (e.g., information 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 the MTA has the best transit professionals in the world by creating an MTA Review Group to conduct market reviews of positions that are hard to fill due to private sector competition (i.e., 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)

Hold a global competition that employs new procurement methods and seeks new technologies for transit systems. Build on this opportunity for a fresh look at innovative solutions.

STRATEGY ONE

- 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)
  - Conduct an MTA-wide review of available databases with the aim of encouraging creativity, accountability, and efficiency. (Short-term)
- Make MTA information timelier, more accurate, and more customer friendly. (Short-term)
  - Make it much easier to track the progress of capital projects by providing 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 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 frontline 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 efficiencies 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 frontline 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.

Recommendations:

STRATEGY ONE

STRATEGY TWO

STRATEGY THREE

STRATEGY FOUR

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN







## 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 and that it is safe, secure, reliable, and equipped to handle the next wave of innovations and improvements. The MTA Capital Program — the set of investment projects that the MTA undertakes in each five-year cycle — consists primarily of these types of investments, which 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, key assets, such as subway cars, mainline tracks, and switches, are in good repair. These complex infrastructure rehabilitation and replacement projects have been implemented while maintaining service, as exemplified by the complete rehabilitation of the LIRR'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:

STRATEGY ONE

**STRATEGY TWO**

STRATEGY THREE

STRATEGY FOUR

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN



### Atlantic Avenue Viaduct Rehabilitation

This viaduct has carried Long Island Rail Road (LIRR) trains and customers between downtown Brooklyn and Jamaica since 1901. The three-year rehabilitation project, completed in 2011, strengthened and repaired the existing 199 steel spans supporting the track over Atlantic Avenue and installed new and improved track structure and lighting along the viaduct. To ensure that minimum disruption was felt by the busy neighborhoods near the project, much of the construction was conducted on the weekends. The LIRR maintained full service during the duration of the project, single tracking trains to guarantee that customers had access to LIRR service throughout construction.

But even as assets are brought into good repair, ongoing investment must be sustained to keep them healthy and to 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), which 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 are currently estimated to cost between \$5–\$8 billion per year, a figure that has always exceeded the

MTA’s available funding. The 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, the 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 be accomplished only 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 the MTA’s future by:

**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 the MTA’s rail rolling stock rehabilitation, new rail vehicle assembly, and new bus manufacture has taken place in upstate communities such as Plattsburgh and Hornell, providing thousands of jobs in these areas.

Challenge	Response
Climate Change	Adopting resiliency standards into accelerated and sustained core infrastructure investments so the system can withstand climate change impacts.
Growth	Ensuring the ongoing reliability of the existing system to handle existing ridership, freeing up capital investment for expanding system capacity.
Institutional Barriers	Fostering interagency consistency and priority setting through Enterprise Asset Management.
Retrofitting the System for Technological Innovations	Replacing core assets with ones that offer technological benefits that increase operational and maintenance efficiencies and improve communications.

STRATEGY  
TWO

## Strategy Two Implementing Actions

- Accelerate implementation of capital investments to bring all assets into good repair and sustain that investment to ensure safety, reliability, and resiliency by annually meeting core capital investment needs. (Ongoing)
  - Improve the process of selecting, prioritizing, and delivering capital and core infrastructure investment projects to address asset conditions 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 the MTA can ensure adequate, reasonable, reliable, and alternative means of transportation. Given the challenges of line closures (identifying sufficient alternate service and customer impacts), New York City Transit (NYCT) must take full advantage of closures 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)
- Incorporate information about the level of investment required to maintain and replace the MTA's core infrastructure into the annual discussion of the MTA's Financial Plan so that all stakeholders have an understanding and appreciation of the system's requirements. Currently, it is the MTA's practice not to anticipate the cost and impact of capital expenses until there is an approved capital plan. (Short-term)

### 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



## Washington Metrorail's State of Good Repair

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, the Washington Metropolitan Area Transit Authority (WMATA) created the 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 seven 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) improvements in 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. Since its creation in 2000, 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 Three, 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 CBTC from 2022 onwards. The new automated systems 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. Conditional 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.

## STRATEGY THREE

### Create a 21st century customer experience for all riders with investments designed to increase responsiveness and ease of access characteristic 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 and region, 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 and technological 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 riders and the MTA 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.

The 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 LIRR branch line stations have real-time information displays, and by 2019, every MNR station in New York will have them as well. MTA Bus Time gives real-time information on every bus in New York City. The MTA's franchise with Transit Wireless will deliver Wi-Fi connectivity to all the 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 and other customer information. 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.

**Travel**  **Time**™

**Bus**  **Time**®

**Subway**  **Time**™

**Train**  **Time**™

*Recommendations:*

STRATEGY ONE

STRATEGY TWO

**STRATEGY THREE**

STRATEGY FOUR

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN

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 a new agency-wide 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 the MTA with an opportunity to usher in a new era of high-quality service, starting with a customer charter

that outlines the MTA’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:

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



STRATEGY  
THREE

### Strategy Three Implementing Actions

- Establish a permanent customer charter that addresses customer expectations, establishes performance timelines, commitments, and standards, and reconfirms the MTA's commitment to customer service by 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 and 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 actions 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 array. (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)

Recommendations:

STRATEGY ONE

STRATEGY TWO

**STRATEGY THREE**

STRATEGY FOUR

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN



### Toronto Transit Commission (TTC) Customer Charter

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 TTC 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, TTC focused on creating quick wins, communicated through an online dashboard, to show that it was serious about modernizing the agency and improving customer service.

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 the TTC into "a transit system that makes Toronto proud." Early benefits of the Customer Charter include positive media coverage and improved customer satisfaction scores.

- Improve operational efficiency, enhance the customer experience, and foster safety and resiliency by investing in system technology, (e.g., flood control technologies, intrusion detection, platform door systems, etc.). (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)

A single-fare medium would enhance regional mobility and connectivity. The MTA's effort could be expedited through exploring the 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.

- 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)
  - 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 the 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 manages customer complaints through an all-agency Customer Relationship Management System, which provides customers with a tracking number to monitor the status of a complaint and comply with recording requirements







### Recommendations:

STRATEGY ONE

STRATEGY TWO

**STRATEGY THREE**

STRATEGY FOUR

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN

## 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 272,000m<sup>2</sup> 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 the 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 three-year, complex operation that will ensure interoperability between four French operators (i.e., 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.





## 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 braking 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 braking heat emissions from 50 percent to 18 percent by installing regenerative braking 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 braking technology by 2016. The program was well-received by the media and the public, shining a positive light on TfL'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.

**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 (CBD). 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 to bring more riders onto the existing system requires improving capacity and reliability and increasing 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. The LIRR added late-night and weekend service from Atlantic Terminal to serve 3,300 new customers on game/event nights at Barclays Center. The 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. The 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-traveled 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 the 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 Station Access project would expand rail access for those in the Bronx, Westchester County, and Connecticut, add redundancy to MNR's service, and eliminate the single point of failure posed by the Harlem River Lift Bridge.

*Recommendations:*

STRATEGY ONE

STRATEGY TWO

STRATEGY THREE

**STRATEGY FOUR**

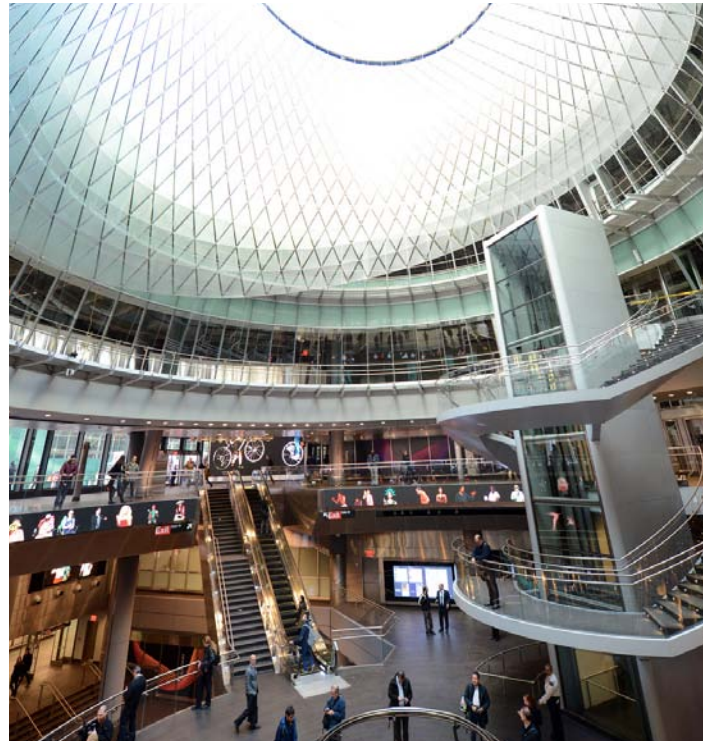
STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN

This fourth strategy focuses on making additional investments to increase the core capacity of the existing system to accommodate the extraordinarily large CBD-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 (BRT) to dense corridors leverage off-peak capacity on available commuter lines. Working with regional transportation agencies such as Amtrak and the Port Authority of New York and New Jersey 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:



Challenge	Response
Climate Change	Creating additional capacity and redundancies in the system that will increase resiliency and mitigate failure points in the event of extreme weather.
Growth	Increasing operational capacity on the existing system and creating new opportunities for transit service that will address future growth needs.
Institutional Barriers	Negotiating agreements between operating agencies and other jurisdictions in the region in order to provide seamless service.
Retrofitting the System for Technological Innovations	Implementing expansion projects using current and future technological standards and innovations.



STRATEGY FOUR

## Strategy Four Implementing Actions

- Prioritize capital investments in areas where the region has significant density or is experiencing significant growth that overburdens 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. (Value capture refers to funding mechanisms where landowners who benefit financially from transit improvements contribute to financing the improvements.) (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 (e.g., true BRT and ferries) could alleviate capacity constraints and redundant services are needed to address single points of failure on existing lines (e.g., BRT 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 New Jersey Transit (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)

Recommendations:

STRATEGY ONE

STRATEGY TWO

STRATEGY THREE

**STRATEGY FOUR**

STRATEGY FIVE

STRATEGY FIVE

STRATEGY SIX

STRATEGY SEVEN

Expansion opportunities include Penn Station Access, long-term completion of full Second Avenue Subway network, and BRT lines. For more information about BRT, see Strategy Five.



## 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 of Berlin. The analysis identified 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, including 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 between major transit corridors. This transit system, taken in its entirety, is known as the “Spiderweb.”

The “Spiderweb” strategy achieved an operations savings of €9.5 million (12 million USD) and an increase of 24 million new trips per year. Its ancillary benefits include 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 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:**

- 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.



## 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 (i.e., 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 Seven, 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 of London. TfL estimates that Crossrail will reduce congestion by up to 60 percent on many Underground lines.



## RATP System Capacity Enhancements

In 2012, RATP launched OCTYS, a new automation technology on Line 3. OCTYS is a semi-automated system that maintains train acceleration and braking, 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 (i.e., no operator) on two lines and has 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.

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**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 MNR’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, the MTA will need to transform into a dynamic system that accommodates a range of new travel patterns (e.g., 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. Recently completed improved passenger connections, including the Jay Street – MetroTech station 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 CBD. Going forward, partnering with ferry operators to support ferry service and feeder service to ferry terminals between outer boroughs (e.g., transporting passengers between hubs in Brooklyn and Queens) 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 MNR 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 MNR–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. The MTA has been leading a collaborative effort among

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the MTA railroads, 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, which is 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 to 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 (e.g., 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 rights-of-way to add new rail service more expeditiously. Creating through-running service between different regional systems such as the MTA railroads and NJ TRANSIT will create new links in services between outlying localities in the region and could allow more efficient use of current network capacity. 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:

Challenge	Response
Climate Change	Creating new service alternatives, particularly more nimble modes like BRT, to improve access across the system, a key resiliency feature.
Growth	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.
Institutional Barriers	Focusing on collaboration with other regional agencies to better serve emerging markets.
Retrofitting the System for Technological Innovations	Investing in new signal and operating technologies to increase efficiency throughout the system.

STRATEGY FIVE

## 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 certain 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 that are not well served by the existing system and that will increase the system's resiliency. (Short-term)
- Implement BRT in emerging (non-CBD) markets, which can be implemented relatively quickly and at a lower capital cost than rail services. Consider LRT 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 Department of Transportation (NYC DOT) and other relevant agencies to implement and showcase true, dedicated BRT. True BRT is defined as a high-performance transit system that combines the speed, reliability, and amenities of rail-based transit systems with the flexibility of buses. To meet high-performance standards, true BRT incorporates certain features, including dedicated and/or physically separated lanes, priority signaling at traffic lights, off-board fare collection, level boarding at multiple doors, real-time bus arrival information, and distinctive branding.
  - Develop a unique brand for the service that builds on lessons learned from SBS implementation and international experiences. Branding should distinguish this as a rapid alternative to existing services by highlighting its unique elements. (Short-term: planning; Medium-term: implementation)
  - Build a network of 20 SBS/BRT routes by 2020. (Medium-term)
- Study the viability of aboveground surface rapid transit concepts that maximize available, underutilized rights-of-way in the city to offer a new service that could run on a frequency that is 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 MNR) 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 of New York and New Jersey 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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### BRT in South America

In Latin America, 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, design elements like off-bus payment and median-separated, and 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.



### BRT 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 CBD in downtown Cleveland, and University Circle, a hub of education, medical facilities, arts, and cultural amenities. The HealthLine line has had a major impact on fostering equity in the area by linking the city's largest employment centers to one of the poorest areas in East Cleveland; roughly 80 percent of riders on the line are transit-dependent. According to research conducted by the Institute for Transportation & Development Policy, 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 their 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 34 percent faster than buses; its ridership, at 15,000 passengers per day, exceeded that of Cleveland's LRT 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.





### Connecting Outer Ring Hubs via Circumferential Transit: London Overground

London has been overhauling its transit system and allowing travelers to circumnavigate the city without passing through its congested core by stitching together previously underutilized track along the outer rings of the city. This ambitious project is known as the London Overground. 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 this new orbital, suburban rail network.

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 city center. 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, discussed in detail in Strategy Seven, are quickly transforming London's emerging population and employment centers outside of the CBD.



### 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 through inner city Paris, and reducing 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, with full project completion by 2025.



### **Serving London's New Employment Centers with Docklands Light Railways (DLR) and the Jubilee Line Extension**

London's CBD has historically covered an area of approximately 10 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 city center 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 LRT 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 with total employment up 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.





## 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. The MTA must have a seat at the regional decision-making table so that 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 of New York, NJ TRANSIT, the Port Authority of New York and New Jersey, and private ferry operators, the MTA could expand capacity through ferry service and strengthen intermodal connections to the region’s airports. Strategies such as upzoning and coordinated planning (e.g., aligning plans with New York City Mayor Bill de Blasio’s goals for affordable housing) 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 will allow the 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.

The MTA has worked with other local partners in New York City to coordinate planning with success. The 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 the 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.

### 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.”

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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 West Side of Manhattan is being coordinated with the creation of new subway access. The project not only tied together transportation planning with land use planning, but also 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 the MTA and the localities’ land use, housing, transportation, and economic planning departments. This strategy also improves collaboration across transportation providers in the region, which 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 provisions. Strategy Six addresses key challenges facing MTA’s future by:

Challenge	Response
Climate Change	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 and investing in redundancy and expansion to drive economic development and enhance resiliency.
Growth	Improving regional coordination to better match growth, land use development, and transportation services in the region.
Institutional Barriers	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.
Retrofitting the System for Technological Innovations	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.

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## 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, which is 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 that the MTA has a seat at the regional economic development decision-making table, including the Regional Economic Development Councils, 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 interagency 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 interagency 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)
    - With respect to New York City, establish a mechanism or office whereby the planning staffs of the MTA, the New York City Departments of Planning, Housing, and Economic Development Corporation can work together to identify and implement opportunities to marry transit expansion and investment with economic development and resiliency planning. (Short-term: planning)
- Building on the 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)

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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.



## 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 improvement 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 zone to capture value generated from future business rate growth in the area.



## Dallas Area Rapid Transit (DART) as a Regional Collaborator and Economic Driver

DART is a major catalyst for economic development in the Dallas region and is a national model of regional cooperation through partnerships with agencies such as the Fort Worth Transportation Authority (The 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 impact on regional development and the economy found that \$4.7 billion invested in the LRT 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).

### *A Bold Direction for Leading Transportation in the Next 100 Years*

- 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 and that MTA stays abreast of development decisions. (Short-term)
- Increase TOD development throughout the region by institutionalizing planning and funding mechanisms (e.g., value capture). (Medium-term)
  - Create a new interagency task force to develop TOD guidelines and processes. Evaluate any barriers created by city, regional, 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 -- the City of New York (e.g., 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 TOD 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 the 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 benefits resulting from a regional approach to providing service and implementing improvements. (Short-term)
- Require more frequent review of interagency operating agreements (e.g., with the Connecticut Department of Transportation and NJ TRANSIT) to facilitate regional mobility and inter-state coordination. (Short-term: study)

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.



**STRATEGY SEVEN**

**Establish a balanced, stable, and reliable long-term funding plan that includes dedicated revenues and contributions from all who benefit—directly or indirectly— even as the MTA implements a comprehensive program to cut costs and generate more revenue.**

The MTA must have a balanced, stable, and reliable long-term funding plan that includes dedicated revenues and contributions from all who benefit — whether directly or indirectly — even as the MTA implements a comprehensive program to cut costs and generate more revenue. A world-class, resilient, 21st century system requires adequate and predictable funding to pay for ongoing investment and improvements. A combination of federal, state, regional, and city funding, as well as MTA bonds and revenues generated by the MTA, 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 the MTA carries 70 percent of the subways riders in the country and 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.

While this report is largely focused on the Capital Program, the operating and capital budgets of the MTA (shown on the following page) are closely linked. Pressures on the operating budget can often lay claim to funding that might otherwise have gone to the capital budget. While the MTA is exploring savings and efficiencies described in the report, a long-term comprehensive funding plan that takes into account both operating and capital needs is essential to creating a resilient, 21st century system.

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 nonrecurring revenues, such as tax revenues from large real estate transactions, are to be used to pay down long-term liabilities, such as underfunded pensions, in order to generate more recurring savings.

Non-fare operating revenues generated by the 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 to 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 CBD.

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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 MTA 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 and, in turn, they should have input on priorities included in the Capital Program. 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.

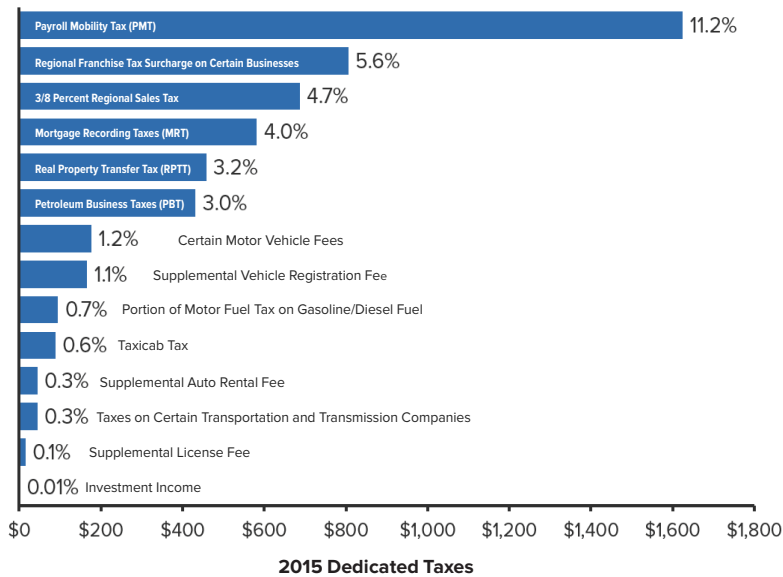
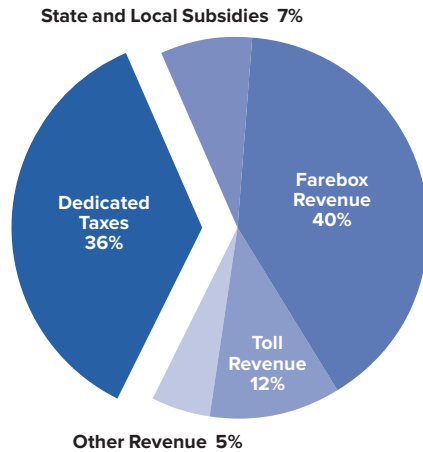
Strategy Seven addresses key challenges facing MTA’s future by:

Challenge	Response
Climate Change	Funding the recommendations discussed above furthers the mitigation of climate change and provides additional revenue to continue investing in the resiliency of the system.
Growth	Identifying potential revenue sources that will allow the MTA to implement a balanced, predictable funding plan for a full framework of investments in the Capital Program to meet projected growth.
Institutional Barriers	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.
Retrofitting the System for Technological Innovations	Implementing technological innovations that in turn will increase operational efficiency and effectiveness and also enhance revenue opportunities.

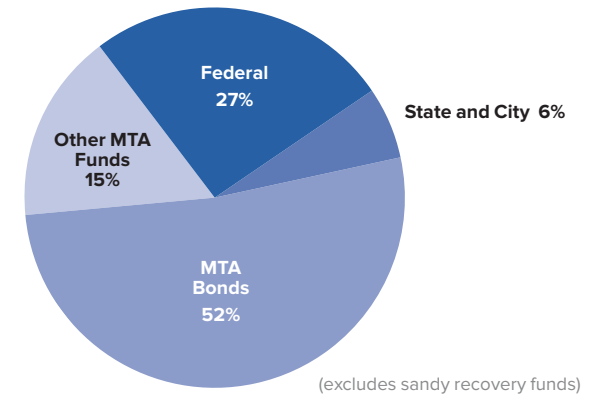
STRATEGY SEVEN

## Operating Budget and Capital Plan

### 2015 Operating Budget – Sources of Revenue



### 2010-14 Capital Plan Sources



#### Federal Funding

**Title III** – Transit Section 3 (5309) and Section 9 (5337) formula grants. Five-year forecasts based on recent annual appropriations and expectations for Transportation Bill Reauthorization

**Title I** – Highway grants (CMAQ and STP) are competitive and flow through NYS DOT

**New Starts, Earmarks, and Discretionary** – Project-specific appropriations. Included in funding forecasts only if project has funding agreements

#### State Funding

**Direct NYS Contributions** – Estimates dependent on discussion/agreement with Governor, NYS DOT, NYS Legislature

#### City of New York Funding

**Five-Year Contributions to NYCT Program** – per prior agreement with NYC OMB and Mayor’s Executive Budget

**MTA Bus Local Match** – The City provides the 20% match to MTA Bus’ federal grants. MTA develops estimates based on forecasts of federal appropriations (actual grant amount requires annual negotiation with NYC DOT)

#### MTA and Other Local Funding

**MTA Bonds** – Backed by operating sources, including fare/toll revenues, taxes and subsidies. Five-year projections based on MTA Financial Plan forecast of available sources

**Other MTA** – Forecasts of capital asset sales, investment income, pay-as-you-go contributions from the operating budget and other misc sources

**Other Local** – Direct local contributions. Estimates dependent on discussion/agreement with other localities and other governmental entities

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## 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, must be maximized. The MTA must tap private sector expertise to develop more entrepreneurial ways to enhance this revenue stream. (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, TOD, 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 that 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 reengineered, 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 the MTA should be expanded upon. (Ongoing)
  - Clarity and transparency must be the hallmark of financial presentations made to the public and decision-makers. The MTA’s 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 secure the level of investment necessary to achieve a world-class, resilient, 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, the 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 the 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 that is 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. In addition, funding for mega-projects should be identified at the beginning of the project, particularly if the construction will span more than one capital program. (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, achieve and sustain assets in good repair, strengthen the core infrastructure, and allow for improvements to the system and service expansions.
    - Currently, on a net basis, those who benefit from the system contribute less than the amount needed to keep these benefits flowing and meet the needs of the future. Additional contributions will be required to reach the service goals envisioned in this report.

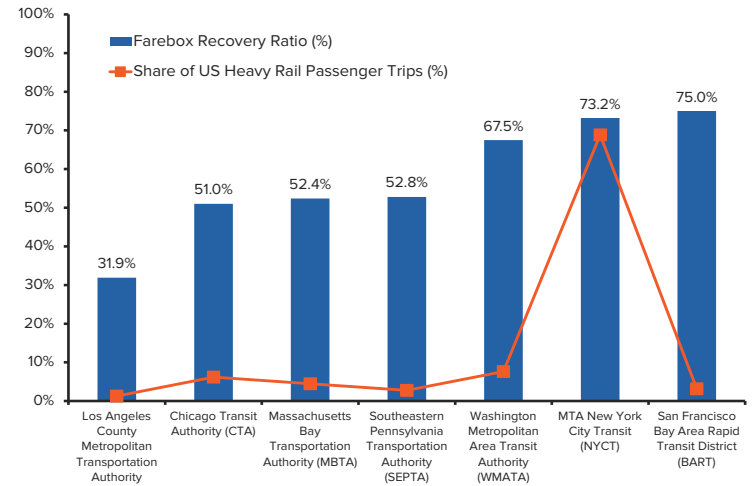
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Strategy Seven Options *(continued)*

Maximize Existing Revenue Streams

- Implement a joint effort to make the case for a more proportionate share of federal funding for transit and for the MTA based on its share of national transit ridership. This should involve all those with a stake in the success of the MTA, including New York State, New York City, other local governments, business, and labor and rider representatives.
  - Review current dedicated taxes for loopholes that could be closed to create a more robust and equitable revenue stream, including possible consolidation or restructuring of dedicated revenue sources. For example, the all-cash transactions for costly residences that have become increasingly commonplace in New York City are not subject to the mortgage recording tax. (Ongoing)
  - Review enabling legislation for innovative funding mechanisms to ensure that they are accomplishing their intended goals. (Short-term)
  - Consider revising the MTA’s capital financing paradigm. The current approach, which is mandated by statute and depends on political agreement for new funding for each successive five-year capital plan, is inconsistent with the long-term nature of the capital needs of the system.
    - As the MTA’s expansion projects become increasingly large, they are financed over the course of multiple five-year capital programs. Funding policies should ensure that such projects can be predictably financed over many years; this is one reason dedicated revenues that flow through directly to the MTA should be preferred over annual appropriations. (Ongoing)
  - In the past, voters have approved transportation bonds issued by New York State to fund MTA improvements. This option should be considered for funding future capital plans and the revenues issued to the MTA upon approval by the voters.
  - The payroll tax collected within the region to support transit is a vital source of support for the MTA. The Commission largely agrees that it should remain in place given transit’s contribution to the region’s businesses.
  - Taxes enacted for the purpose of supporting transit should not be diverted to other uses. This further adds to the volatility of the MTA’s revenue base.

- Fares and tolls already provide a significant share of the MTA’s funding and they must continue to be a component of a balanced funding formula even as the MTA seeks to maximize other existing revenue streams. (Ongoing)
  - The funding formula for the MTA should recognize the trade-off between the increased self-sufficiency that comes with higher fares and tolls versus dedicated taxes or appropriations that depend on legislative action. Specifically, it must recognize that the NYCT, which accounts for over two-thirds of the nation’s heavy rail trips, has one of the highest fare recovery ratios of all heavy rail operations. It should also take into account increasing support from the other constituencies that benefit from the region’s extensive transit system. An equitable approach to contributions from all these sources is needed. (Ongoing)



- Perform a comprehensive study that re-examines the MTA’s approach to fares and tolls. Fare policies vary around the world. For example, some world cities maintain a flat fare for their systems (Beijing, Mexico City, Moscow, New York, Paris and Rome) and some base fares on how far their customers travel or time of day (London and several cities in Asia.) New technology presents an opportunity for the MTA to evaluate approaches used in other world cities while improving mobility in the region.
  - This study should consider practices in competitor regions and judge any potential change against policy criteria that

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## Value Capture Mechanisms in London

**Crossrail 1**, a new rail line running east-west through central London opening in 2018, will provide high-frequency high-capacity service to 40 stations, increasing London's capacity by 8 to 10 percent and providing an estimated 200 million annual passengers with direct connections to London's main employment centers. The line, which includes 8 new stations and 28 other station upgrades, will link Heathrow with Paddington, the West End, the City of London, and Canary Wharf and will provide 1.5 million people with the ability to reach London's key business districts within 45 minutes.

As a result, many areas above and adjacent to future stations will be transformed into new economic and residential centers, adding an estimated £5.5 billion (8.6 billion USD) in value to property along its route between 2012 and 2021. Over the next decade, the value of commercial properties located near stations will likely increase by 10 percent. The business community responded to these benefits, by strongly promoting the project and agreeing to fund 36 percent of the £14.5 billion (22.8 billion USD) project with two innovative value capture mechanisms:

- The 2009 Business Rate Supplements Act allows authorities to levy supplements on the business rate to support projects aimed at economic development in the area. The Greater London Authority will contribute £4.1 billion (6.45 billion USD) to the Crossrail 1 project, with income generated from a business rates supplement (BRS) on properties above £55,000 (86,500 USD) in the 32 London boroughs and the city of London. With this threshold, less than 1 in 5 of London's businesses are liable to pay the Crossrail BRS, which protects small business owners in the area and restricts the levy to the businesses that will benefit the most from Crossrail 1.
- The Community Infrastructure Levy (CIL) allows authorities in England and Wales to raise funds from developers undertaking new residential and commercial developments in the area. In London, CILs are collected by the London boroughs and apply to most new development after April 2012. CILs will generate £1.1 billion (1.7 billion USD) in revenue for Crossrail 1.

Crossrail 1's funding package did not implement a mechanism to capture increases in residential values near stations, even though those are projected over the next decade to increase by 25 percent in London and 20 percent in the suburbs.

**Crossrail 2**, a new rail line running southwest-northeast through Central London, is currently in the planning stages and will likely require the financial support of the businesses and residents of London.

## *A Bold Direction for Leading Transportation in the Next 100 Years*

include the impact on: ridership; mobility; equity especially on those least able to pay or those who have only been able to find affordably priced housing far from the centers of employment; socioeconomic impact on the region; cost to the user in relation to benefits received; revenue raised; ability to support a high performing system; the environment; and the region's competitiveness.

- This study should examine the advantages and disadvantages of setting a target for the portion of MTA costs paid by users, and should refer back to the actual history of rate setting by the MTA and other agencies in the region.

### *New Revenue Sources for Consideration*

- Value capture, which refers to funding mechanisms where landowners who benefit financially from transit improvements contribute to financing the improvements, has become an increasingly important funding source for transit investments throughout the world. Drawing on these examples, the MTA should form a task force with private sector participation to consider new forms of value capture, including social activity bonds, tax increment financing, and rezoning, as well as other potential financing vehicles that fit within the MTA's existing legal authority to take action. Several large capital projects have been financed in recent years using value capture, including the Hudson Yards and Atlantic Yards projects. That said, the MTA and the region have barely scratched the surface in achieving the revenue and possible investment associated with TOD and value capture. (Ongoing)
  - The MTA, New York City, and suburban communities should work together to identify both short- and long-term opportunities to capture some of the value the MTA system provides to real estate, including TOD near MTA services and stations. Similar efforts should be undertaken with suburban jurisdictions. (Ongoing)
    - This initiative should identify pilot projects to be completed and longer-term projects that provide obvious opportunities for private development and funding. (Ongoing)
    - Explore creating a "development fund" for extending transit (by whatever mode) in the outer boroughs and maximize MTA value capture via re-zonings or other mechanisms. (Ongoing)
    - Local rezoning, housing, and economic development plans should include a mechanism for funding and delivering the necessary infrastructure capacity and accessibility improvements. Where new construction will place strain on affected subway stations and lines, possible funds from development and transit improvements should be in place before the new development opens. (Ongoing)





## WMATA Value Capture National Gold Standard

WMATA has dedicated 18 in-house positions with various skill sets to advance value capture and real estate opportunities for the agency. WMATA's NoMa-Gallaudet U station, Metrorail's new Silver Line and another proposed infill station, Potomac Yard station include significant value capture components.

The **NoMa – Gallaudet U station** opened in 2004 as the Metrorail's first infill station. Prior to construction, property in the vicinity of the station consisted of industrial development and vacant land. The private sector proposed redevelopment of the area and established a task force of major developers, area property owners, corporate business leaders, and community leaders to leverage private investment for the proposed station. Property owners permanently donated \$10 million in land, funding 10 percent of the \$104 million project. To further reduce property acquisition costs, other adjacent properties were temporarily donated for construction storage and staging purposes. Property owners within 2,500 feet of the future station agreed to fund \$25 million (24 percent) by increasing property taxes through the creation of a special assessment district. The project's funding package also included \$25 million (24 percent) in federal earmarks and \$44 million (42 percent) from the District of Columbia. The station was the catalyst for a substantial transformation of NoMa (a designation for the area north of Massachusetts Avenue), generating over \$3 billion in private investments from eight million square feet of office, retail, residential, and hotel construction, which was well in excess of the initial \$1 billion estimate.

The **Metrorail Silver Line** is a new 23-mile, two-phase extension connecting the Tysons, Reston, Herndon, and Dulles Airport areas of Fairfax County, Virginia, to WMATA's Metrorail system. Fairfax and Loudon counties created two special assessment districts, increasing property taxes on commercial and industrial properties along the right-of-way and dedicating a total of \$901 million (15 percent of total project costs) to the line. The remaining project

costs for Phase 1 were funded by \$1,354 million in Dulles Toll Road (DTR) revenues, a \$900 million New Starts grant, and \$251.7 million in Commonwealth of Virginia funds. Phase I of the Silver Line opened to revenue service mid-2014, already boasting over 20 million square feet of new office space around its five stations, increasing total office space by 40 percent in the Tysons area. WMATA estimates that this statistic as well as the creation of over 2 million square feet of retail space (more than twice the size of Tysons Galleria mall), 17,800 new residential units (over double the current population of the Tysons area), and 9,300 hotel rooms is valued at over \$18 billion.

Similar to the NoMa Gallaudet U station, the **proposed Potomac Yard station's** preliminary funding package includes significant private sector contributions and the creation of two special assessment districts. The City of Alexandria, Virginia plans to issue up to \$275 million in general obligation bonds to finance the costs associated with the station, backed by a soft dedication of the following revenues:

- In return for land rezoning, the City of Alexandria secured **developer contributions** of \$10 per square foot for all development within a quarter mile of the proposed station. The approved rezoning plan would allow the conversion of the existing 600,000 square-foot "big-box" development into a 7.5 million square-foot mixed-use development. The City of Alexandria estimates a total of \$50 million in developer contributions. If contributions meet or exceed this estimate, it will be one of the largest equity investments for transit station infrastructure in the nation to date.
- The City of Alexandria created a **high-density special assessment district** on commercial properties, with plans to create a second, **low-density special assessment district** on all properties once the station opens in 2018.
- The City of Alexandria dedicated **net new tax revenues** in the area to the station and will likely require additional unknown revenues, which will be determined once the final station location is chosen.

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- The MTA and local governments, as well as Connecticut and New Jersey, should work cooperatively to encourage growth around transit and cooperatively fund transit improvements from the increased value and economic activity. (Ongoing)
- The MTA and its local partners should establish a goal for private investment into station infrastructure and aggressively pursue this goal.
- The MTA should concurrently pursue TOD 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.
- The reforms to the MTA's procurement, contracting, and project oversight processes, detailed in earlier recommendations, will be needed to encourage risk-sharing with the private sector and private investment. The MTA must improve its approval processes on private development projects and private construction of improvements to MTA facilities, including mechanisms such as additional fees for expedited reviews. (Ongoing)
- A significant portion of the region's greenhouse gases come from vehicular transportation sources and increased use of transit is a necessary component of any regional emissions reduction strategy. California's greenhouse gas cap-and-trade program is an important revenue source to transit; the approach used in California should be considered for the Regional Greenhouse Gas Initiative (RGGI), which includes New York State, as an additional potential revenue source for transit. (Ongoing)
- New sources of revenue generation must be explored from roadway users in the Tri-State Region (including both New Jersey and Connecticut), who must contribute a fair share of revenues to support the regional transportation system. (Ongoing)
  - A variety of alternatives for increasing contributions from roadway users have been used nationally and internationally including parking fees (Sydney) and congestion pricing (Stockholm and London). The MTA region should look at these alternatives and identify their benefits, costs and impacts (Ongoing).

## Cap-and-Trade in New York and California

The RGGI is a multi-state cap-and-trade program established by New York, Connecticut, Maryland, Maine, Delaware, Massachusetts, New Hampshire, Rhode Island, and Vermont. (Cap-and-trade programs are market-based strategies designed to control emissions or pollutants by providing economic incentives for achieving reductions in those emissions through limits or "caps" on the total amount of emissions and allowances for the right to emit a specific amount of emissions.) The RGGI was the nation's first market-based CO<sub>2</sub> reduction program. While over \$1.75 billion in revenue has been generated to date, approximately 2 percent of the share of these revenues in New York is dedicated to transportation, representing 0.5 percent of the return that transportation modes contribute to the program.

In contrast, California established a greenhouse gas cap-and-trade program, with transportation at the center of its plans for emissions reductions. The program was created with the enactment of the Global Warming Solutions Act of 2006. The initial auction took place in 2012, and in 2014, the Legislature and Governor allocated 60 percent of the long-term revenues with at least 40 percent of the funds going to transportation, representing about \$500 million in California's 2014/15 fiscal year budget. One-quarter of the funds are dedicated to high-speed rail and the remainder can be used for a range of needs including transit operations and capital programs.





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## Dedicated Transportation Fund to Boost Development in London

In 2012, the Mayor of London called for the creation of a dedicated £300million (469 million USD) transportation fund to support eight transportation projects located within areas of Greater London that had previously been hindered by their lack of public transportation options. Successful completion of the eight projects, achieved by plugging existing project funding gaps with fund revenues, would support development expected to generate an estimated 50,000 new homes and 50,000 new jobs in the targeted areas. In TfL's 2012 Business Plan, the agency dedicated the entirety of the £300million (469 million USD) fund from surpluses achieved through its Savings and Efficiencies program, discussed in detail in Strategy One, and revenues generated from property, advertising, and retail assets. Approximately £170million (266 million USD) funded improvements to London's roadway bottlenecks and the remaining £130 million (203 million USD) supported London Underground and Crossrail station upgrades.

## Parking Fees in Sydney, Australia

In 1992, the New South Wales Government introduced annual off-street commercial and office parking space fees to generate additional revenue for public transportation and to encourage increased use of public transportation. The annual fees were originally imposed on two of Sydney's major bisecting commercial centers, Sydney's CBD and the North Sydney/Milsons Point district. In 2000, the annual parking fees were expanded to include university and industrial districts, including the Bondi Junction, Chatswood, Parramatta, and St Leonards districts. Since 2003, the fees have been annually increased with inflation, and were doubled in 2009 with the passage of revised legislation. As of 2014, the parking fee for parking spaces located within the original two districts is 1,967 AUD (1,694 USD) per space per year and the parking fee within the four expanded districts is 636 AUD (556 USD) per space per year. Sydney's strategic implementation of parking fees created a long-term, stable, and predictable source of revenue for public transportation, which over the years has been consistently used to support public transportation within the districts, including advancements for bus and LRT and upgrades to passenger information systems. As of June 2013, total parking fee contributions toward Sydney's completed public transportation projects amounted to approximately 574 million AUD (500 million USD). In 2013, 30 percent (25.6 million USD) of annual parking fee revenues were directly used to fund public transportation infrastructure in the districts. The remaining 70 percent was reserved for future public transportation investments, increasing the total amount of public transportation funds from parking space fees reserved for future use to 149.4 million (130.7 million USD).





## Congestion Pricing in Europe

### **Stockholm**

After a six-month congestion pricing trial period in 2006, a public referendum on the program enabled the permanent implementation of a congestion pricing scheme in 2007. Using Automatic Number Plate Recognition System technology at 18 control points, non-exempt vehicles are charged a time-variable price when entering and exiting Stockholm's 13.8 square-mile city center. Charges vary between 10, 15, and 20 kroners (1.50, 2.50, and 3.25 USD) depending on a fixed daily schedule. Fees are assessed Monday through Friday from 6:30AM to 6:30PM for each entrance and exit to the city center made by a non-exempt vehicle, up to a maximum daily charge per vehicle of 60 kroners (8.00 USD). Fees are not assessed on public holidays and during the month of July. Emergency vehicles, buses, motorcycles, foreign-registered vehicles, and disabled persons are exempt from the congestion fee.

Though congestion pricing is known primarily as a congestion mitigation tool, the congestion pricing scheme generated 650 million kroners (101 million USD) in net revenues in 2010, creating a stable funding source for transportation in Stockholm. Charges were not automatically set up to increase with inflation and have not manually been increased; even so, congestion pricing has consistently decreased non-exempt traffic in Stockholm's city center by 29 percent. In addition, the policy has increased public transportation ridership by 8 percent, reduced greenhouse gas emissions by 14 percent, and increased retail sales within the city center by 10 percent. Stockholm underwent an extensive transition period that resulted in changes in travel patterns and a greater public acceptance of road pricing. Overall public acceptability of the congestion charge increased from 36 percent during implementation in 2006 to 70 percent in 2011.

### **London**

In 2003, a congestion pricing scheme was implemented in the 8.5 square-mile area of central London for the purpose of mitigating congestion and generating additional revenue for transportation. Using Automatic Number Plate Recognition System technology, non-exempt vehicles are charged a flat daily fee (£10.50/16.57 USD auto pay, £11.50/18.15 USD advance pay) when entering or exiting the "charging zone." Fees are assessed Monday through Friday from 7:00AM to 6:00PM for each non-exempt vehicle that travels within the "charging zone." Zone residents receive a 90 percent discount. Taxis, private-hire vehicles, motorcycles, bicycles, buses, alternative fuel vehicles, and eligible disabled persons are exempt from the congestion fee.

As a result of the scheme, traffic in the congestion zone has decreased by 27 percent, removing 80,000 vehicles per day, and increasing average travel speeds within the "congestion zone" by 5 to 8 mph. The scheme resulted in an estimated 14 percent increase in bus ridership and a 66 percent increase in bicycle usage. Other benefits include reduced emissions, improved road safety, and increased retail activity in the "charging zone." By law, annual net revenues must be reinvested into London's transportation infrastructure. In 2012/13, the scheme generated £139 million (219.4 million USD) in net revenues, which supported improvements to transportation in London, including bus network improvements, road safety measures, and better walking and cycling facilities.

## Conclusion

To remain a world-class city and region, New York must have a resilient transit system that will sustain its growth needs. The ideas presented in this report represent a collaborative effort by experts from around the world. The Commission's proposed reforms and strategies in this report are the first step in providing greater transparency, accountability, efficiency, and public confidence in the MTA and for providing for the region's future needs. The strategies presented in the report are structured in a way to help guide the MTA and its stakeholders in identifying and making organizational and investment choices that will have both an immediate and an ongoing impact. These recommendations are informed by national and international examples of success, particularly ways that all regional actors can participate to create a better MTA. 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.

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*Transmittal Letter from  
the Co-Chairs*

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## Acknowledgements

The following invited speakers, drawn from regional agencies, civic and transportation advocacy groups, and the business community, are acknowledged for the time and expertise they provided during this effort.

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Charles Brecher, Citizens Budget Commission

Gerard Bringmann, Long Island Rail Road Commuter's Council

Kevin S. Corbett, Empire State Transportation Alliance

Walter Edwards, Harlem Business Alliance

Emil Frankel, formerly of USDOT

David Giles, Center for Urban Future

Randolph Glucksman, Metro-North Riders Council

Veronique Hakim, NJ TRANSIT

John Hartwell, Connecticut Commuter Rail Council

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## Appendices

The following appendices include supplemental information used to frame the report. The appendices include:

- Appendix A: Challenges
- Appendix B: Summary of Social Media and Public Engagement
- Appendix C: List of Reference Documents
- Appendix D: Abbreviations
- Appendix E: Glossary

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## Appendix A: Challenges

A wide variety of challenges will impact — and potentially inhibit — the MTA’s ability to fully deliver service to its customers during the balance of the 21st century. They are wide-ranging — affecting the rider experience, system operation, regional cohesion, and long-term development. The Commission identified four major challenges as the most critical for the MTA to address in order to meet the needs of the next 100 years, including:

- **Climate Change**
- **Population Growth, Record Ridership, and Demographic Shifts**
- **Institutional Barriers**
- **Retrofitting the MTA System to Incorporate Technological Innovation**

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## Climate Change

In October 2012, Superstorm Sandy hit the New York region, causing billions of dollars in damages, devastating the MTA system, and wreaking havoc on the daily lives of residents in ways that had been previously unimaginable.

**Superstorm Sandy highlighted that the MTA system is not only vital to the regional economy, but to the national economy as the New York metropolitan area constitutes nearly 10 percent of the nation's GDP.**

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.

The MTA needs to understand what future weather patterns might look like and to put a plan in place to prevent or mitigate the potential negative impacts that climate change will bring.

### Observed Changes in Northeast Climate

There is ample evidence that climate conditions have changed over the past century:

- Temperatures in the Northeast have risen by 2 degrees Fahrenheit between 1895 and 2011, resulting in increasing spans of extreme high temperature days.
- Precipitation has increased by more than 10 percent (approximately 5 inches total) in the region over the same period.
- In the past 50 years, between 1958 and 2010, the Northeast experienced more than a 70 percent increase in precipitation falling during “heavy events.”<sup>1,2</sup>
- In the past 100 years, sea level has increased by 1.2 feet, a higher rate than the global average of 8 inches.

<sup>1</sup> “Heavy events” are defined as the heaviest 1 percent of all daily precipitation events  
<sup>2</sup> U.S. Global Change Research Program, Climate Change Impacts in the United States, Chapter 16: Northeast.

Sea level rise is critical to the New York region due to the increased likelihood of flooding. Sixty-three percent of people at risk in the Northeast region — defined as those living within the Federal Emergency Management Agency’s (FEMA) 100-year coastal flood zone — live in New York and New Jersey. Sea level rise, coupled with increasing amounts of precipitation, can lead to record-breaking high tides and storm surge, causing substantial flooding such as that experienced by the New York region during Superstorm Sandy.

### Projected Changes in Northeast Climate

Beyond these observed changes, peer-reviewed research by leading climate scientists projects higher temperatures, larger increases in the amount of precipitation and sea level rise, as well as increases in the number of extreme weather events in the future. The number of days per year in the Northeast where the temperature reaches 90 degrees Fahrenheit or above is expected to increase, and that increase will be more pronounced with the combined effect of higher levels of greenhouse gases.<sup>3</sup> Temperatures are also expected to increase on average from 4 to 10 degrees Fahrenheit by 2100, resulting in warmer temperatures in the winter<sup>4</sup> and more rain events instead of snow, with greater flooding risks.

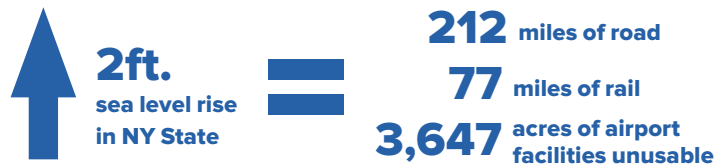
Sea level rise is expected to increase 1 to 4 feet by 2100 in the Northeast, with some experts projecting a rise of as much as 6 feet in New York City and Long Island in some scenarios. A rising sea level of only 2 feet could triple the frequency of coastal flooding through areas in the Northeast, damaging infrastructure in low-lying areas, which would affect much of the New York metropolitan area. It also would increase the frequency of current “100-year flood” levels (severe flood levels with a 1-in-100 likelihood of occurring in any given year); by the end of the century, New York City may experience a 100-year flood every 10 to 22 years, on average.<sup>5</sup> Increased precipitation, especially in extreme weather events, heightens the risk of flash flooding and erosion.

<sup>3</sup> U.S. Global Change Research Program, Climate Change Impacts in the United States, Chapter 16: Northeast.  
<sup>4</sup> NYS 2100 Commission. “Challenges Facing the Empire State.”  
<sup>5</sup> <http://www.epa.gov/climatechange/impacts-adaptation/northeast.html#ref2>



### Climate Change Effects on the MTA System

During Hurricane Irene in August 2011, flood risk led to the mandatory evacuation of 2.3 million residents in New York, New Jersey, and Delaware and wreaked catastrophic damage to MNR's Port Jervis Line, which was out of service for several months. During Superstorm Sandy, storm tides of up to 14 feet flooded nine of fourteen subway tunnels, Amtrak's East River tunnels, and three vehicle tunnels and caused significant damage to electrical grids, including the loss of power to Lower Manhattan.<sup>6</sup> The 8.5 million passengers who ride the system each day had to find alternative modes of transport for an entire week, as crews worked overtime to pump water out of the tunnels, restore and inspect electric and other operating equipment, and restore power.<sup>7</sup> Even when restored, there has been a long process of renewal to put facilities and equipment in a stable state for the long run.



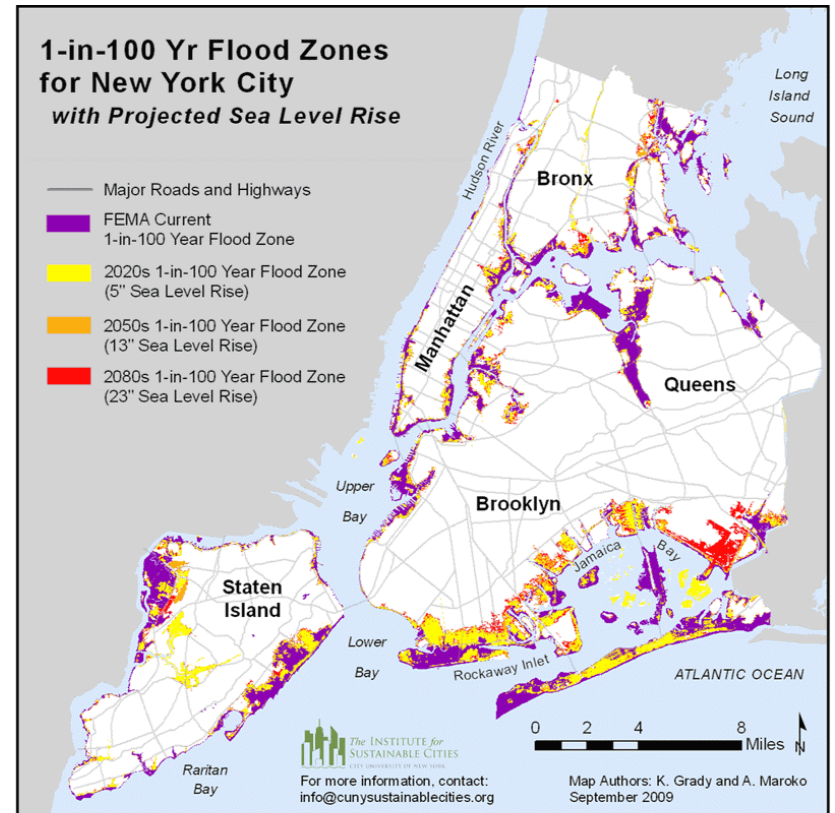
Source: U.S. Global Change Research Program, Climate Change Impacts in the United States, Chapter 16: Northeast; Parsons Brinckerhoff

Service disruptions and safety risks caused by climate change are compounded in urban areas, where essential infrastructure systems, like the electrical and transport networks, rely heavily on each other. The energy grid is also stretched during extreme weather events, for example, as electricity is needed to pump water out of tunnels and stations to protect valuable infrastructure.<sup>8</sup> The negative effects of climate change exacerbate an already delicate balance by compounding stress on a series of networks operating at maximum capacity. Scenarios such as heat waves and heavy flooding have the potential to affect millions of people and shut down interdependent networks, delaying access to emergency personnel, crippling

<sup>6</sup> U.S. Global Change Research Program, Climate Change Impacts in the United States. Chapter 16: Northeast., Chapter 5: Transportation.

<sup>7</sup> U.S. Global Change Research Program, Climate Change Impacts in the United States. Chapter 5: Transportation.

<sup>8</sup> U.S. Global Change Research Program, Climate Change Impacts in the United States. Chapter 16: Northeast.



Notes

1. Methods and Caveat - The projected flood extents shown on this map reflect a "bathtub" methodology whereby a flood elevation is extrapolated landward until it reaches the equivalent contour height on land. This approach does not account for cumulative effects of soils, vegetation, surface permeability, bathymetry, infrastructure and beach structures, friction, and other factors that affect the movement of floodwaters resulting in local variations in flooding extent.
2. Error - Numerous sources of potential error are present in the map. These include limitations of model input and scope (climate and FEMA floodplain models), error inherent in model output, errors in and coarseness of topography, the rounding of base flood elevations to the nearest foot, and in GIS technique.
3. Interpretation - The floodplains delineated above do not represent precise flood boundaries but rather illustrate three distinct areas of interest: A) areas currently subject to flooding that will continue to flood (areas with the current 100 year flood zone), B) areas that do not currently flood but are expected to potentially do so in the future, and C) areas that do not currently flood and are unlikely to do so in the timeline of this research.

Source: CUNY Institute for Sustainable Cities

economic markets, and cutting residents off from necessities such as water and fuel. During these scenarios, when infrastructure is needed the most, it is at the highest risk of failure.

In the aftermath of Hurricane Irene and Superstorm Sandy, regional entities, including the MTA, began addressing the risks of climate change and incorporating mitigation strategies into broader regional planning. Reports from the New York State 2100 Commission and the NYC Special Initiative on Rebuilding and Resiliency provided recommendations on how the region could prepare for the effects of extreme weather, and build and improve infrastructure to protect the region.<sup>9</sup>

MTA amended its 2010-2014 Capital Program to include \$5.8 billion in climate change mitigation investments, based on funding support advanced by federal and state partners. MTA's most recent Twenty-Year Needs Assessment identifies even more necessary investments. An integral element of these investments, as well as those in all future capital programs, will be the adoption of new standards that promote system resiliency, protect the MTA's most valuable assets, mitigate service disruptions and ensure that its employees and riders are safe both day-to-day and during major events. Investment decisions made through the Capital Program will need to be shaped and prioritized through this lens.



<sup>9</sup> NYC 2100 Commission, "Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure," <http://www.governor.ny.gov/assets/documents/NYS2100.pdf>; NYC Special Initiative for Rebuilding and Resiliency, "A Stronger, More Resilient New York" <http://www.nyc.gov/html/sirr/html/report/report.shtml>

## Population Growth, Record Ridership, and Demographic Shifts

The MTA system is currently experiencing both record ridership and significant capacity constraints. The New York region's population is projected to grow, which will further exacerbate and strain system capacity. Riders' travel patterns throughout the region are also changing, resulting in shifting demand on a mostly fixed — and aging — system. With a new generation of customers also come new demands and expectations of what is essential for a customer travel experience. The challenge for MTA will be to reinvent an aging system built on a relatively fixed backbone for the needs of a region as it developed a century ago.

### Population Growth and New Patterns of Travel

MTA's customer base continues to grow as the New York metropolitan region draws more people to live, work, and visit. Approximately one million new residents are projected in New York City by 2040.<sup>10</sup> Population declines of the 1970s and 1980s have reversed as new residents take advantage of renewed urban housing stock and the economic and social advantages afforded by the agglomeration of human capital in New York City.



Already crowded subway lines will be further strained by emerging residential neighborhoods, such as Greenpoint in Brooklyn, Highbridge in the South Bronx, and Long Island City in Queens. Within the MTA's overall service region, population is expected to increase by 13.3 percent (1.6 million) over 2010 levels by 2035 and 15.6 percent (1.9 million) through 2040.<sup>11</sup> Long Island population growth is expected to increase by 480,000 people from 2010 to 2040, a 17 percent increase focusing more on Suffolk County, while the Lower Hudson Valley will grow by 269,000 or 19.8 percent. New York City's population will grow by 1.2 million, or 14.4 percent, over 2010 levels to 2040. Finally, visitors to New York City have increased steadily over the past 10 years, growing by 36 percent in response to an aggressive tourism marketing strategy and to the reality of New York City as a world business center.<sup>12</sup>

Employment is growing but also becoming more dispersed throughout the region. Two million new jobs beyond 2010 levels are forecasted for the MTA service region by 2035, increasing to an estimated 10.2 million (+20.9 percent).<sup>13</sup> Projected 2040 Manhattan job growth is 5.9 million, which is an increase of 29 percent over 2010 (4.6 million) levels.<sup>14</sup> Job opportunities are expected to grow at a higher proportional rate through 2040 outside of Manhattan in the Bronx, Brooklyn, and Staten Island, as well as in Westchester, Rockland, and Suffolk counties.<sup>15</sup> New employment destinations within the outer boroughs of New York City are creating demand for more intra-borough travel. Emerging business districts such as those in Long Island City and Downtown Brooklyn — driven especially by strong growth in high-tech companies<sup>16</sup> — as well as hubs outside the region — such as White Plains, Stamford, and the Route 110 Corridor in Suffolk County — are attracting more people to regions outside the CBD of Midtown and Lower Manhattan.

Even with the emergence these new employment centers, traditional journeys into the CBD will remain significant. For instance, projected growth in commuters originating from New Jersey's central and

10 DCP Report, "New York City Population Projects by Age/Sex & Borough, 2010-2040

11 MTA Capital Needs Assessment 2015-2034

12 <http://www.nycgo.com/articles/nyc-statistics-page>

13 MTA Capital Needs Assessment 2015-2034

14 NYMTC.

15 NYMTC. [http://www.nymtc.org/Files/RTP\\_PLAN\\_2040\\_docs/](http://www.nymtc.org/Files/RTP_PLAN_2040_docs/Publicpercent20Reviewpercent20Drafts/Chapter2.pdf)

[Publicpercent20Reviewpercent20Drafts/Chapter2.pdf](http://www.nymtc.org/Files/RTP_PLAN_2040_docs/Publicpercent20Reviewpercent20Drafts/Chapter2.pdf), p. 2-13

16 New York City's Growing High-Tech Industry (NYS Comptroller, April 2014)



northern counties will place additional stress on capacity constraints at Penn Station and connecting subway lines.

Over the next 5 years in New York City, the employment sectors that are expected to grow fastest are concentrated in healthcare support (31.5 percent change), personal care and service (28.5 percent change), computer and mathematical industries (18.6 percent change), as well as traditional business and financial operations (15.9 percent change). This reflects growth industries in other parts of the MTA region as well.<sup>17</sup> Concentration of employment in these industries suggests that some activity will shift away from the Midtown and Lower Manhattan CBD to other parts of the region, where healthcare and personal service jobs may also be located. Concentration of industry away from office-based jobs will lead to a shift in ridership away from the traditional core, as is already being experienced in parts of the region.

### **Increased Ridership**

Over the past year, the MTA has surpassed ridership records on several of its services across the region. While the figures below illustrate current demand on the system, projections indicate increased demand to come. This should guide where and how the MTA invests in the system to increase capacity and meet customer needs.

#### *Recent Ridership Growth*

- Annual subway ridership of 1.7 billion is now the highest since 1949, and weekday ridership of 5.5 million is the highest since 1950.
- Weekend subway ridership was 5.8 million and has surpassed the highest ever ridership in 1946.
- Brooklyn had the largest borough-wide average weekday ridership percentage increase (2.4 percent or more than 27,000 riders per weekday), driven by strong growth on the recently improved Canarsie L Subway Line **L**, Crosstown G Subway Line **G**, and Culver F Subway Line **F**, as well as the activity generated at the Atlantic Av-Barclays Center station.

<sup>17</sup> New York State Department of Labor. "Occupational Projections 2010-2020." <http://labor.ny.gov/stats/isproj.shtm>. Used for New York City, Long Island, and Hudson Valley regions.

- Combined ridership on the east and west of Hudson commuter rail markets in 2013 was 83.4 million. MNR's annual east of Hudson ridership last year was the highest in the railroad's history, at 81.8 million, surpassing the previous east of Hudson record of 81.5 million rides that was set in 2008.
- In 2013, the Harlem Line was the fastest growing line with a 1.2 percent increase and carried nearly 27 million riders.
- The New Haven Line was up 0.5 percent and recorded its highest ridership ever in 2013 (carrying nearly 39 million customers).
- The LIRR carried 83.4 million riders in 2013, an increase of more than 1.6 million passengers over the previous year.

On top of these record numbers, the MTA can expect continued and significant growth in demand for transit services both to the CBD and elsewhere.<sup>18</sup>

- Travel to Manhattan CBD is projected to increase by approximately 21 percent.
- Travel to outer boroughs for work is expected to grow by 23 percent.
- Travel in the Mid-Hudson region for work is expected to grow by 24 percent.
- Growth for the reverse-commute between outer boroughs of New York City and Long Island is expected to grow by 22 percent, catalyzed by projected 31 percent growth in employment in Suffolk County.

Investments will have to meet these growth challenges.

### **Demographic Changes — Millennials and Baby Boomers — and New Expectations**

Millennials—those born between 1980 and 1991—represent a fast-growing demographic in the New York region. There are nearly 4.4 million Millennials currently in the New York metropolitan area, representing approximately 18 percent of the region's population.<sup>19</sup>

<sup>18</sup> MTA Twenty-Year Capital Needs Assessment 2015-2034, <http://web.mta.info/mta/capital/pdf/TYN2015-2034.pdf>

<sup>19</sup> <http://adage.com/article/adagestat/advertising-age-finds-cities-millennials/149347/>

Millennials are characterized by greater ethnic and racial diversity, higher levels of education, and greater dexterity with and reliance on technology.<sup>20</sup> They exhibit a greater desire to live and work in an urban setting but do not necessarily conform to conventional work norms, often not working from a single office and not making a long-term commitment to any single employer. Millennials are more likely to cite environmental considerations as motivating their transportation options – often not owning an automobile and placing importance on cost and convenience in embracing transit to meet their mobility needs.

At the other end of the generational spectrum, aging Baby Boomers are contributing to a fast-growing senior population, a segment that is projected to grow 58 percent in New York City between 2015 and 2040, when nearly one in five residents will be 65 or older.<sup>21</sup> Many are choosing to “retire in place” rather than move out of the region.



Their dependence on transit and need for accessibility features, such as elevators, escalators, bus lifts, and information services for the vision or hearing impaired, will place a greater demand for these system elements.

The advent of Millennials and aging of Baby Boomers is overlaid with a dipping trend in household incomes. Household incomes play a role in transportation choices and may help guide ridership trends in the future. Median incomes, adjusted for inflation, have dropped since 1990 for more than three-quarters of the region's households.<sup>22</sup> Low income residents are often transit-dependent yet, as gentrification pushes them further out to the fringes of boroughs, they often locate in areas that are not well served by the current transit network. This will have to be a consideration when determining how to improve access to the system both geographically and economically.

### Population Growth, Record Ridership, and Demographic Changes: Effects on the MTA System

Today's network of subway lines, bus service, commuter rail, and paratransit service is already strained from record ridership levels. Transit ridership in 2013 was at a level that had not been seen since 1950.<sup>23</sup> Weekend ridership is at post-World War II levels. Thirty years of capital investment, volume pricing through NYCT's MetroCard fare collection system and the introduction of free intermodal transfers have contributed significantly to this trend.<sup>24</sup> Coupled with growth in ridership are emerging travel patterns that create new challenges for how to manage the system and target investment in the region. The MTA will have to reinvent its thinking towards new, innovative ways to provide service to meet the evolving needs of its customers. This will affect not only the look and feel of the system, but investment strategies and business decisions surrounding maintenance and construction. As the region's economy and population transform, the MTA will have to provide optimal customer service to capture and benefit from regional growth.

20 Pew <http://www.pewsocialtrends.org/files/2010/10/millennials-confident-connected-open-to-change.pdf>

21 NYS 2100 / NYS Office of Aging: <http://www.aging.ny.gov/ReportsAndData/CountyDataBooks/30NYCALL5.pdf>

22 RPA Fragile Success

23 <http://www.mta.info/news-subway-ridership-l-r-g-b-d-4-7/2014/03/24/2013-ridership-reaches-65-year-high>

24 MTA Capital Needs Assessment 2015–2034

## Institutional Barriers

The current organizational and operating structure of the MTA harkens back to 1965, when the MTA was chartered as a public benefit corporation. This organizational structure, created by statute to solve financial solvency and operations issues at the time, has remained mostly unchanged despite vast changes to the environment in which MTA operates. Failure to take advantage of opportunities to maximize efficiencies in the institutional environment has resulted in a number of barriers to effective planning and prioritizing of investments, as well as project delivery. The barriers are both internal to the MTA organization, as well external between the MTA and the various governing municipalities in the region.

These organizational and institutional barriers have resulted in insufficient coordination in the capital planning process, creating gaps in knowledge about concurrent economic development and land use planning decisions. Without strong coordination between operating agencies and across municipal institutions, the MTA's ability to effectively and appropriately prioritize its capital investment decisions is compromised. The cost-effective and timely delivery of its capital plans is also hampered by risk averse policies and procedures of the current organization and suboptimal coordination of shared resources.

### Internal Hurdles

Prior to their incorporation under the MTA, the operating agencies were independent private or public corporations. After their incorporation, some back office functions were consolidated across the MTA agencies; however, most operations, resources, and assets continue to remain largely within agency silos. The current institutional silos discourage resource sharing that could lead to more efficient project planning and execution. Redundancies in processes common across the agencies lead to higher project costs and time delays. These handicaps are known throughout the construction market, and cause MTA to pay a premium on contracts to offset the increased costs and delays to business partners. Although differences among the MTA agencies exist, such as labor and assets, opportunities to do more in the way of knowledge-sharing and streamlining processes exist.

## Jurisdictional Barriers

Just as silos exist within the MTA, the larger region in which the MTA operates presents its own set of jurisdictional barriers to effective, coordinated regional transportation, economic development, and land use planning. Since the MTA was founded, the economic and demographic makeup of the region has changed dramatically, yet the framework through which priorities are established and decision-making occurs has remained static.

Currently, decision-making happens largely within local economic and planning agencies and individual transit agencies with little coordination among them. Yet coordinated planning at the local level between municipalities and MTA has produced recent success stories and opportunities upon which to build and maintain momentum. For example, New York City and the MTA worked together on both the Hudson Yards/7 Line Extension and SBS projects to coordinate changes in the built environment with access to transit.<sup>25</sup>

Integrating land use and transportation decisions will help to prevent the types of gaps in access to transit service that has been occurring in the outer boroughs. Incentives to encourage development in neighborhoods should go hand-in-hand with transportation planning to improve service to these development zones. Planning in silos leaves MTA catching up to fill gaps in transit service and lacking information on where capital investments are needed most.

The New York metropolitan area extends beyond the MTA services in New York and Connecticut to include New Jersey. Hundreds of thousands of commuters cross the Hudson River each day to work in and visit New York City and its suburbs. Despite that, capital planning at a higher level is not well coordinated between MTA and the major transportation agencies that operate in New Jersey - NJ TRANSIT and the Port Authority of New York and New Jersey. Nor do New York and New Jersey collaborate to identify priority investments that will improve inter-state travel.<sup>26</sup> This leads to circuitous transit routes between communities that are located just over the border and an inefficient use of each state's resources and assets.<sup>27</sup>

Without coordinated planning among operating agencies and across municipal institutions, the capital planning process will be hindered in terms of prioritizing the investments needed to provide the most accessible and efficient service throughout the region.

<sup>25</sup> Testimonies by Anthony Shorris and Polly Trottenberg, July 15, 2014.

<sup>26</sup> Trans-Hudson planning issues were brought several times during MTA Transportation Reinvention Commission public listening sessions, July 15-17 2014.

<sup>27</sup> Testimony of Andrew Albert, NY Riders Council, July 16th, 2014



### Effects of Institutional Barriers on the MTA System

Insufficiently coordinated capital planning in a region where millions cross-jurisdictional borders every day creates inefficient decision-making on project priorities, which leads to system gaps, lower levels of service, and service quality. Similarly, hundreds of thousands cross agency borders every day, and pay the price for insufficient integration between fare media and planning in the stations they use. Without shared regional and agency objectives and decision-making, implementing improvements to shared facilities is cumbersome, for example, at Penn Station and the Port Authority Bus Terminal. Looking forward, without greater regional coordination, the New York metropolitan area might not be able to implement a regional fare payment system which is a key attribute of a world-class regional metropolitan transport system. Breaking down institutional barriers is critical for increasing the effectiveness and geographic reach of the MTA's capital plan, realizing efficiencies, and improving operations and service.



Source: NY Daily News

### Retrofitting the MTA System to Incorporate Technological Innovation

*“Of this sight New York seemed never to tire, and no matter how often it was seen there was always the shock of the unaccustomed about it. All the afternoon the crowds hung around the curious-looking little stations, waiting for heads and shoulders to appear at their feet and grow into bodies.”*

—“Our Subway Open, 150,000 Try It,”  
New York Times, October 28, 1904

When New York's first subway opened to the public on October 27, 1904, it was a technological marvel. Thousands of people lined up at stations across the city to witness a technological advancement that for years had been dismissed as merely a dream. While the systems and structures that make up the MTA were groundbreaking at the time that they were built, the rate of technological advancement has greatly outpaced the MTA's ability to incorporate many improvements into its system which would enable it to operate more efficiently and to offer the amenities that its customers increasingly expect of a world-class system.

Technological innovation — particularly information technology — has grown exponentially over time. At a personal level, devices such as smartphones and tablets have changed the way we communicate and manage our lives, facilitating rapid information gathering, decision-making, and communication with others near and far. Innovative technologies have dramatically changed the way transportation organizations manage their systems, operations, and assets, allowing real-time responses to rapidly changing circumstances and to customer needs. Technology can increase efficiency and save time and money both at the personal and organizational level. Its ubiquity has transformed it from an exotic luxury to a basic need of the MTA's system, integral to system performance and customer service.

### Meeting Customer Communication Expectations

Those that have embraced information technology — particularly Millennials and younger generations — now expect transit systems to allow them to make informed up-to-the-minute decisions about how, where and when to travel, and to work and socialize digitally during travel. More and more customers now expect more reliable information systems, real-time updates, Wi-Fi or 3G/4G accessibility, and a more user-friendly and intuitive travel experience<sup>28</sup> in lieu of the oft-garbled audio messages and largely static signage found across the system today.

Large majorities of tech-savvy customers are actively pulling MTA information to make better decisions about which lines to travel, and to mitigate the time spent waiting for buses and paratransit. The growing use of technology illustrates a trend that will only continue, and a demand for access to more information over time.

### Replacing Outdated Mechanical Train Controls with Modern Computerized Systems

The MTA and the New York City subway in particular, is in dire need of systematic technology upgrades. Signals and communication systems alone represent 19 percent of the MTA's Twenty-year total core investment needs.<sup>29</sup> The MTA currently uses an antiquated signaling system, relying primarily on century-old technology to keep trains running. These systems need replacement simply as a matter of age and maintainability, but this need creates the opportunity to bring on modern technology with broader benefits.

The MTA has begun converting its fixed-block wayside signals, the manual train control system that has been in place for over 50 years, to CBTC, a more precise and flexible signaling system that uses telecommunications between the train and track equipment to control the speed and location of subway trains. This increases line



capacity by safely reducing the space needed between trains, an approach that many of the world's best-in-class metro systems rely on today. The pace of its implementation in New York City, however, has been very slow. "At the current rate, a full transformation wouldn't occur for more than 50 years, putting the city decades behind its peers around the world."<sup>30</sup>

Until its entire signaling system can be overhauled, the New York City subway will mainly be reliant on an outdated system that is further stressed as ridership continues to grow and leads to greater wait times for trains in stations, delays that echo throughout the system and higher levels of customer dissatisfaction. "Greater ridership growth in off-peak hours has made it challenging to find time to inspect, maintain, and replace the signal blocks, switches, relays, and automatic train stops without major effects on service. Dispatchers can only determine so much now about train location, and lack the precision and ability to centrally monitor and manage the entire system."<sup>31</sup> Switching to a more modern CBTC system will, by contrast, link tracks and vehicles into a seamless system, providing more capacity, better reliability, and greater customer satisfaction.

### Keeping Pace with the Revolution in Fare Payment Systems

The MetroCard, first introduced in 1993, represents a bygone era of magnetic-strip fare technology. The MTA's current fare payment infrastructure consists of ticket machines, turnstiles, and fare processing equipment that are fast approaching the end of their useful life.<sup>32</sup> Rather than a simplified and seamless experience, the MTA customer must purchase and use multiple fare media if they wish to traverse between MNR, LIRR, and the New York City Subways and Buses, not to mention other regional services.

An MTA survey found that 54 percent of New York City customers now report use of a web-enabled mobile device. This jumps to 79 percent among those between 16-to-24 years. Over one-third of NYCT customers are using wireless devices to get real-time arrival, service status, and schedule information during their transit trips. This jumps to 79 percent among electronic schedule users, 76 percent among early-adopters, 71 percent of transit app users, and 57 percent of all smartphone users.

28 American Public Transportation Association, "Millennials & Mobility: Understanding the Millennial mindset."

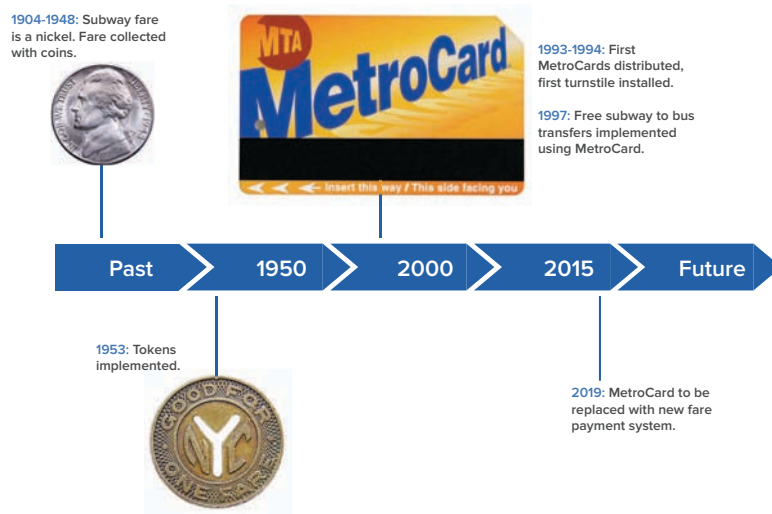
29 MTA Twenty-Year Capital Needs Assessment 2015-2034

30 Regional Plan Association, "Moving Forward: Accelerating the transition to Communications-Based Train Control for New York City's Subways."

31 Regional Plan Association, "Moving Forward: Accelerating the transition to Communications-Based Train Control for New York City's Subways."

32 MTA Twenty-Year Capital Needs Assessment 2015-2034

Furthermore, the current vending machines are relatively costly to procure, operate and maintain and are prone to tampering and vandalism. The process of standing in line at the ticket window, using an automatic vending machine, or paying with cash, which then has to be collected and processed, is increasingly costly, tedious, and time-consuming.



Implementing a new, modern fare payment system will require overhauling both the back-end support as well as customer-facing technology. While the MTA has completed two successful long-term open fare payment pilots aimed at demonstrating the usefulness and practicality of using media in general circulation, much more progress is needed to implement this technology across the system. While an open payment system will be expensive and complicated for MTA to implement on the front end, it will ultimately yield long-term cost savings and reflect the type of services and amenities that customers increasingly expect.

### Underutilization of System Performance Data

The MTA needs to invest in systems that allow it to do a better job of monitoring system performance data, which is needed to track work, waste, and fleet components, to name a few examples.

Having more robust system performance data will allow the MTA to improve system performance. Failure to gather, synthesize, and interpret data effectively or to present it in a manner that is easily understandable can result in substandard system performance or missed opportunities for improvement. Hard data informs asset management and real-time decision-making and tells agency leaders and stakeholders if funds are being deployed effectively. Implementing a data management system that unifies various data sets in an accessible “dashboard” format would optimize focused decision-making, and effective use of dollars and create a system that is nimble to real-time changes in resource and service needs, even to predict when these changes need to occur. MTA is starting to pursue these systems through its implementation of an Enterprise Asset Management system and this effort should be sustained and supported.

### Effects of Technological Innovation on the MTA System

The MTA will not be able to increase system capacity, accommodate future growth, and improve customer satisfaction unless it replaces outdated technology and systems with newer, innovative technologies. Technology investments directly impact the quality of the customers’ station experience, the level of safety and security, and the ability of riders to make the best decisions about how, where, and when to travel around the region.



# Appendix B: Summary of Social Media and Public Engagement

## Background

Shortly after the MTA Transportation Reinvention Commission (TRC) was formed, the MTA scheduled three expert sessions and three sessions open to the public to solicit input in mid-July. The MTA rapidly deployed a communications strategy focused on an online and social media presence with the goal of reaching as many people as possible to build awareness and draw the public in to the three sessions.

## Goals and objectives

- Establish immediate voice on this topic on Facebook and Twitter.
- Monitor social media conversations with key words and phrases.
- Take part in an online conversation surrounding the challenges being considered by the Commission (e.g., climate change, population growth, ridership demands, demographic shifts).
- Get public input on strategies for addressing these challenges.
- Set up social media sites that can continue beyond the Commission.
- Establish this effort as an example of best practice for how the MTA can more fully engage customers and the public in the future.

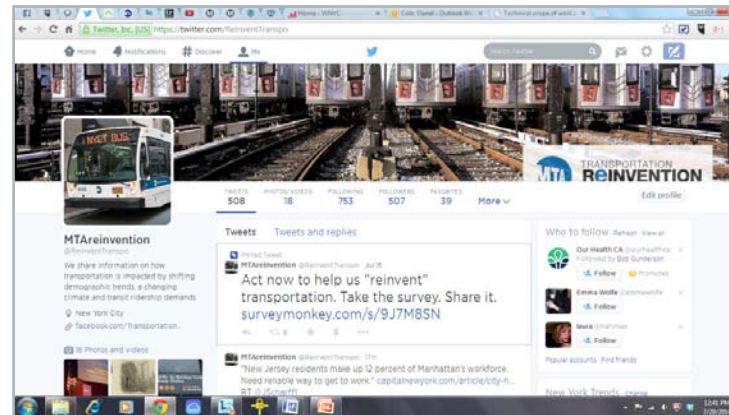
## Summary of Results

The Commission's report addressed all of the major general themes that were expressed by the general public— connectivity, equity, accessibility — and many of the specific ideas that were expressed — outer borough connectivity, ADA accessibility, more robust and easy-to-understand customer information, to name a few. This report is an initial step in the continued dialogue and engagement that the MTA will have with the public as it begins to implement the recommendations presented in this report.

## Analytics and Measurements (As of Aug. 29, 2014)

### MTA Website TRC page:

- 3,056 “page views”
- 27 people completed the MTA comment form connected to the Commission website asking for feedback.



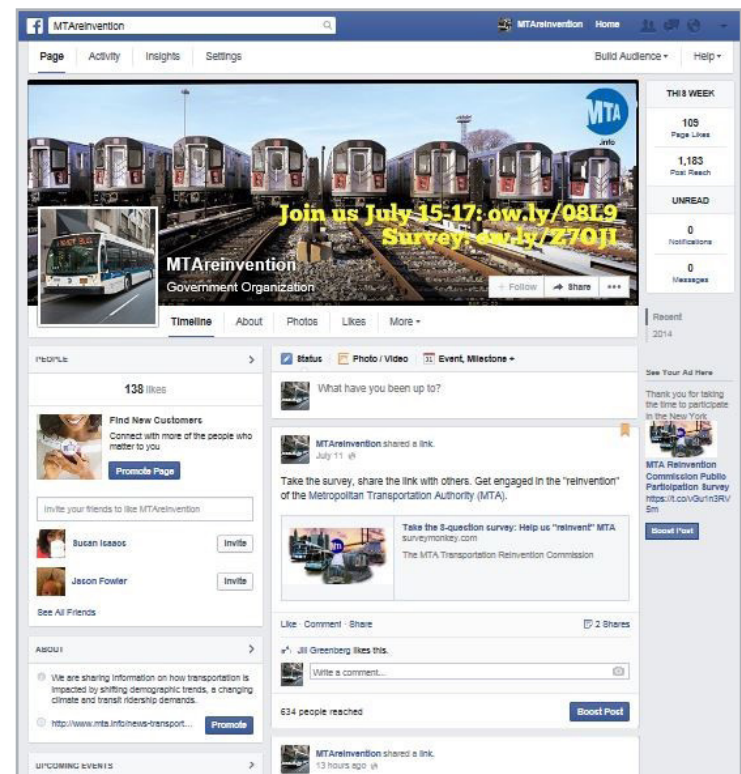
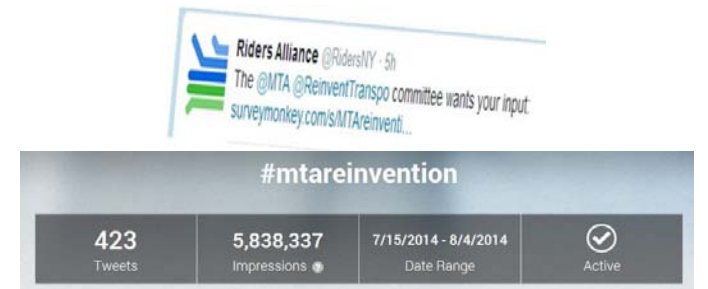
### Twitter: Established July 8, 2014

- 664 followers (12 per day)
  - Including people and entities such as: StreetsBlog, NY; Mayor's Office; Park Slope Neighbors; Tri-State Campaign; Riders Alliance; NYC DOT; Robert Puentes; Eno Center for Transportation; and various news reporters.
  - 46% of followers were male; 16% female; 36% unknown.
  - 79% of followers were a person; 20% were a company/ organization/entity.
  - Followers are interested in the following topics: #cities, #nyc, #public, #reporter, #transit, #transportation, #tweets, #urban.

- 813 Tweets (16 per day)
  - 580 Tweets “favorite” or “Retweeted”
  - Tweets “reached” tens of millions of Twitter accounts.
- During the three expert sessions and three public sessions, posted live via website broadcast.
  - Established the #MTAReinvention hashtag to stimulate conversation and live postings of the testimony.
  - On the first day of testimony alone, #MTAReinvention hashtag was tweeted 200+ times, and of that 107 were Retweets (shares) of posts, showing significant engagement with the content shared. These in turn reached more than 300,000 accounts.
- 22% of contributors used mobile devices; 56% used a desktop computer; and the rest (22%) were on an undetectable device or tablet.
- Snapshot of a Tweet:
  - Promotion of the online survey closing Aug. 29.
  - Over 2 days, shared various posts announcing survey.
  - The Tweet was shared by 27 other Twitter accounts, including NYCT Subway Service, StreetsBlogNY, and various reporters. As a result, it reached the followers of all those accounts, totaling almost 150,000 “reach/impressions.”
- Twitter Survey: To put the “reach/impressions” in perspective, the analogy is similar to website “page views.” After almost 30 days:
  - 288 people filled out the twitter online survey, which was promoted heavily on social media, generating thousands of “ideas.”
  - More than 5 million “reach/impressions” from social media engagement.

#### MTA’s Facebook Page: Established July 8, 2014

- 225 “likes”
  - 42% ages 25-34
  - 18% ages 18-24
  - 18% ages 45 and older
  - 16% ages 35-44
- More than 5,000 people engaged with posts. This means they liked the post, shared it, or commented on it.
- Online “Ideas” Survey: launched July 11, closed Aug. 30
  - 380 people filled out the survey
  - More than 4,000 separate “ideas” submitted



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## Appendix D: Abbreviations

ADA	Americans with Disabilities Act
BRT	Bus Rapid Transit
CBD	Central Business District
CBTC	Communications-Based Train Control
CIO	Chief Innovation Officer
DB	Design-Build
FEMA	Federal Emergency Management Agency
GDP	Gross Domestic Product
LIRR	Long Island Rail Road
LRT	Light Rail Transit
MNR	Metro-North Railroad
MTA	Metropolitan Transportation Authority
NJ TRANSIT	New Jersey Transit
NYCT	New York City Transit
PTC	Positive Train Control
P3	Public Private Partnerships
REDCs	Regional Economic Development Councils
SBS	Select Bus Service
TOD	Transit-Oriented Development

## Appendix E: Glossary

2100 Commission	Convened by New York Governor Andrew Cuomo, the 2100 Commission reviewed the vulnerabilities from climate change faced by the State’s infrastructure systems, and developed specific recommendations to be implemented to increase New York’s resilience in five main areas: transportation, energy, land use, insurance, and infrastructure finance.
ADA Accessible	Regulations published by the Federal Department of Justice that set minimum requirements for newly designed and constructed or altered state and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities. Service standards are also promulgated by United States Department of Transportation.
Articulated bus	A public transit vehicle consisting of two rigid sections linked by a hinged or pivot joint. This arrangement creates a longer vehicle that can accommodate a higher passenger capacity, while still allowing the vehicle to maneuver adequately on the streets of its service route.
Baby Boomer	The colloquial term for an individual born after World War II. Within the MTA’s service area, this age bracket is choosing to “retire in place”, and desires to be more mobile. Due to the large number of Baby Boomers, their aging contributes to a large demographic shift.
Bus rapid transit	A high performance transit system that combines the speed, reliability, and amenities of rail-based transit systems with the flexibility of buses. To meet high performance standards, BRT incorporates certain features, including dedicated and/or physically separated lanes, priority signaling at traffic lights, off-board fare collection, level boarding at multiple doors, real-time bus arrival information, and distinctive branding.
Communications-Based Train Control	A subway signaling system that uses telecommunications between train and track equipment to manage and control train traffic and individual trains on the line; the system improves safety and increases capacity by allowing trains to follow each other more closely.
Enterprise Asset Management	Refers to the optimal management of the lifecycle of physical assets of an organization to maximize value.
Extreme weather event	A descriptive term which refers to weather events which are more destructive than in the past due to higher winds, rainfalls, etc. This term is most often used to describe the trend of an increasing number of these events.
Gross Domestic Product	Estimate used to measure the economic output of a country or region.
Hub and Spoke System	System of connections in which service moves along spokes (i.e., lines) to connect to hubs in the center(s) of the transit network.
Light rail transit	Mode of urban transportation operating electrified rail cars on fixed rails using predominately reserved, but necessary grade separated rights-of-way. Light rail may include streetcar, tramway, or trolley.
Manhattan Central Business District	The central business district is the city center where retail and office buildings are concentrated. Traditionally in New York City, the CBD has been in Manhattan, south of Central Park near 59th Street. Recently, other areas of New York City, including Downtown Brooklyn and Long Island City, are experiencing large concentrations of retail and office buildings that are secondary and tertiary to the Manhattan CBD.

MetroCard	Introduced in 1993, this magnetic-strip card is the primary payment method for the MTA's subway and bus systems. Commuter rail has hybrid ticketing (MetroCard on one side, train ticket on other, as well as separate paper tickets).
Millennial	Individuals born between 1980 and 1991. This demographic is known for an urban living preference, participation in non-traditional work hours, high use of technology to manage their private and professional lives, and emphasis on mobility and access to non-car modes of transportation (i.e., transit, bike, pedestrian).
MTA Bus Time	Uses Global Positioning System (GPS) hardware and wireless communications technology to track the real-time location of buses.
MTA Region	Region including five boroughs of New York City, seven counties (Duchess, Nassau, Orange, Putnam, Rockland, Suffolk, Westchester), and southern Connecticut.
Northeast Corridor	The rail line running from Boston, Massachusetts to Washington, D.C. with branches serving other metropolitan areas. The Northeast Corridor is owned primarily by Amtrak and is used by Amtrak's Acela Express and Northeast Regional services in addition to several commuter and freight rail services. The Northeast Corridor is the busiest passenger rail line in the United States by ridership and service frequency.
Positive Train Control	Technology designed to automatically stop or slow a train before a collision occurs by sharing information on a train's location and safe passage via on board computer systems.
Regional Economic Development Councils	Created in 2011 by Governor Cuomo to develop long-term strategic plans for economic growth in respective regions created throughout New York State. The Councils are comprised of leaders across sectors and industries in each region.
Select Bus Service	MTA's hybrid bus service — a step short of BRT as defined above — generally characterized by high-capacity, articulated buses, dedicated lanes (painted instead of median separated), minimum corridor stops, and off-bus fare payment. Select Bus Service corridors also generally include traffic signal priority for buses to speed up movement along routes.
Small Business Federal Program	Program created to facilitate and encourage the participation of small businesses in federally funded MTA projects.
Small Business Mentoring Program	Program created by the MTA to increase, facilitate, and encourage the participation of small business by providing a framework for eligible firms to develop and grow within the construction industry and establish stable, long-term relationships with the MTA.
Superstorm Sandy	The unofficial name given to Hurricane Sandy by residents along the Northeast Atlantic Coast. The second-costliest Hurricane in United States history, the storm caused billions in damage, and crippled transportation systems especially.
Transcom	Transportation Operations Coordinating Committee; a coalition of 16 transportation and public safety agency in the New York — New Jersey — Connecticut metropolitan region, created to provide a cooperating approach to regional transportation management.
Transit-oriented development	High-density, mixed-use residential and commercial development designed and constructed to maximize access to transit.
Tri-State Region	The group of states comprised of New York, New Jersey, and Connecticut.
Upzoning	Changing zoning of a tract of land to intensify its usage.





**A BOLD DIRECTION *for* LEADING TRANSPORTATION *in* THE NEXT 100 YEARS**

**MTA Transportation Reinvention Commission**  
New York, NY