Twenty Year
Capital Needs Assessment
2010-2029

DRAFT - August 2009

Metropolitan Transportation Authority

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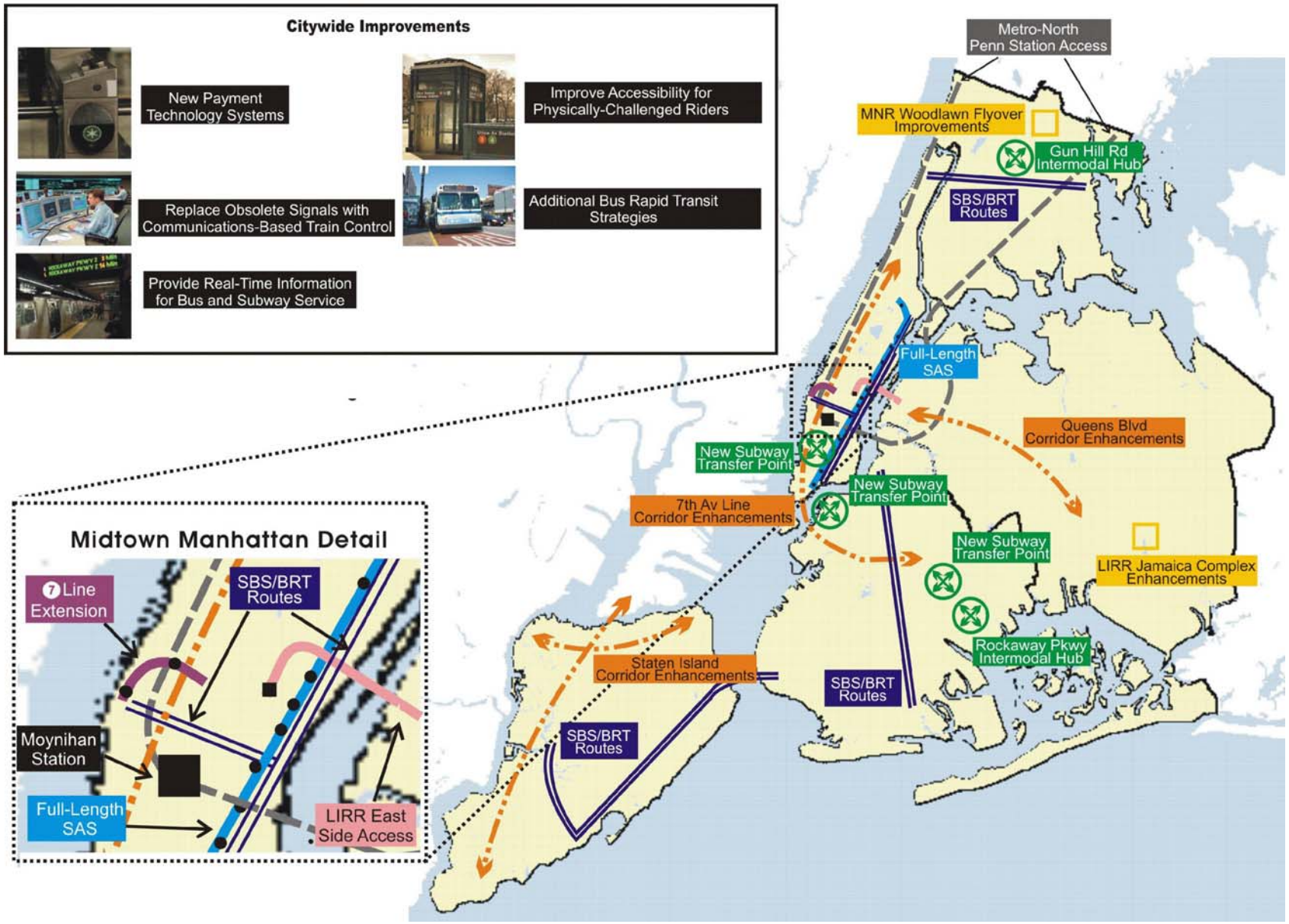
Prologue to the Twenty Year Capital Needs Assessment

This Twenty Year Needs Assessment focuses on: continuing to rebuild and replace the thousands of assets that comprise the MTA transportation system's vast infrastructure and enhancing and expanding the network to address critical, long-standing transportation needs. Travel demands in the region will require the MTA to respond to crowding, longer travel times, underserved areas and neighborhoods, cumbersome fare and toll payment requirements, lack of interoperability and connectivity among transit modes and systems, and an aging and inadequate communications infrastructure. Ongoing investment in our transportation network will be essential.

The strategic enhancements included in this Assessment, summarized on the following maps, provide a view of future planned transportation investments. Over the next 20 years, these will transform the MTA's network so that by 2030 customers will use an MTA system where customers can seamlessly travel throughout the region. These investments are critical to maintaining New York's standing as one of the world's preeminent economic centers.

Strategic Enhancements Delivered: 2010-2029



Strategic Enhancements Delivered: 2010-2029
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Introduction: Preserving the Transit System's Rich Heritage For Future Generations

The MTA's network of subways, buses and railroads move 2.6 billion New Yorkers a year, about one in every three users of mass transit in the United States and two thirds of the nation's rail riders. MTA bridges and tunnels carry close to 300 million vehicles annually — more than any bridge and tunnel authority in the nation. This vast transportation network – North America's largest--serves a population of 14.5 million people in the 5,000 square-mile area fanning out from New York City through Long Island, southeastern New York State and Connecticut.

Today's network reflects the rich heritage of the region's original transportation systems. When the **New York City Transit subway** opened in 1904, it launched an unprecedented era of growth and prosperity for the newly unified New York City. Over 100 years later, the City continues to rely on its rapid transit system. NYC Transit keeps New York moving 24 hours a day, seven days a week as over 6,000 subway cars travel over nearly 700 track miles in underground tunnels and elevated structures throughout the boroughs of New York City.

Bus service on the streets of Manhattan began in 1907. Today, NYC Transit operates over 4,600 buses in all five boroughs on more than 200 local and 30 express routes. Long Island Bus, formed in 1973 by the combination of ten private bus carriers into a unified transportation system, runs over 300 buses on 53 routes linking 96 communities, 47 Long Island Rail Road stations, five subway stations and seven major shopping malls. MTA Bus Company, the newest member of the MTA family, was formed in 2004 to merge seven private operations. With more than 1,300 buses, it provides service on 80 local and express bus routes serving the Bronx, Brooklyn, and Queens.

The **Long Island Rail Road**, the largest commuter railroad in the country, was chartered in 1834, making it the oldest railroad in America operating under its original name. With over 700 miles of track on eleven rail lines extending from three major New York City terminals — Penn Station, Flatbush Avenue and Hunterspoint Avenue — through a major transfer hub at Jamaica to the easternmost tip of Long Island, the Long Island Rail Road transformed Long Island from farmland to economically vibrant communities with easy access to Manhattan jobs.

Proud old names in the history of railroading—New York Central and New York, New Haven & Hartford among them — are the lineage of **Metro-North**, the second largest commuter railroad in the nation. Metro-North's main lines — the Hudson, Harlem and New Haven — run northward out of Grand Central Terminal, a 96 year old Beaux-Arts Manhattan landmark, on nearly 800 miles of track into suburban New York and Connecticut. West of the Hudson River, Metro-North's Port Jervis and Pascack Valley lines run northward out of Hoboken, NJ serving Orange and Rockland Counties in the State of New York.

Infrastructure of the MTA Network

Track Length:	*1,960 miles—enough to reach from New York to Santa Fe, NM*
Mainline Switches:	*3,259—supporting the complex network of rail service branches and express and local transit service*
Signal Blocks:	*14,850—controlling over 9,000 trains a day with nearly 5 million passengers*
Fiber Optic Cable:	*Over 975 miles—enough to reach from New York to St. Louis, MO*
Power Substations:	*524—using more than enough power annually to light the city of Buffalo for a year*
Third Rail:	*1,271 miles—enough to reach from New York to Lincoln, NE*
Pump Rooms:	*301—pumping 17 million gallons of water each day*
Ventilation (Fan) Plants:	*197—clearing air in tunnels during emergencies*
B&T Structures:	*368,940 tons of steel and 3.9 million cubic yards of concrete*
B&T Bridge Cables:	*49,368 feet, containing 181,900 miles of wire—enough to circle the Earth over 3½ times*

Created in 1933 by master builder Robert Moses, MTA **Bridges and Tunnels** carries more traffic than any other bridge and tunnel authority in the nation over its seven bridges and through its two tunnels. These spans of concrete and cabling are critical links in New York City's transportation infrastructure.

This remarkable transportation legacy, which underlies the economic success of the region and promises to do so for generations to come, depends on an ongoing commitment to protect this infrastructure and its thousands of visible and invisible components. This responsibility has been well recognized by the State through its continuing choice to invest in public transportation, beginning with the

State Legislature's historic investment program in 1982 through to the current 2005-2009 Capital Program, comprising the largest public investment program in the country's history. These investments – over $78 billion as of 2008 – have brought the MTA back from the brink of collapse. The most critical elements of MTA's core system – its rolling stock and tracks – have been rebuilt or replaced. As a result of these unprecedented improvements in the transit system, subway delays have fallen almost 60% and reliability has reached new heights with the distance between breakdowns increasing 1,800% on subways and 670% on the bus systems. As MTA has continued to rebuild, now completing its sixth capital program, the public has returned to the system in record numbers. In 2008, ridership on the subway, bus and commuter rail system reached an all time high with 2.6 billion people using the MTA system daily compared to 1.6 billion in 1991.

Twenty-Year Capital Needs Assessment

Recognizing that continuous investment is essential to insure the viability of the transit system for generations to come, the New York State Legislature mandated in 1982 that the MTA prepare five-year capital programs to rebuild and improve the New York Region's transit network. To establish the long term planning context prior to the development of each of these five-year capital plans, the MTA prepares a Twenty Year Capital Needs Assessment that sets forth the long-term capital investments that would be made in a program constrained only by the system's ability to accommodate the work. These investments focus on two priorities: rebuilding the system and expanding the system.

Rebuilding the System. These investments embody the responsibility to continue to restore the massive, regional transit system to a State of Good Repair and to replace assets that reach the end of their useful lives before they fall into disrepair. While past investments have restored many of the system's assets, many more still require investment. And many of those that have been restored have reached the end of their useful lives and now require replacement. With an infrastructure valued in the trillions, this Twenty Year Capital Needs Assessment identifies an investment level between $30-$35 billion in each five year period over the next 20 years in order to accomplish both the repair and replacement needs of the system. These investments to rebuild and modernize the system, which comprise the overwhelming majority of investments in this assessment, promise to preserve the legacy of these systems, which will serve the region well when the economy rebounds from its current crisis.

Expanding the System. The ongoing commitment to maintain and rebuild core assets has enabled the MTA to begin to address long-standing capacity limitations of the existing system. The size of the MTA's rail network has not been significantly increased since its expansion in the first half of the 20th century. In the past 20 years, only four new route miles (a 1.7% increase) have been added to the subway system and only seven miles of new commuter rail links have been added. This assessment includes the next stages in the multi-year development of the network expansion projects currently underway – East Side Access, the Second Avenue Subway, and the #7 Line Extension – as well as the identification of future capital initiatives that address currently unmet and emerging transportation needs.

The following sections discuss in turn the capital investments proposed for rebuilding the system and for expanding the system for the twenty year period from 2010 to 2029. This period begins with, and is the basis for, the next MTA five-year Capital Program proposed for the years 2010-2014. This program will be the seventh in a series which addresses the ongoing core rehabilitation and expansion needs of the region's mass transportation network.

Rebuilding the System: 2010-2029 Continuing Needs

This assessment identifies over $128 billion in asset investment need over the next twenty years to protect the vast and rich heritage of New York's transportation infrastructure. Investments are focused on rebuilding the existing system, which includes replacing assets and maintaining those assets already repaired. While past investments have restored many of the system's assets, there is a significant backlog of assets that still require rehabilitation. And many assets that have been restored in past programs will reach the end of their useful lives over this twenty year period and require replacement. This Twenty Year Capital Needs Assessment process started with an update of the inventory and condition status for all the agencies' capital assets. Based on that process, each agency identified an investment level in each five year period over the next 20 years (Table 1) to accomplish both the repair and replacement needs of the system. These needs are constrained only by the capacity of the agencies to implement the program while continuing to operate their systems and serve their customers.

Table 1
MTA Summary of Continuing Needs: 2010-2029
(2008 $ in millions)

Agency	2010-2014	2015-2019	2020-2024	2025-2029	Total
NYC Transit	$22,180	$20,126	$22,117	$19,723	$84,146
Long Island Rail Road	3,492	4,232	4,091	4,557	16,372
Metro-North Railroad	2,106	3,820	3,281	2,579	11,786
MTA Bus Company	708	988	839	663	3,198
MTA Bridges and Tunnels	3,025	3,459	4,141	1,731	12,356
MTA Police and Security	651	239	39	43	972
Total	$32,162	$32,864	$34,508	$29,295	$128,832

On a fully unconstrained basis, the agencies' needs are even greater than what is included in this assessment since more backlogged State of Good Repair needs exist than can be implemented. The "Rail Modernization Study," an April 2009 Report to Congress by the Federal Transit Administration, found that more than one-third of the assets of the nation's seven largest transit agencies, including MTA, are near or

have already exceeded their useful lives. These backlogged State of Good Repair needs total roughly $50 billion for these seven agencies. Recognizing the extraordinary needs inherent in the vast infrastructure of these large systems and their extraordinary value to the economic health of the nation, the report recommends that Congress and the FTA consider implementation of a temporary funding source designed to eliminate this existing State of Good Repair backlog, which is similar to the catch-up investment suggested by the City in PlaNYC. The FTA report acknowledges, however, that there are capacity constraints on the ability to implement these extraordinary investments. Given the size of the backlog and the industry's capacity to accommodate additional construction on such a large scale, the report suggests that this investment cover two or three six-year reauthorization periods.

The significant investments identified in this assessment, constrained by the capacity of the agencies to accomplish the work, are prioritized according to their condition and performance in order to provide the greatest service benefits and maintenance savings to the operating budget. These needs-based investments establish the long term planning context for developing prioritized investments in each five-year capital plan. While funding for the upcoming 2010-2014 Capital Program is expected to keep pace with past programs, it will not address the full backlog of needs identified in the first five years of this planning document. As recognized by FTA and New York City in its PlaNYC, these extraordinary needs require implementation of a targeted funding source over two or three federal reauthorization periods or capital programs to eliminate this SGR backlog. While all of the identified needs may not be included in the upcoming five-year program, the most critical investment needs will be included; for those assets not proposed for repair or replacement, additional maintenance investment will ensure their ongoing safety and acceptable performance.

This assessment outlines smart investments in replacing obsolete assets and restoring assets at the end of their useful lives. This means that assets are not replaced in kind where opportunities exist to make smarter investments that promise increased benefits, like introducing new technologies that enhance capacity and increase safety, such as computerized train control, or like implementing innovative ways to enhance transit services, such as Bus Rapid Transit. These "smart investments" described below are a key element of this assessment.

Replacing Obsolete Signals with New Technology

As the agencies replace their signal systems, smart investments will ensure that obsolete hand-thrown switches for which parts are no longer available on the open market are replaced by micro-processors with central control capabilities that offer greater system safety and enhance system capacity by providing more control over train movements. These next twenty years will see much of the subway signal system rebuilt with communications-based train control (CBTC), an advanced signal system that enables real-time centralized train supervision and monitoring, permitting trains to operate at higher speeds and with shorter headways, thus increasing capacity. It also provides for automated train operation, and information regarding the exact location of trains, enhancing normal operations and emergency response. NYC Transit recently completed a CBTC installation on the Canarsie Line (L train). Plans are currently in place to next advance CBTC on the Flushing Line (7 train). CBTC applications will also be evaluated for the Queens Boulevard and the Broadway-7th Avenue (2/3) corridors to help address capacity limitations.

The railroads will similarly replace aging signal infrastructure. LIRR will install Centralized Train Control, a multi-phased effort which will relocate the management of train dispatching, train supervision, and tower operations to the Jamaica Central Control Center Building (JCCB) and Metro-North will continue the multi-program replacement of the aging signal system with the latest technology to accommodate current operations and ensure compatibility with future service needs.

Providing Innovative and Enhanced Bus Service

Long standing problems, including slow speeds, poor reliability and long travel times have plagued bus services and limited the efficiency and therefore the appeal of surface transit. Future investments in surface service will incorporate smart approaches to addressing these problems. This assessment, therefore, promises

the introduction of a new way to deliver bus services, Bus Rapid Transit, to areas of long-standing need.

Bus Rapid Transit (BRT) is a modern approach offering a new type of bus service with innovative features, including street pavement treatments, dedicated bus lanes, signalized intersection strategies to speed buses through traffic choke points and fare payment innovations to speed boarding. This initiative integrates with Intelligent Transportation System elements to further their regional benefits. Such components include:

- Off-board fare collection;
- Traffic signal priority;
- Bus priority signals at key locations;
- Real time information at bus stops;
- Cameras on buses for incident recording; and to help enforce bus lane regulations.

NYC Transit and the City of New York are advancing an initial BRT effort to implement six routes between 2008 and 2014. The MTA and NYC are also working together on a BRT Phase II Study which will identify additional BRT services that could be implemented once the initial routes are operating. Further, because BRT can provide increased capacity and connectivity to areas of need at less cost and in a shorter development period, it is being integrated into the standard MTA planning process in all corridor studies seeking to expand capacity. This plan delivers investments to expand the benefits of BRT to additional areas of need in all five boroughs.

This new approach to core surface service investments promises to increase capacity, reduce travel times, improve reliability and attract new riders.

Innovative and enhanced bus service also means rationalizing the delivery of service throughout the MTA region to insure effective and efficient operation and coordination with the existing MTA bus and rail network. An evaluation will be done to learn about the opportunities and challenges of a more unified and coordinated regional bus system.

Communicating Real Time Information

Many of the communications investments in the core plans will replace the system's aged communication assets, garbled audio messages and largely static signage with smart communications that provide the information backbone to allow customers to make smart travel decisions, providing customers "real-time" information while they are planning a trip or en-route.

Investments over this assessment period include:

- Expansion of real-time transit information in subway and rail stations, bus stops and on personal hand-held devices; and
- Implementation of new communication systems on the bus fleet to enhance dispatching and reliability.

These investments will, in turn, provide the opportunity in the future to communicate with customers through new technologies, such as Twitter and "Instant Messaging" systems, to deliver targeted "just in time" information on transit services (arrival time, track number, etc) over this assessment period.

Implementing New Fare and Toll Payment Options

During the first half of this assessment period, the fare payment infrastructure currently in use at all MTA agencies — ticket machines, turnstiles, fare processing equipment — will all reach the end of their useful lives. Just as this infrastructure was transformative with its introduction in the 1990s enabling elimination of two-fare zones and implementation of fare discounts, the replacement of these assets with the next generation of fare payment technology promises a similar transformation.

This assessment includes investments to migrate to more advanced fare and toll collection and payment systems across the MTA family. MTA is completing an evaluation of new fare and toll payment methods for the transit, commuter rail and crossings network, including the use of contactless "smart chip" payment systems, such as standard bank and credit cards, pre-paid

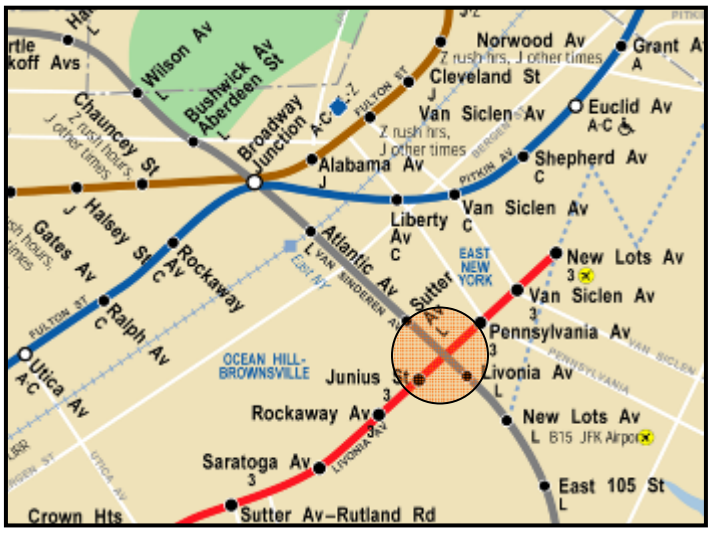
transit payment cards, key-tags and smart phones. The future promises the ability to use a single smart card or a cell phone with a smart chip — cell phones being nearly ubiquitous in the New York region — to ride any and all of the MTA region's transportation systems, from NYC Transit's subways and buses, to the commuter railroads. This new approach could offer many benefits to the MTA, including increasing bus speeds by shortening the boarding process, reducing labor and cash handling expenses, supporting inter-modal fare payments options and improving customer service through simplified and expanded fare payment options.

Improving Access for the Elderly and Physically Challenged

As assets are repaired and replaced, opportunities will continue to be identified to increase access for the disabled. Surveys continue to show that people expect to remain in the workforce longer than previous estimates so that the elderly are expected to account for 20% of the work force by 2020, up from 13% in 2000. Many of these individuals are or will become MTA customers, and investments will have to accommodate a wide range of new needs, from larger message text to innovative ways to site and maintain elevators and escalators throughout the transit system. To this end, this assessment continues investments in audio/visual screens, low-floor buses, elevators and paratransit vehicles among other core investments to serve an aging customer base.

Optimizing System Links

As investments are made in stations and track on the rail system and enhancements to the bus system, opportunities exist to optimize service by adding new transfer points between intersecting subway lines and between bus and subway or bus and rail connections through intermodal terminals. These investments promise to expand travel choices and better exploit network capacity, especially when also informed by the real-time information improvements described above. These smart investments have provided new access between the 1 and R/W lines with a new South Ferry Terminal, links between MTA/NYC Transit Bus services and adjacent subway lines via new intermodal terminals in Jackson Heights and Ridgewood, and will soon provide new transfers between the B/D/F/V and uptown 6 lines in NoHo, and between the A/C/F and the M/R lines in downtown Brooklyn.



Additional opportunities to better link existing transit lines could include a transfer between the 3 and the L trains at Livonia Ave, and intermodal improvements at Rockaway Parkway (L) and Gun Hill Road (2/5). Other locations will be considered based on high transfer volumes between buses and subways.

LIRR will undertake infrastructure investments in the vicinity of Jamaica Station to increase station capacity and throughput in conjunction with service expansion, including new Cross-Borough "Scoot" Service between Jamaica and Brooklyn. This critical link in LIRR's system will be modernized, through a new track layout, new signals, and new higher speed crossover switches. Metro-North's Strategic Intermodal Facilities and Parking Expansion project will implement strategic station and parking investments to construct key intermodal transportation hubs in the Metro-North region.

Smart investments such as these will allow customers to optimize travel by minimizing travel paths and seamlessly switching from one service to another.

Maximizing Investments in Commuter Rail Stations in New York City

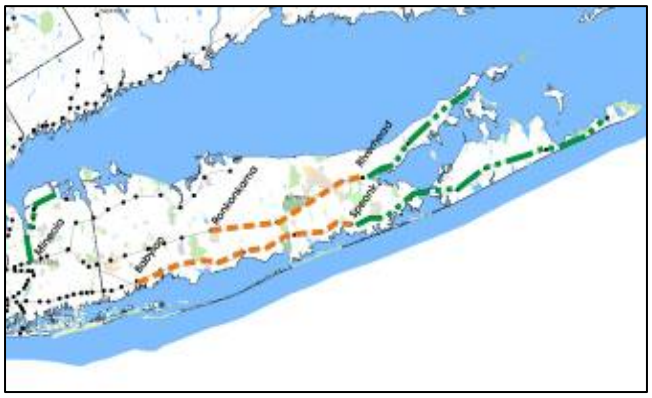
While Metro-North and LIRR services are primarily used by customers traveling to and from the suburban counties, the rail lines pass through parts of Manhattan and the outer boroughs and provide a number of city station locations. As part of investments in these stations over this plan period, opportunities may exist for pocket tracks and signal enhancements to create incremental throughput capacity. This would enable additional trains to stop at these stations, enhancing both CBD-bound service and reverse-commuter travel to the suburbs.

For example, the construction of a new pocket track extension east of Great Neck Station will increase train storage capacity and allow the LIRR to start more Port Washington Branch trains mid-branch. This will increase service and seating capacity for all nine Port Washington Branch stations in Queens.

LIRR can also make investments to overcome infrastructure limitations at the Kew Gardens and Forest Hills stations, whose platforms are only four car lengths. Lengthening the station platforms at these two stations would allow additional LIRR customers to utilize these stations without having to pass between train cars during a station stop in order to access a car which platforms at the station. Through the construction of lengthened platforms that accommodate more train cars, station dwell times at these stations will decrease, making for shorter travel times between Jamaica and Penn Station, while improving service to these Queens communities. This smart investment is particularly beneficial after East Side Access service opens, as LIRR service to two Manhattan terminals will help to decrease overcrowding on the Queens Boulevard subway line.

Implementing Strategic Corridor Improvements to Improve Service

As the railroads invest in track, signals and power, additional targeted investments in strategic corridors promise significant opportunities to increase capacity and enhance service. For LIRR, these investments in their core program complement the East Side Access network expansion project currently underway, putting in place the infrastructure necessary to maximize the increase in capacity that Long Islanders will receive. For Metro-North, similar improvements will facilitate additional service on the Hudson and Harlem Lines.



Long Island Rail Road's Strategic Corridor Improvements represent strategic core program investments to increase railroad capacity. For instance, as the LIRR modernizes the aging signal system in Jamaica, it will reconfigure the existing track layout, which has not changed significantly since the complex opened in 1913, to allow for increased throughput. Other strategic corridor investments in LIRR's program include: expanding Main Line track capacity, including a complete double track between Farmingdale and Ronkonkoma, constructing the Republic Hub Intermodal Station, enhancing/establishing "Scoot" Services on diesel branches, and building additional electric train storage capacity on multiple branches in Suffolk County.

Metro-North Railroad's core program investments also include strategic corridor improvements aimed at increasing capacity on the busy Harlem, Hudson and New Haven Lines of Metro-North's East of Hudson River services in conjunction with general track, signal and power improvements intended along the corridors. These investments include: electrification of the Hudson line between Croton-Harmon and Peekskill and a new Woodlawn flyover at the junction of the Harlem and New Haven lines in the Bronx.

These smart investments in track, signal and power promise to remove critical existing operational constraints, improve service flexibility and improve train performance.

Making Investments Sustainable

The MTA has made a concerted effort in this Twenty Year Needs Assessment to incorporate smart "sustainability" in its many definitions into the planning and construction of proposed infrastructure investments. Building sustainable features into core investments will further enhance transit's role in the overall sustainability of the region, which already has one of the lowest carbon footprints in the nation largely due to transit use. This twenty year period will also see the growth in smart station access programs and transit-oriented development (TOD). The MTA and the communities it serves will continue to work collaboratively to cluster commercial and residential development around MTA stations and MTA right-of-way.

The core agency investment needs which follow focus on repairing and replacing obsolete assets in these smart ways, to ensure the legacy of the system for the generations to come.

MTA Agencies' Twenty Year Capital Needs: 2010-2029

The following sections describe the investments identified by each agency as necessary to restore the regional transit system to a State of Good Repair and to replace assets that reach the end of their useful lives before they fall into disrepair in the smart ways identified above. These needs, constrained only by the capacity of the agency to accomplish the work, are prioritized according to asset condition and performance in order to provide the greatest service benefits and maintenance savings to the operating budget. While all of the identified needs may not be included in subsequent five-year programs, for those assets not proposed for repair or replacement, additional maintenance investment will ensure their ongoing safety and acceptable performance.

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New York City Transit Capital Needs 2010-2029

Subway ridership was 1.6 billion in 2008, the highest annual since 1950. Combined subway and bus ridership of 2.37 billion was the highest since 1965. Achieving this high level of ridership depends on the health of the vast infrastructure upon which it relies, estimated to be worth more than $700 billion in replacement value. In the "city that never sleeps," NYC Transit runs a much needed 24-hour service, but that non-stop service causes tremendous wear and tear on the system and all its elements. Continuing the reliability of service requires significant ongoing investment in all of the massive infrastructure elements of this complex system.

NYC Transit forecasts a need of $84 billion through 2029 to continue to maintain, replace, and upgrade all its capital assets (see Table 2). This excludes investments in new routes and extensions, which are addressed in the expansion section of this assessment.

More than half of all needs, $47 billion, focus on: signal system investments; subway cars; buses and paratransit vehicles; and passenger stations. Signal systems, at $14.5 billion, constitute the single largest category of needs.

Table 2
MTA NYC Transit Summary of Needs: 2010-2029
By Investment Category
(2008 $ in millions)

Investment Category	2010-2014	2015-2019	2020-2024	2025-2029	Total
Subway Cars	$3,037	$1,724	$3,674	$2,843	$11,278
Buses	2,584	1,154	2,615	1,799	8,152
Passenger Stations	3,638	3,392	3,396	2,143	12,569
Track	1,280	1,205	1,190	1,174	4,849
Line Equipment	1,118	1,682	1,958	2,112	6,869
Line Structures	923	982	1,051	1,266	4,222
Signals	4,043	3,940	3,190	3,316	14,488
Communications	858	1,046	940	637	3,481
Traction Power	728	758	723	728	2,937
Shops	782	1,088	846	1,128	3,843
Yards	649	842	381	579	2,452
Depots	896	691	736	643	2,966
Service Vehicles	185	233	110	90	619
Passenger Security	27	27	30	30	114
Miscellaneous	1,098	1,131	1,105	1,128	4,462
Staten Island Railway	335	232	173	107	847
Total	$22,180	$20,126	$22,117	$19,723	$84,146

System Investment Status – Overview

In this Twenty-Year Capital Needs Assessment, NYC Transit has evaluated the assets that comprise its vast infrastructure based on one or more of three attributes:

- asset condition;
- asset age vs. useful life;
- asset performance vs. the identifiable performance standard must meet.

These attributes determine an asset's investment need.

This approach is different than the traditional State of Good Repair approach utilized in past assessments. Previously, all assets that were in good condition at the onset of the first capital program in 1982 – or that have been modernized since 1982 – were

considered as having achieved a "State of Good Repair" that never changed, even as conditions declined or the asset reached the end of its useful life. Assets were not reclassified out of a State of Good Repair. The new approach used in this assessment moves beyond these labels and identifies investment need based on demonstrable current asset attributes.

The *System Investment Status* (Chart 1) presents by investment category the measure of whether an asset is considered in good repair or whether it is backlogged and already past due for investment (if all components of an asset category that are in need of investment cannot be funded in a given program, those not addressed will be maintained through the operating budget).

This approach results in some significant differences between past and present assessments. While several key operating assets remain classified as 100% in good repair (rail cars and mainline track / switches), some asset classifications have changed. The noteworthy findings are as follows:

- **Stations** This asset group reports on 11,107 station components that make up NYC Transit's 468 stations (staircases, mezzanines, platforms and platform edges, etc). Most stations (386) require investment in one or more component types; approximately 32% of all components do not meet current standards.

- **Power** This category considers all parts of the substation and its constituent power distribution assets (e.g.- circuit breaker houses). As a result, the status of the power system is 63% in good repair.

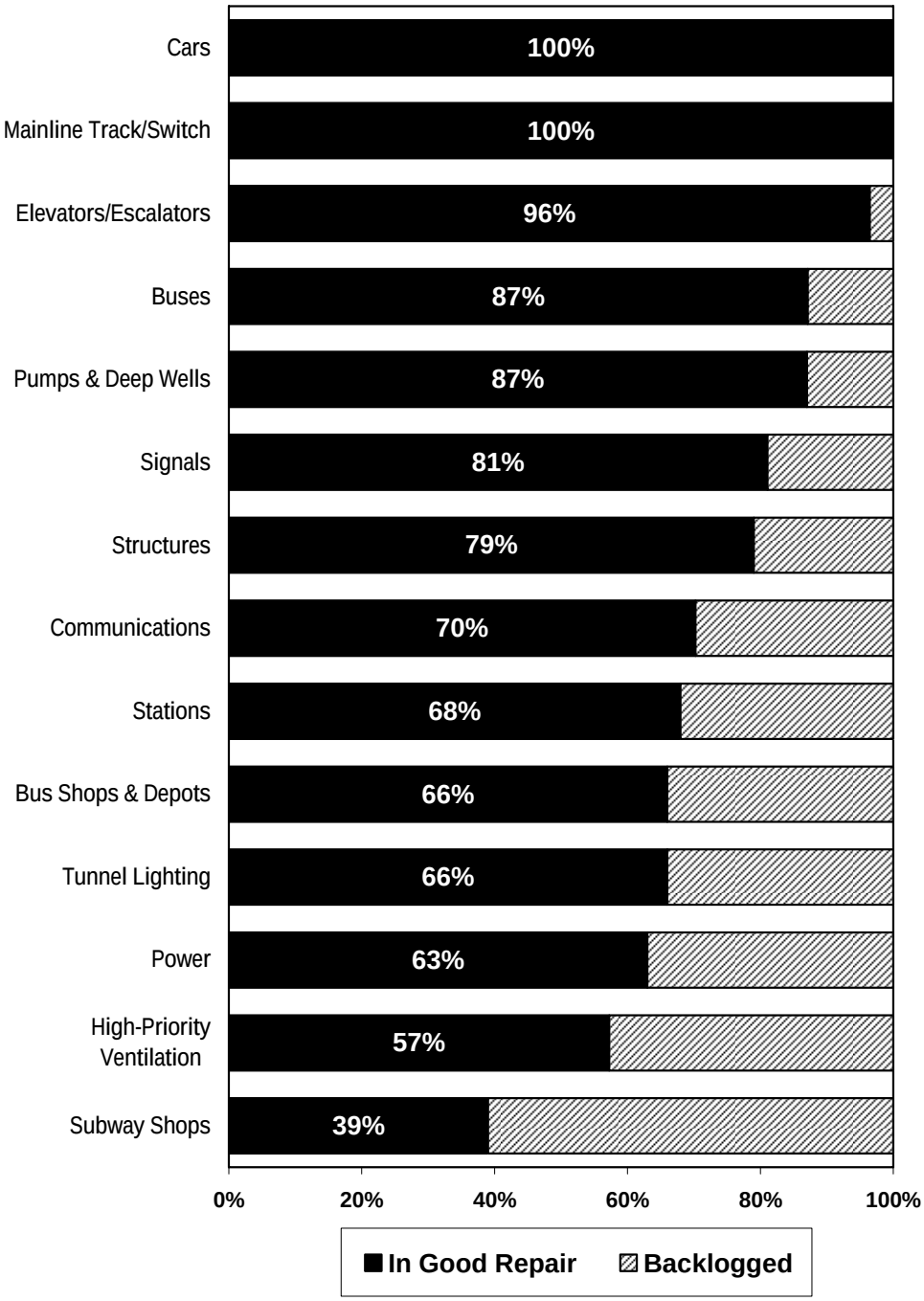
- **Bus Fleet** Since all buses were purchased new since 1982, this category might be expected to be 100% in good repair. However, a strict comparison of vehicle age to the 12-year useful life of a bus reveals that only 87% conform. More than 500 vehicles (mostly standard buses) are overage within the current fleet of over 4,600 buses. While it is well within NYC Transit's fleet management capabilities to operate with these older buses, it is at the expense of additional vehicle maintenance expenses.

- **Bus shops/depots** In recognition of the reinvestment now required in facilities dating from the mid-20th century, the percentage of assets in good repair drops from 90% to 66%. Significantly, there are currently four active

depots greater than 60 years old that cannot accommodate modern bus fleets, current technologies and efficient workspaces.

- **Ventilation Plants** This category illustrates how an asset's investment status has changed through adherence to a revised performance standard. Previous assessments focused on the status of existing fan plants. Now, a subway tunnel segment (320 segments make up the underground portion of NYC Transit's system) is only considered in good repair if it is protected by vent plants that can achieve a "critical velocity" of airflow as specified by the National Fire Protection Association for **new** subway systems. A significant number of high priority segments do currently meet the standard (including all under-river tube segments), and investments for the next tier are proposed in this assessment. The time frame for full system coverage extends well beyond the 20-year horizon.

Chart 1
System Investment Status
NYC Transit Major Investment Categories



Highlighted Investment Categories

Below are the three "signature" investment categories that have the most significant needs over the coming 20 years. Each is a major capital initiative in its own right, and each reflects unique challenges in execution to achieve the aggressive investment goals over this horizon.

The following sections provide more detail on these categories. They are followed by a comprehensive presentation of all NYC Transit investment categories.

Signal Systems

Signal systems are the single largest need at 17% of NYC Transit's 20-year total. This priority investment has been scaled up from previous assessments to address this category's need for investment. Responding to the demands of ridership growth and the age of certain signal systems, this assessment contains an ambitious program to progressively eliminate backlogged repairs and overage signals by 2025 and to address immediate Normal Replacement needs though 2029 (and beyond).

Rolling Stock

Rolling stock (subway cars and buses) make up 23% of total needs. Investments focus on replacing older vehicles when they reach the end of their service lives. New technologies and amenities are often incorporated in each successive generation of rolling stock to further improve the quality of service for riders. NYC Transit also anticipates ridership growth and plans for purchases to increase the fleet size to meet those needs.

The bus fleet, with a backlog of more than 500 buses over the age of 12 years and a short timeframe for replacement, represents an enormous need over twenty years. The bus fleet expansion of 1997-1999 (a result of fare policy-induced ridership increases) now drives an outsized replacement need, which is repeated in the latter part of the twenty year period.

Stations

Based on a newly completed comprehensive station condition survey, NYC Transit is continuing with station rehabilitations and is also expanding station investments to include a flexible program for prioritized, condition-driven investments. As a tool in parallel with traditional rehabilitations, station renewal projects offer a more targeted approach that address several component areas within a single location and bring the station into good repair. Renewals are planned on a 20-year investment cycle.

Additionally, the strategy will permit more frequent and timely investments focused on addressing priority repairs (e.g.- stairs) with campaigns at multiple locations. The total cost of this approach is also markedly lower than that required by comprehensive reconstruction/rehabilitation. The two strategies in tandem – rehabilitations and renewal investments – will eliminate all significant defects in a shorter timeframe than the prior approach, which relied only on full rehabilitations.

Investment Category Summaries

Railcars

NYC Transit's railcar fleet has 2,802 cars in the A Division and 3,532 cars in the B Division for a combined fleet of 6,334 cars. The railcar fleet has been in a Normal Replacement cycle since 1992.

Railcars are a critical service delivery asset and, as such, make up 13% of the total Twenty Year Capital Needs investments. This level of investment is needed to maintain the high service level that NYC Transit has achieved through past railcar purchases and a comprehensive railcar maintenance program. Past investments have increased reliability from 7,000 miles between breakdowns in 1982 to more than 130,000 miles today.

NYC Transit's strategy for the 2010-2029 period is to continue the Normal Replacement of railcars as they reach the end of their 40-year useful lives, with additional cars purchased as necessary to support expected ridership growth. Highlights for the A Division include the purchase of growth cars in the 2010-2014 program for the Flushing line and a large Normal Replacement of the R-62/R-62A fleet in the 2020-2024 program. In the B Division, the R-44 and R-46 car classes will be replaced in the 2010-2019 programs and the R-68/R-68A car classes will be replaced in the 2025-2029 program. For the purposes of this plan, all B Division purchases are assumed to be 60 ft cars. Growth cars for the B Division are scheduled for purchase in the 2015-2019 and 2025-2029 programs, and for the A Division in 2020-2024 and 2025-2029.

Buses

The NYC Transit bus fleet currently has 4,768 buses, including 3,499 standard, 620 express, and 649 articulated buses. All express and articulated buses are in a Normal Replacement cycle, but over 500 standard buses have remained in service beyond their

stated useful lives of 12 years. Prior purchases coupled with NYC Transit's service program, including preventative maintenance and general overhauls, have resulted in fleet reliability improving from less than 1,000 miles between breakdowns in 1982 to more than 4,000 miles today. They have also made NYC Transit's fleet the greenest large bus fleet in the nation; the entire bus fleet is now composed of either clean diesel, hybrid diesel-electric, or CNG-fueled buses. And, the fleet is one that is fully accessible to the disabled.

NYC Transit remains committed over the next 20 years to the Normal Replacement of buses with purchases planned to coincide with the retirement of all buses at the end of their useful lives. Overall, over 5,200 standard, 2,800 articulated, and 1,100 express buses will be purchased by 2029. These purchases will further diversify the bus fleet. Over the next two decades, the number of articulated buses will grow from 14% to 31% of the total fleet, representing an average growth of 5% per year as they are used on high-volume and new BRT routes. Alternative energy buses will also comprise a larger share of the fleet. Since 2003, NYC Transit has committed to purchase only clean fuel buses for its standard fleet.

NYC Transit's paratransit fleet of 2,551 vehicles provides point-to-point trips for qualifying customers. This fleet consists of 1,775 accessible vans and 776 sedans, all of which are in a Normal Replacement cycle. Since sedans are purchased through the operating budget, only vans are dealt with in this Twenty Year Capital Needs Assessment. The paratransit van fleet is expected to grow substantially over 20 years; based on an average growth rate of nearly 4% per year over the next 20 years, the van fleet will double by 2023. Factors that influence this significant need in paratransit service are a growing and aging population and a mandated "zero-denial" rate.

Stations

NYC Transit currently operates 468 passenger stations: 277 subway, 142 elevated, and 49 on viaduct, fill, or open cut structures. In 2008, NYC Transit completed a comprehensive condition survey of all stations. The survey rated over 11,000 station components such as stairs, platforms, windscreens, and canopies; of these, approximately 32% are backlogged. Most stations display some backlogged State of Good Repair needs.

Based on these findings, NYC Transit has developed a strategic station investment plan that combines limited traditional rehabilitations with condition-based station renewal work. The latter approach will feature targeted projects that simultaneously

address all major identified components necessary to restore the station. By focusing on component needs, this investment approach will allow NYC Transit to accelerate the renewal process and program more timely reinvestment on a 20-year cycle. Additionally, campaigns are planned to fix a single type of station element at various locations, therefore further accelerating our ability to address critical items such as stairs and platform edges. This overall strategy enables NYC Transit to more quickly address prioritized needs, and reinvest at a sustainable pace that also recognizes the varying useful life of station subcomponents.

Currently, there are 196 elevators and 174 escalators in NYC Transit stations. The number of elevators has increased by 20% over the last five years mainly due to the upgrading of 81 (of the 100 planned) stations ("Key Stations") to become fully ADA-accessible. The upgrade of these Key Stations puts NYC Transit ahead of the pace needed to make 100 stations mandated to be made accessible by 2020; beyond 2020, each successive capital program will make five additional station fully ADA compliant. (In addition, 16 stations beyond these Key Stations are also accessible.) New stations that are part of the 2nd Avenue Subway and 7 West Extension projects, as well as additional Key Stations, will greatly increase the number of elevators and escalators. Over the 20-year period, investments in escalators and elevators are planned to replace these assets at the conclusion of their useful lives. A new element of NYC Transit's accessibility improvement program includes consideration for redundant elevators, where feasible, for improved reliability.

Automated Fare Collection equipment will be replaced over the 20-year period. The next generation of fare equipment promises to transform access to the region's transportation systems much like MetroCard did years ago. An additional 233 new high entrance and exit turnstiles will also be installed over the 20-years as control areas are addressed.

Mainline Track and Switches

The NYC Transit system contains 631 miles of mainline track and 1,754 switches. Each switch has an associated length of approximately 100 feet, resulting in a total system length of 659 miles. As track and switches are two of the most critical assets for safe, efficient, and reliable service delivery, a rigorous inspection program has been instituted where every segment of track is assessed several times each month on a scheduled basis. Switches are inspected jointly by track and signal maintainers. These efforts have yielded up-to-date condition information that has enabled a track and

switch replacement program that has placed all track and switches in good repair since 1991 and 1997, respectively.

An estimated 182 miles of mainline track is planned for replacement between 2010 and 2029, or approximately 46 miles per capital program. Approximately 600 switch replacements are planned over the next 20 years, which is suitable to maintain a Normal Replacement pace.

Line Equipment

Line equipment refers to the array of equipment distributed along the right-of-way. Broadly, there are four distinct types of line equipment: tunnel lighting, ventilation plants, pump rooms, and deep wells.

There are approximately 432 track miles of tunnel lighting in the NYC Transit system, covering all subway tunnels, including 148 miles of incandescent lighting. All incandescent tunnel lighting will be replaced with compact fluorescent lighting by 2024. To accomplish this goal, tunnel lighting awards will proceed at an average pace of 49 track miles per capital program. While this pace is relatively consistent with what was achieved in 2000-2004 and 2005-2009 (46 to 48 miles per program), sustaining it remains a challenge.

There are currently 194 ventilation plants (or "fan plants") in the NYC Transit system protecting all under-river tubes and a share of the rest of the system. In an emergency, they are used to direct heat and noxious fumes away from passengers and evacuation routes. NYC Transit proposes to construct 50 new or expanded fan plants by 2029 to achieve modern ventilation standards at the next group of high-priority tunnel segments (this is out of 250 segments that under modern standards for new subway construction should have high-velocity vents). Plants will be built based on a priority ranking and other site considerations. In addition, smaller-scale investment is programmed to extend the useful life of existing fan plants.

There are 230 pump rooms to expel the ground water that naturally infiltrates the subway tunnels and other runoff that enters the system. The last 32 backlogged pump rooms will be addressed by 2016. After 2016, investment in pump rooms will shift to Normal Replacement, and will address an additional 130 pump rooms by 2029. Replacement investment is assumed to be less intensive than initial modernizations and thus will ramp up from 25 locations in the 2015-2019 program to 57 locations in 2025-2029, as more and more pump rooms reach the end of their useful lives.

Investment in deep wells (pumps that lower the water table in the vicinity of a subway structure to prevent water infiltration) will continue in the 2010-2019 programs.

Line Structures

There are 228 miles of line structures on the NYC Transit system. There are 136 miles of underground subway structures, including 13 miles of under-river tubes and 123 miles of land-based tunnels. There are 70 miles of steel elevated structures, nine miles of viaducts, which are ferro-concrete or concrete-encased steel elevated structures, and 22 miles of at-grade structures, which consist of right-of-way built on earthwork at-grade, in open-cut, or on embankments.

Over the next 20 years, 76 miles of subway structure will be rehabilitated. All subway structures currently in need of rehabilitation (42 miles) will be addressed by 2024 and half of all structures now rated marginal (34 miles) will require Normal Replacement investment later in the 20-year period. Subway structures are difficult to inspect and, as such, condition ratings may be revised to reflect new findings often in response to new needs that require attention.

Subway structures include 543 emergency exits, which are located at regular intervals along the right-of-way. An in-house initiative to rehabilitate approximately 25 exits per year, begun in the 2005-2009 program, will continue.

Elevated structures will be rehabilitated at a pace of approximately two miles per five-year program, for a total of nine miles over 20 years. This pace is sufficient to rehabilitate all elevated structures currently in moderate condition (there are no elevated structures with significantly deteriorated conditions). Three viaduct structures and ten miles of at-grade structures will be rehabilitated in the 20-year period.

There are 65 miles of painted steel structure, including virtually all steel elevated structures, plus steel bridges that are part of certain at-grade structures. Line structure painting will proceed at an average pace of 21 miles per capital program. This is an accelerated pace of painting – only 14 miles were painted in 2005-2009 – and is necessary to reestablish a regular repainting cycle based on the 15 or 25-year useful life of paint. Paint that is currently over-age will be eliminated by 2014. By that time, however, additional paint will have reached the end of its useful life, and will be in need of reinvestment. By 2021, the painting cycle will have caught up with Normal Replacement needs, and thereafter all paint will be addressed immediately at the end of its useful life.

In response to heavy flooding that occurred in August 2007, NYC Transit initiated a Flood Control program to block the inflow of floodwaters into subway structures. It began in the 2005-2009 Capital Program and will conclude in the 2010-2014 Capital Program.

Signal Systems

Signals govern the movement of trains along the right-of-way to ensure that trains operate at safe speeds and to prevent collisions. There are 728 track miles of mainline signals. Most of the NYC Transit system relies on conventional "fixed block" signal systems, but the agency is beginning to transition to communications-based train control (CBTC) signals.

Currently, 71% of the signal system (519 track miles) is within its 50-year useful life. The balance of the system's 209 track miles is in need of modernization. Most over-age signals are located on IND lines; IRT and BMT signals are within their useful lives, except for the signals on the Dyre Avenue line. A number of interlockings have been modernized in advance of the full modernization of signals along a line, so only 24 interlockings (13%) are backlogged.

Significant portions of the IRT and BMT signal systems were modernized in the 1960s, including the core Lexington Avenue and Broadway lines in Manhattan. Although currently within their useful lives, these lines will come due for Normal Replacement within the 2010-2029 period.

An ambitious program is planned for signals through 2029 to eliminate over-age signals by 2025 and to address immediate Normal Replacement needs. This plan represents a major increase in investment pace compared to recent capital programs – up to $4 billion per five-year program, compared to less than $1.5 billion in the 2005-2009 Capital Program.

CBTC will be installed on most of the lines to be modernized. In contrast to trains operating on lines with traditional fixed-block signals, each train on CBTC-equipped lines has an on-board computer that is in constant radio communication with wayside devices. Train speeds and positions are measured precisely, not based on fixed blocks, and are communicated to the centralized Rail Control Center (RCC). Instructions regarding allowable train speed are then transmitted back to the on-board computers. CBTC provides a variety of benefits, providing enhanced safety, capacity,

operations, and customer information. Installation of CBTC will entail the modernization of each individual interlocking along the line, the subsequent "overlay" of CBTC technology along the entire line, and outfitting all railcars that operate on the line with CBTC carborne equipment. The rollout of CBTC signals will proceed with installation on 303 miles of track. Much of the IND, which is backlogged, will receive CBTC by 2029. The Lexington Avenue line (IRT) and the Broadway line (BMT) will also receive CBTC as Normal Replacement investments.

This plan requires an intense focus on project implementation. Up to two CBTC projects and up to six interlocking modernization projects will be awarded per year. CBTC carborne equipment will be installed on more than 5,000 railcars. Note that CBTC equipment can only be installed on new-technology cars (the R142-class cars and newer), so the pace of CBTC equipment installation is coordinated with the planned schedule for delivery of new cars. By 2027, all revenue cars in the NYC Transit system will be CBTC-equipped, except cars serving the G, J, M, S, and Z lines.

The largest investment area in the signals category is the modernization of interlockings – $8.0 billion over 20 years. Signal interlockings ensure the safe movement of trains at locations where tracks cross or merge/diverge. There are 183 interlockings in the mainline NYC Transit system. Interlockings are controlled from signal towers, where NYC Transit personnel can monitor the position of trains and specify the route for each train to take. Interlockings in need of modernization will be addressed by 2016. An additional 54 interlockings will undergo Normal Replacement upgrades, which are necessary for compatibility with CBTC. Interlockings will be modernized at least three years in advance of CBTC installation on a line, so the pace of interlocking modernizations is highest in the 2010-2014 and 2015-2019 progams.

In parallel with this extensive CBTC rollout, conventional signals will continue to receive investment because of their condition and because some lines are not projected to need the capacity benefits of CBTC. On the Dyre, Crosstown, Culver, and Nassau lines (a total of 61 miles), conventional signals will be rehabilitated. By the end of the 20-year period, 355 track miles will feature CBTC signals and 373 track miles lines will have conventional signals.

Another enhancement to conventional signals will be the rollout of an Automatic Train Supervision (ATS) system on the B Division, to provide a visual display of train positions and remote control of interlockings at the Rail Control Center. (An ATS

system on the A Division was recently completed.) The system will be implemented in two phases, one in 2010 and the other in 2015.

Lastly, NYC Transit will continue several initiatives to enhance the safety and operational efficiency of existing conventional signals. These projects include circuit and control modifications, stop machine cable replacements at locations throughout the system, and modifications to signals on the Lexington Avenue line to provide an incremental increase in throughput. These initiatives are expected to conclude by 2015.

Communications Systems

NYC Transit has an extensive carrier-grade communications network. The network is supported by 475 miles of fiber optic cable, extensive copper telephone cable installations, eight major PBX sites, wireless radio systems for use in the subways by NYC Transit and the New York City Police, 190 miles of subway antenna cable, and 558 communications rooms located in stations. Communication assets also include in-station communications applications such as public address and CCTV systems. Collectively, these assets are critical to providing voice and data communications for rail operations and facilities as well as administrative operations.

The strategy over the 20-year period is to complete on-going projects and begin Normal Replacement work, with a small number of System Improvements. Construction of the Synchronous Optical Network /Asynchronous Transfer Mode (SONET/ATM) network is expected to be complete by 2010. A major activity for the 2010-2029 period is the migration of applications to this new network. Expansion of the network is accounted for as well, as increasing numbers of applications are added to it, raising bandwidth requirements.

To support the functionality of the network, infrastructure investments in 2010-2029 include replacing degraded fiber optic cable by 2017, antenna cable by 2013, and copper cable as needed. Thereafter, Normal Replacement for each cable asset will continue at a pace reflective of the amount of the asset installed and its useful lifetime. Upgrades and expansions of communications rooms are required as more electronic equipment is placed in them; air conditioning/ventilation upgrades for the rooms and expansions continue through 2029.

All subway stations will have some capacity for public address by the end of the 2010-2014 Capital Program, and all older systems will be upgraded to modern standards by

the 2020-2024 Program, replacing existing audio-only systems with digital Public Address (PA) and Customer Information Screens (CIS). Passenger ID CCTV installation will continue, with projects to complete all stations by 2019. Other applications receiving investments include an upgraded and expanded equipment supervisory network, and a phased project to place electronic information tablets with station agents.

Enhancement of the police radio system is programmed for 2010 to resolve outstanding issues. A multi-phased project to replace the subway radio system is underway. Following on the first phase from the 2005-2009 Capital Program, subsequent phases will be awarded in 2011 and 2017. This project will bring the radio system into compliance with an FCC mandate and add new channels for use by additional NYC Transit personnel.

Traction Power

NYC Transit operates 216 substations throughout the subway system. Substations receive high-voltage alternating current (AC) power from Con Edison and convert it into 600-volt direct current (DC) power for use in train propulsion. To accomplish this conversion, each substation includes a transformer, which reduces the voltage of the AC power, and a rectifier which converts the power from AC to DC. Substations also include switchgear to isolate equipment and protect against overloads or short circuits. DC power output from a substation is transmitted to the third rail by means of the power distribution system, which includes traction power cables and circuit breaker houses (CBHs). For emergency removal of power, Emergency Alarm Units (EAUs) are placed throughout the NYC Transit system.

Currently 99 substations exhibit conditions requiring capital investment, and these will be addressed by 2029. In general, substations with multiple backlogged components will receive a more comprehensive 'modernization' type project, while substations with only one or two backlogged components will receive component-only investment.

The construction of a new substation, in the vicinity of 34th Street and 8th Avenue, is proposed. This System Improvement project will allow for higher train speeds and improve reliability on the 8th Avenue line.

There are 299 circuit breaker houses (CBHs) system-wide. Investment in CBHs will increase compared to recent programs, with an average of 18 locations in each five-

year program, up from six in 2005-2009. At this increased pace all 73 CBHs that need replacement will be addressed by 2029.

Investment in traction power cables will proceed at an even pace of 40 miles of cable per five-year program. To facilitate the replacement of cables, it is sometimes necessary to construct new duct banks. Emergency alarm units will also be invested in systemwide during the 2010-2029 period.

Subway Shops

NYC Transit's system of railcar shops keeps the subway fleet in good working order. The 14 railcar maintenance facilities handle daily maintenance and cleaning tasks along with the Scheduled Maintenance System (SMS) component change-outs. NYC Transit's two overhaul shops house the six- and twelve-year SMS program and any repairs that are too time-consuming to be completed at the maintenance facilities. In addition, NYC Transit's 25 Maintenance of Way (MOW) shops are critical to maintaining the track, signals, and electrical infrastructure of the subway system.

Overall, 39% of all shops are in good repair. To address the maintenance shops that are old, in need of replacement, and/or ill configured for current industrial practices, six demolition and reconstruction projects are planned to take place over the 20 year period. Additionally, each maintenance shop that does not undergo reconstruction is planned to benefit from rehabilitation work over the course of 20 years; six will receive significant renovation, and the two currently in good repair, Corona and 180 Street, will undergo a minor renewal. Similarly, 23 MOW shops will each receive funding for moderate rehabilitation work. Lastly, both of the overhaul shops will undergo a phased rehabilitation; 207th St will begin in 2010 and Coney Island will begin during the 2025-2029 program. With these planned investments, all railcar shops will reach good repair by the 2025-2029 program.

Yards

The 23 yards used for the storage of railcars and work trains are spread out across the NYC Transit system, generally located near the end of subway lines. Several components make up NYC Transit's yard facilities, including 118 miles of yard track (including track occupied by switches), 876 yard switches, signal systems, perimeter fencing, and yard lighting. In addition to the tracks located at the yards, there are also some unsecured lay up areas at various locations throughout the system that are used for off-peak train storage.

With investments through 2009, 89% of all yard track and 92% of both non-revenue track and yard switches are in good condition. The most backlogged element of yards is their lighting; 39% of yards have lighting that does not meet current standards.

An accelerated pace of yard and non-revenue track replacement is planned to eliminate delayed investment needs by 2015 and keep pace with Normal Replacement needs. Yard switch replacement over the 20-year period will continue at the same pace as the 2005-2009 Capital Program (80 switches per program). The backlogged signal systems at six yards will be replaced by 2018 with an average pace of three per capital program starting with Concourse Yard and Jamaica Yard in 2010-14. The signals at five additional yards will undergo Normal Replacement upgrades by 2029. Beyond this signal work, Jamaica Yard is planned to undergo an expansion that will double its storage capacity and greatly reduce the need to store trains along the mainline during off-peak hours. To improve the security at the yards, the installation of CCTV at all locations will continue through the 2015-2019 program. The final two phases for yard fencing replacement will occur by 2017. Lastly, in order to eliminate the investment needs for yard lighting, a pace of three yards per program is proposed, with Normal Replacement resuming in the 2025-2029 program.

Bus Depots and Shops

NYC Transit's 20 bus depots support bus service throughout the five boroughs of New York City by fueling, servicing, maintaining and storing buses as required. As the bus fleet diversifies, so do the facilities that support it. Two of the bus depots, West Farms in the Bronx and Jackie Gleason in Brooklyn, are equipped to service buses that run on compressed natural gas (CNG). Other depots have been modified to house the new hybrid buses that have been introduced into the fleet during the last 12 years. Supporting the maintenance functions at depots are three base shops that handle heavier work and more complex overhauls such as major bus chassis and engine repairs. In addition, seven support shops provide resources such as paint booths.

Overall, 66% of all bus facilities are in good repair. Six of the 20 depots are in need of capital investment. Those facilities are on average 62 years old and exhibit condition-based repair needs that warrant significant investment. A significant challenge during the next 20 years will be to secure additional bus maintenance and storage capacity to accommodate a growing fleet. To meet this need, NYC Transit is planning to build four new bus facilities, reconstruct one depot and expand another. The general lack

of available and suitable property will need to be tackled in order to construct new depots in a timely manner.

In addition, an average of four depots is planned to undergo targeted rehabilitation work that addresses specific components, similar to the planned work at subway shops, in each of the next four capital programs. Approximately three to four depots will be active job sites at any given time, but to minimize impacts on operations and service delivery no more than one depot per borough will be in construction concurrently. Three support shops and one base shop will also be rehabilitated in this 20-year period, and a new non-revenue shop to accommodate a growing fleet will also be constructed.

Besides the needs of depot buildings, important facility and communication equipment needs must be addressed. Over 40 bus washers and 18 bus paint booths are to be upgraded or replaced on a campaign basis by 2029. Additionally, the bus radio system will be replaced. Last, investments are planned to support future deployment of Bus Rapid Transit services in partnership with the NYC Department of Transportation. NYC Transit is planning $23 million per program for the purchase of AFC equipment and real-time information screens to support the implementation of the new BRT routes.

Service Vehicles

NYC Transit maintains a fleet of 462 specialized railcars (i.e. - worktrains) and 674 heavy-duty rubber-tire trucks and vans used to support capital construction projects, operations and emergency situations.

NYC Transit proposes to purchase 312 new work trains by 2029, in order to ensure that operations and capital construction projects are properly supported. The investments assume that there will not be growth in the work train fleet over the 20-year period. The need for locomotives, flatcars, and crane cars is largely driven by the quantity of work in the ongoing capital program. For rubber-tire vehicles, our goal over the 20-year period continues to be maintaining a Normal Replacement cycle as vehicles reach the end of their useful lives.

Passenger Security

NYC Transit's passenger security program includes initiatives to provide riders with a secure environment, primarily through the construction and renovation of police facilities. The Transit Bureau of the New York City Police Department operates out

of 18 district offices and other facilities. In accordance with the merger agreement with the City of New York, NYC Transit will continue to consider specific capital needs of the Transit Bureau related to these facilities. Eight locations are identified for rehabilitation in the 20-year period.

NYC Transit Miscellaneous

This category has varied investments to support the work of the capital program. These include safety and environmental improvements, such as asbestos abatement, upgrade and replacement of fire safety systems, and installation of backflow preventers in various facilities. Employee facilities will be rehabilitated and, where possible, consolidated. Additionally, this category includes scope development for future projects. Specialty consulting services are provided for as well; NYC Transit utilizes consultants for specialized engineering services to support ongoing and planned capital work, such as borings, concrete testing, environmental analysis, value engineering and other architectural and engineering support. In all cases, investment needs over the 20-year period are similar to what has been programmed in this category in recent capital programs.

Staten Island Railway

The Staten Island Railway (SIR) offers 24-hour rail transit service to approximately 23,000 daily riders on a single line consisting of 23 stations from Tottenville at the southern end of the island to the St. George Terminal in the north. The capital needs of SIR are diverse and the railway purchases and maintains most of the same types of assets and infrastructure as NYC Transit.

With the exceptions of yard infrastructure, work trains, and employee facilities, all of SIR's assets are currently in good repair. This overall favorable condition is the result of significant spending on critical infrastructure such as mainline track, switches, and passenger stations through the 1980s and 1990s. The Normal Replacement of these assets at the end of their useful lives dictates the general investment strategy of the next 20 years. The three backlogged asset categories will be brought into good condition by 2027.

A highlight of SIR's 20-year investment strategy is the phased upgrading of track, switches, and signals at the St. George terminal and associated yard. A second major project is the replacement of SIR's fleet of 64 railcars in the 2010-2014 Capital Program. In anticipation of the new cars, the power system for the railway, including

the construction of a new substation at Huguenot and other power improvements, and the Clifton railcar shop will also be upgraded.

Long Island Rail Road Capital Needs 2010-2029

In 2009, the Long Island Rail Road celebrated its 175th anniversary, providing an opportunity to reflect on its illustrious history, take note of recent accomplishments, and continue planning for the future. Since the 19th century, the Long Island Rail Road has played a crucial role in the history and development of Long Island and New York City, with many communities literally growing up around the LIRR. Today, the LIRR is the biggest and busiest commuter railroad in North America and the oldest in the US continuing to operate under its original charter name.

In 2008, the LIRR experienced record setting ridership of 87.4 million passengers – the railroad's highest annual ridership since 1949. It was also a record-setting year for LIRR's on-time performance (OTP), with 95.14% of trains on time, making it the railroad's highest OTP since modern record keeping began 30 years ago.

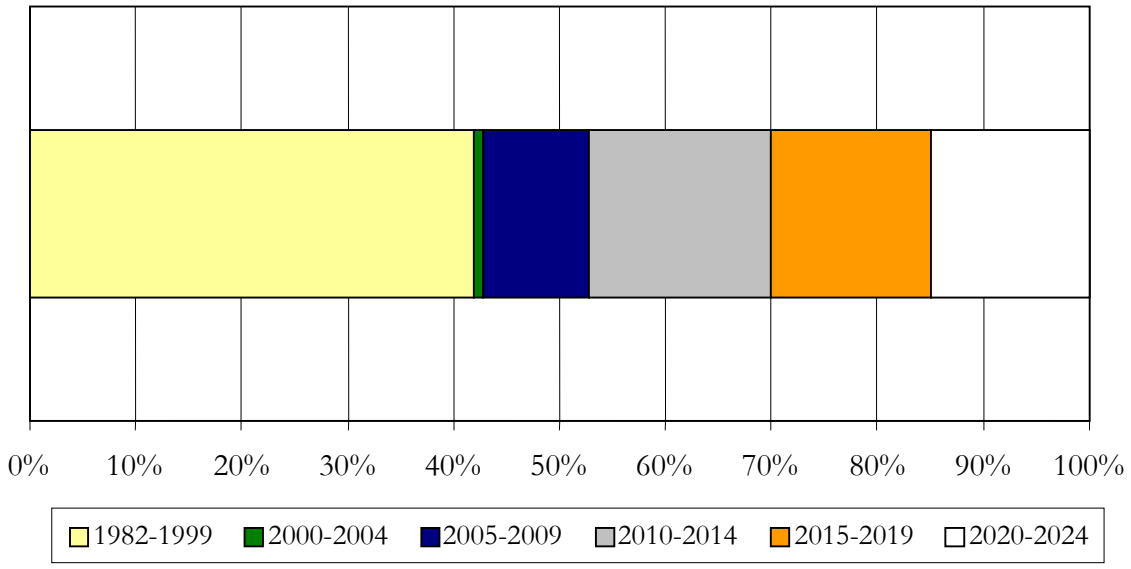
This rich history and vital role in the railroad industry and the life of the New York region continues today, with the LIRR remaining extremely focused on maintaining and modernizing its infrastructure and preparing for future service enhancements, including East Side Access service to Grand Central Terminal. With its new M-7 cars, the LIRR now has the youngest fleet of rolling stock in the MTA family - over 70% of the fleet is less than 10 years old. The LIRR continues to move forward with projects to modernize its signal system and migrate towards centralized train control, invest in infrastructure to provide service reliability, and work to serve the New York region's transportation needs in the 21st century.

Planned Long Island Rail Road investments through 2029 total over $16 billion (Table 3). This proposed level of investment, developed through an extensive, integrated staff effort, will continue the Normal Replacement of assets and ensure that line structures, the only asset category currently not in a State of Good Repair, will be brought into a State of Good Repair by 2024 (Chart 2).

Table 3
MTA LIRR Summary of Needs: 2010-2029
By Investment Category
(2008$ in millions)

Investment Category	2010-2014	2015-2019	2020-2024	2025-2029	Total
Rolling Stock	$382	$813	$504	$600	$2,299
Stations	460	350	529	505	1,844
Track	1,083	1,265	1,773	1,506	5,627
Line Structures	285	282	251	271	1,088
Communications and Signals	467	801	360	561	2,189
Shops and Yards	389	141	134	308	972
Power	253	340	298	554	1,444
Miscellaneous	174	241	242	253	910
Total	$3,492	$4,232	$4,091	$4,557	$16,372

Chart 2
MTA LIRR – Line Structures
Progress Towards State of Good Repair



Investment Strategy Overview

The LIRR Core Program includes a profile of investments -Strategic Corridor Service Improvements – to enable LIRR to maximize the benefits of East Side Access Service by implementing all the infrastructure necessary to support it. The initiation of East Side Access Service will be the most dramatic transformation for LIRR riders in a century. Creating a one-seat LIRR ride from Long Island/Queens to the east side of Manhattan will save up to 40 minutes of daily travel time for many commuters, improving access to jobs and quality of life for both LIRR commuters and those who utilize LIRR service for discretionary trips, leisure, and recreation. Linking Long Island with Grand Central Terminal will also create new opportunities for reverse-commute as well access to JFK International Airport (via the Port Authority's AirTrain). This new transit service will encourage more trips in the New York region via public transportation instead of by automobile, lessening roadway congestion and improving regional air quality.

There are a number of investments which prepare the LIRR for this expansion of service and ensure that Long Islanders receive the full value of this important regional investment by putting in place the necessary supporting infrastructure. One critical element of this effort is the reconfiguration of the Jamaica complex, including a redesigning of the track, signals and switches both east and west of Jamaica station, to allow increased train throughput. With a few exceptions, the existing track level layout of the Jamaica complex appears today as it did in 1913, when the complex opened. The design and construction of modernized track level infrastructure will streamline operations by eliminating conflicting routings and allow for train operation at higher speeds, through the utilization of higher speed switches. Work on this project also includes modernizing the aging signal system in Jamaica, and replacing signal components which are at the end of their useful life.

Additionally, infrastructure investments to the east of Jamaica are also critically important, particularly in the vicinity of the Main Line. The LIRR's Main Line between Jamaica and Ronkonkoma serves as a crucial "central artery" for Long Island, where the Port Jefferson, Oyster Bay, Hempstead, Ronkonkoma and selected Montauk Branch trains operate for all or a portion of their route, prior to these branches diverging at various locations. Stretching across the center of Long Island, the Main Line connects densely developed suburban population and employment centers, including the Nassau Hub / Mineola / Garden City, Hicksville, Route 110 and MacArthur Airport. The ability to accommodate a high volume of trains and

density of customers along the Main Line is constrained by limited track capacity, suppressing the LIRR's ability to expand service, both peak and reverse-peak/intra-island and address current and future ridership demand. Expanded track capacity on the Main Line includes a full second track from Farmingdale to Ronkonkoma, as well as a full third track from Floral Park to Hicksville. A collection of investments, including expanded Main Line track capacity, a new Republic Hub station, new intermodal parking facilities, improvements to track-level infrastructure in Jamaica, and increased train storage yard capacity, are envisioned to leverage economic growth and improve regional accessibility. These enhancements in transportation infrastructure will foster economic growth, both by making central Long Island more accessible for those who commute from points west, and also strengthening the connection between Long Island and Midtown Manhattan.

In the 1980s, the LIRR electrified the Main Line from Hicksville to Ronkonkoma, greatly reducing travel time to New York City for thousands of Suffolk County residents. When it was designed, this project was anticipated to include the construction of a full second track between Farmingdale and Ronkonkoma. However, due to funding challenges at that time, only selected passing sidings and double tracking at stations were constructed. Without a full second track, this section of the Main Line contains considerable stretches of single track territory which cause constrained, fragile operations, especially during peak travel periods. Although a full second track was not constructed as part of the electrification project, the supporting infrastructure, including bridges, substations, and most station platforms, were sized to accommodate a future second track. The Main Line between Farmingdale and Ronkonkoma has for decades been envisioned to contain a full second track, and it is important that this vision from the 1980s is realized in order to improve service reliability by enhancing operating flexibility and speeding recovery time following service disruptions.

In order to improve on-time performance and to accommodate more service, both in the peak direction and to address gaps in reverse-peak trains, the LIRR needs to add track capacity to the Main Line. This will allow service reliability improvements and reduction in recovery time following service disruptions. With limited track capacity, a single incident can cripple rush hour service for thousands of commuters, creating ripple effects felt in offices throughout New York City or in households across Long Island, as employees are delayed getting to work or returning home, resulting in wasted work productivity and diminished quality of life.

By constructing a third Main Line track between Floral Park and Hicksville and a full second track between Farmingdale and Ronkonkoma, the LIRR will strengthen the links between Long Island's Main Line artery and the region's economic engine in Midtown Manhattan with the ability to operate more train service on this vital life line for Long Island. In addition, Main Line infrastructure investments will allow for expanded service in the important intra-island and reverse commute markets, providing more service to the Nassau Hub, Garden City, the Route 110 corridor and Long Island MacArthur Airport while supporting the local economy by providing access to labor resources and employment markets.

Independently, the Main Line double track and the Main Line third track provide tremendous benefits. Both improve reliability and provide for improved access within their portion of the LIRR Main Line. With the completion of both these vital investments, even greater regional benefits will be felt, as the infrastructure constraints which limit more optimal operational conditions are removed, opening the door for vastly improved service and flexibility, which results in improved train performance.

A key element of the economic development and regional mobility aspects of the Long Island Strategic Corridor Service Improvements is the construction of a Republic Hub intermodal station. This new hub station along with added Main Line track capacity will provide LIRR access to the Route 110 Corridor, thereby linking with planned and active initiatives to improve transit access - including proposed bus rapid transit service, spurring economic growth and encouraging more intermodal transit trips. Investments in Main Line track capacity will improve access from New York City / Nassau County to MacArthur Airport, which will help to relieve overburdened airports in Queens, improving regional mobility and quality of life. The construction of three new electric yards in Suffolk County over this twenty-year period is also a key requirement in the LIRR's ability to expand service. The increase in rail service made possible by these infrastructure investments is expected to trigger transit oriented development, not only in economic activity centers like the Republic Hub, but also in downtowns across Long Island.

Strategic Corridor Service Improvements on the Main Line will also help to facilitate the investigation of new scoot service within diesel territory as a result of the added track capacity. New scoot service could allow for more frequent connecting service into electric territory, including improved service east of Ronkonkoma and on the Oyster Bay Branch, upgrading commutation service for residents living outside of LIRR electric territory. This potential new service will serve residents of eastern Long

Island as well as recreational travelers to the Hamptons and the North Fork, where the leisure economy plays a crucial role.

The Long Island Strategic Corridor Service Improvements will serve to advance a number of goals which are important for the MTA: addressing current system constraints and expanding service delivery, establishing new connections with key regional economic activity centers, and improving the region's quality of life through expanded mobility and improved service reliability. These Strategic Corridor Service Improvements will strengthen the economic competitiveness of Long Island's business centers and residential communities, while also improving access to jobs, recreation and airport travel for New York City and Long Island.

Investment Category Summaries

Rolling Stock

Presently, the Long Island Rail Road rolling stock fleet consists of 1,006 electric cars and 134 locomotive hauled diesel coaches. Also included are 23 diesel electric locomotives and 22 dual mode locomotives that can operate in electric territory, providing a one-seat ride service into Penn Station from diesel branches. The non-revenue portion of the LIRR's rolling stock consists of work locomotives utilized during track and infrastructure maintenance and during fall and winter weather conditions; protect locomotives to haul disabled trains; and track equipment to maintain various components of the track bed and track system components.

Over the next 20 years, the composition and size of the Long Island Rail Road's electric fleet will change dramatically. The 170 M-3 cars, which have been in service since the mid-1980s, will be replaced with modern M-9 cars. Additional M-9 cars will be purchased to support service expansion as part of LIRR East Side Access service to Grand Central Terminal. These investments in rolling stock will enable improvements in on-time performance and customer satisfaction, accommodate ridership growth, expand service, and increase maintainability and reliability. The procurement of a new Diesel Multiple-Unit (DMU) fleet will allow for potential additional "scoot service" between terminal stations for electric service and points east, enhancing access to electrified service for diesel territory customers. LIRR diesel locomotives, both revenue and non-revenue, will also be replaced, as will the diesel hauled passenger coaches. In addition to the fleet replacement benefits described above, replacing the aging diesel locomotives will also provide an important regional

environmental benefit, as the new fleet of diesel locomotives will be less polluting. This will improve air quality and contribute toward making the MTA more "green."

Stations

The Long Island Rail Road operates eleven branch lines and serves customers at 124 stations in Nassau and Suffolk counties and New York City. The long-term objective of investments in this asset category is to improve the appearance and utility of Long Island Rail Road stations thereby increasing the safety and satisfaction of current and future customers. Investments proposed for this category will maintain station assets in a State of Good Repair and guard against increased maintenance and potentially unsafe conditions. Included in this area is the rehabilitation of station and parking facilities system-wide, as well as investments to expand parking and construct intermodal station facilities. Some of the largest station projects will re-build 1960s-era elevated stations on the Babylon Branch. These high volume stations will undergo complete platform replacement, providing new station components at platform level and creating a safer, more attractive and more accessible station for LIRR customers.

Renewal and component-based investments will also address escalators, elevators, staircases, overpasses, platform canopies, platform edgeboards and station buildings systemwide. Ticket vending machines (TVMs) and ticket office machines (TOMs) will be replaced as well in coordination with regional fare technology initiatives. The Twenty Year Capital Needs Assessment includes two Normal Replacement cycles for the ticket selling equipment, consistent with a 12 year useful life (which reflects associated life cycle maintenance of this equipment).

Also included are investments for East Side Access facilities at Grand Central Terminal, both system enhancements like added station entrances and crossovers between tracks, as well as Normal Replacement of station elevators and escalators. In addition, the Twenty Year Capital Needs reflects the need to design and construct a new LIRR Republic Hub station on the Main Line, to address planned smart growth development, both business and residential, along Suffolk County's vital Route 110 Corridor.

Track

The Long Island Rail Road has 701 miles of track, all of which are in a State of Good Repair. The ongoing maintenance of the system includes the replacement of component assets on a life-cycle basis. Included in this category are cyclical Normal Replacement projects to maintain the track infrastructure (wood ties, rail, track

surface and turnouts). The cyclical replacement of track components is based on age, condition, and physical inspection. LIRR's long-term strategy in this area also includes the installation of concrete ties in place of wood ties in selected areas to maximize service life and ensure longer periods between track outages, thus minimizing the impact on customers. Concrete tie installation is planned on the busy Main Line west of Ronkonkoma, as well as portions of the Atlantic, Montauk, Port Jefferson, Oyster Bay and Port Washington Branches.

Two other track initiatives will address State of Good Repair needs on the Babylon Branch and in the Atlantic Avenue Tunnel. Merrick, Bellmore, Massapequa Park Direct Fixation initiatives will replace the track fixation on the viaduct in these three areas of Nassau County, while the World War II-era concrete track bed and wood-half ties between East New York and Jamaica on the Atlantic Branch will be completely replaced as well.

Also included are significant System Improvements: multi-phased Jamaica Capacity Improvements will construct a new platform at Jamaica Station to support "Brooklyn Scoot" service between Jamaica and Flatbush Avenue following the opening of East Side Access, as well as reconfiguring the track, switch and signal infrastructure in the vicinity of Jamaica Station to enhance the complex's capacity and modernize its operations. The construction of a full second electrified track on the Main Line from Farmingdale to Ronkonkoma will provide a substantial increase in train capacity and greatly improve service reliability and recovery time following incidents for this very busy and crowded railroad corridor. Another opportunity to expand service and improve reliability along the Main Line Corridor is the construction of a third track between Floral Park and Hicksville. The LIRR intends to restart the EIS process during the 2015-2019 Capital Program, with construction in the following two capital programs.

Line Structures

The Long Island Rail Road line structures category (bridges, viaducts and tunnels) is the only asset group not in a State of Good Repair. Investments planned over the next 20 years will bring the assets in this area into a State of Good Repair by 2024; thereafter they will be maintained under a cyclical Normal Replacement program. One major element of this work is completing the rehabilitation of the Atlantic Avenue Viaduct (Phase IIb), including the rebuilding of the elevated Nostrand Avenue station in the 2010-2014 Capital Program. In addition to the rehabilitation and replacement of railroad bridges, the LIRR will implement a bridge painting

program to protect structural steel and prevent rusting and corrosion, thus extending the life of the structures. Six LIRR-owned highway bridges, most of which date from the 19th century, are planned for replacement as well. It is also expected that rehabilitation of the East River tunnels (which connect Penn Station to the Queens portion of the Long Island Rail Road system) will continue over the next twenty years, with the participation of Amtrak.

Communications and Signals

Over the next twenty years, the communications and signal infrastructure will be upgraded and modernized to increase operational capacity and ensure the provision of cost-effective, safe and reliable rail service. Included in this category is the cyclical Normal Replacement of the communications and signals infrastructure to maintain past investments and lay the groundwork for improvement, modernization and expansion. Planned investments in the communications infrastructure will enable the LIRR to meet ever-increasing voice, video and data requirements (both vital and non-vital) while increasing reliability and reducing dependence on leased line services. Communications cables in the Atlantic Avenue and East River Tunnels will be replaced, and a program to replace deteriorated communication poles systemwide will continue. The outdated private branch exchange (PBX) and wayside phone systems will be replaced with a modern vital voice telephone and wayside system.

The signal system will also be upgraded and modernized to continue the safe operation of trains. While this asset category is in a State of Good Repair, the railroad has the oldest cab signaling system in the country. The proposed replacement of these systems with modern, state-of-the-art equipment is critical to maintain prior investments and support the new rolling stock fleet. One of the major initiatives in the signal category is the implementation of centralized train control (CTC), which will migrate train towers from outlying locations into the Jamaica Central Control Building. This effort will provide a centralized command center to coordinate, manage and dispatch LIRR trains. Investments to meet a Federal mandate for railroads to implement Positive Train Control are also included in the signal category.

Shops and Yards

Currently, the Long Island Rail Road operates 25 shops and yards for fleet storage, maintenance and inspection services. The rolling stock fleet size will be increased to meet projected ridership growth and to begin LIRR service into Grand Central Terminal. In order to accommodate this expanded fleet, the LIRR will construct three new yard facilities in Suffolk County, one on the Main Line, one on the

Huntington / Port Jefferson Branch, and one on the Babylon / Montauk Branch. These new facilities will allow the LIRR to begin additional train starts in Suffolk County, providing enhanced service for some of the LIRR's busiest stations, and providing adequate seating capacity systemwide. In Nassau County, Port Washington Yard will be reconfigured to provide storage for two additional 10-car trains. This added yard capacity will allow the LIRR to enhance service and seating availability, providing improved service to busy Port Washington Branch stations in Nassau and Queens Counties.

In an effort to modernize its maintenance facilities, the LIRR will construct a new locomotive maintenance and repair facility at Morris Park, replacing an outdated 19th century facility. The rehabilitation and upgrade of facilities at Long Island City and Hillside will accommodate the maintenance of the new electric and diesel fleets. Also included is the replacement of employee facilities, in order to enhance safety and improve employee productivity and efficiency.

Power

The long-term goal of asset investments in power is to replace equipment that has reached the end of its useful life and reduce equipment failures, continuing component replacements necessary to maintain the power infrastructure. Maintaining these assets ensures the safe, reliable operation of trains while containing the growth of operating costs.

The LIRR's most substantial effort in this regard is the replacement of six 1940s era substations, which are the oldest LIRR substations still in operation. Many LIRR substations were built in coordination with the M-1 fleet introduction in the early 1970s. These substations are nearing the end of their useful lives and will need to be replaced. Additional investments will address various other components of the traction power system, including third rail, protection board, third rail cable, negative reactor upgrades, third rail disconnect switches, and substation batteries. Investments will also be made in station and building electrical systems, station platform lighting, as well as yard and tunnel lighting. The LIRR's Traction Power Load Study identified areas where traction power supply needs to be increased in order to meet future service demands. One of the key aspects of this is the construction of three new substations in Queens, along the busy Main Line and Montauk Branches, to prepare for additional operational demand once service to both Penn Station and Grand Central is underway.

In support of MTA sustainability efforts, the LIRR's transition from composite to aluminum third rail is projected to result in significant energy efficiencies.

Miscellaneous
Included in this area are investments to meet environmental remediation requirements at LIRR substations, yards and other locations.

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Metro-North Railroad Capital Needs 2010-2029

Metro-North celebrated its 25th anniversary in 2008 – 25 years of historic accomplishments and improved performance. As one of the largest passenger railroads in the country, Metro-North carried an unprecedented 84.2 million riders in 2008 on the Hudson, Harlem and New Haven Lines east of the Hudson River, and on the Pascack Valley and Port Jervis Lines west of the Hudson River. From an annual ridership of 41 million in 1983, this is an increase of 105%. In the last 25 years Metro-North has carried over 1.61 billion customers.

Over this same period, the number of trains Metro-North operates has increased by more than 35%, the number of revenue passenger miles is up 76% and the fleet size has increased by over 36%. On-Time Performance has improved dramatically from 80.5% in 1983 to 97.7% in 2007. Finally, Metro-North's market share of weekday train commuter trips to Manhattan has increased from 70% in 1991 to 79% in 2007.

To enable this transformation, the past 25 years have seen major investments in rolling stock and infrastructure of the railroad with the dedicated funding of the MTA Capital Program. This funding has allowed Metro-North to fulfill its primary mission to provide a safe, clean, comfortable ride to every customer – reliably and on-time nearly 98% of the time.

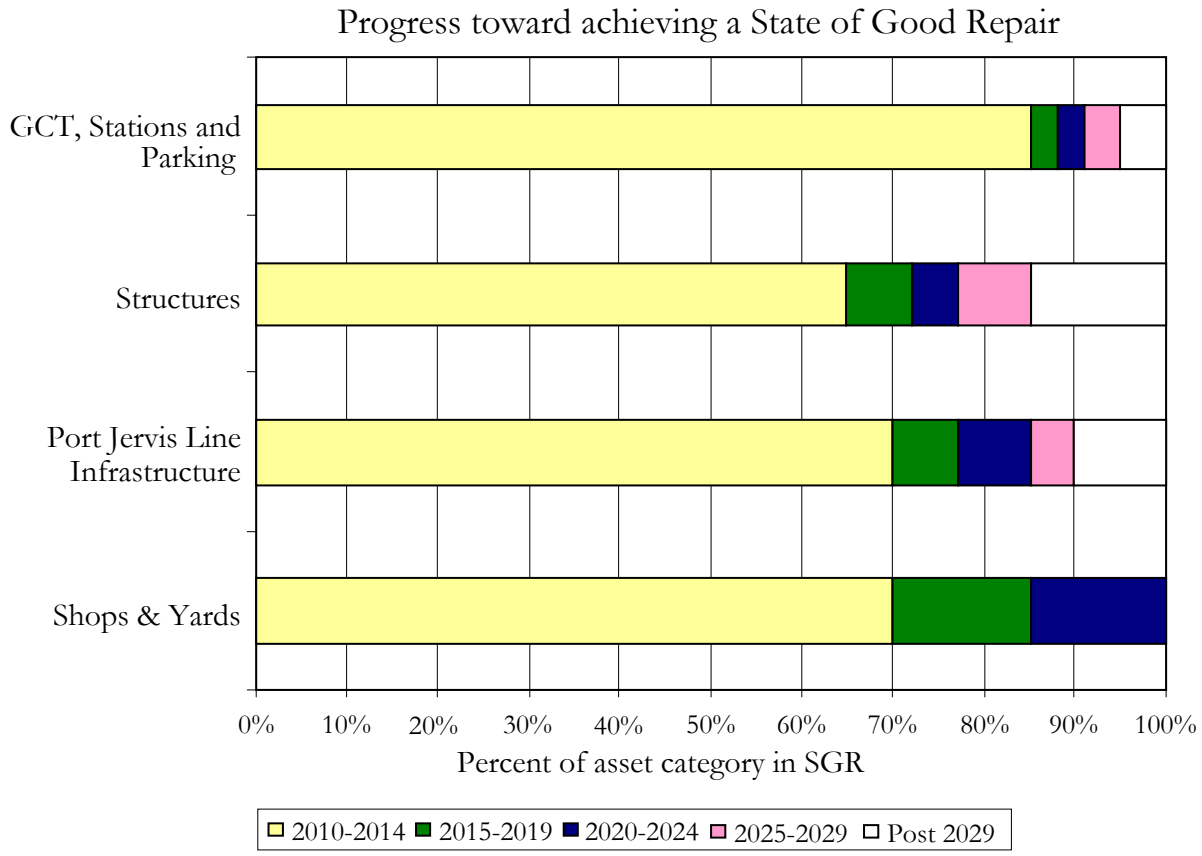
Metro-North's early focus was on large-scale reinvestment in a system in disrepair, restoring basic infrastructure to reliable condition. Much progress has been made in investments to repair and restore the infrastructure and in providing targeted improvements that resulted in increased ridership. However, significant repair work remains, particularly in Grand Central Terminal, select line structures, West of Hudson infrastructure and in Shops and Yards.

Planned Metro-North investments total nearly $12 billion through 2029 (Table4). This level of investment will ensure that the majority of the system is brought into a State of Good Repair by the end of this twenty year period (Chart 3).

Table 4
MTA Metro-North Railroad Summary of Needs: 2010-2029
By Investment Category
(2013 $ in millions)

Investment Category	2010-2014	2015-2019	2020-2024	2025-2029	Total
Rolling Stock	$422	$1,538	$754	$900	$3,614
GCT, Stations and Parking	372	695	626	584	2,277
Track and Structures	368	585	875	578	2,406
Communications and Signals	274	175	136	162	747
Power	121	156	246	92	615
Shops and Yards	449	568	541	160	1,718
Miscellaneous	100	103	103	103	409
Total	$2,106	$3,820	$3,281	$2,579	$11,786

Chart 3
MTA Metro-North Railroad
Progress Toward State of Good Repair
For remaining Investment Categories



Investment Category Summaries

Rolling Stock

The Metro-North East of Hudson rolling stock fleet currently consists of 840 electric cars, 213 push-pull coaches (inclusive of Connecticut DOT-owned equipment) and 52 locomotives. In addition, 15 diesel locomotives and 65 coaches are currently supplied for service west of the Hudson River on the Port Jervis and Pascack Valley lines, operated by New Jersey Transit under an agreement with Metro-North.

As the fleets reach the end of their useful lives and must be replaced, the challenges of serving a growing and changing ridership while increasing fleet standardization (within

Metro-North and regionally) must be considered in developing replacement programs. Standardization makes use of uniform equipment such as rolling stock and/or specific systems, both within Metro-North's fleet and with its regional transit partners wherever possible, providing economies of scale for fleet purchases, maintenance, training, and replacement parts. Greater standardization provides the opportunity to take advantage of technological commonalities as fleets are replaced, and increases the ability of Metro-North to make efficient use of funds through joint procurements with other properties.

In addition, Metro-North's recent acquisition of new locomotives for shuttle and switching service illustrates a commitment to providing a cleaner fleet. The locomotives purchased in the 2005-2009 Capital Program produce lower emissions than the Genesis dual-mode fleet, and will be easily upgraded to meet the Tier 3 emissions standards which take effect in 2012. The locomotives to be purchased in the 2010-2014 Capital Program are specified to meet Tier 3, and all future purchases will meet the standards in place at time of purchase.

In the short term, Metro-North will replace its overage M-2 series electric car fleet with deliveries of 300 M-8 cars ordered in 2006 for New Haven Line service. Additional M-8s will be ordered in the 2010-2014 Capital Program, allowing for expansion to meet ridership growth on the New Haven Line. Critical repair investments are also planned for the M-4 and M-6 fleets. The 1984-built M-3 fleet comprises a third of the Hudson and Harlem fleet and is 25 years old. Replacement of this fleet, the Hudson and Harlem end door coach fleet, and the West of Hudson locomotive fleet is scheduled in the timeframe of this Capital Needs Assessment.

In addition, the Genesis locomotive fleet and the East of Hudson Center Door coaches will be 35 years old near the end of this twenty year period. This replacement program is particularly critical as the Genesis fleet represents the backbone of the Metro-North dual mode fleet. Replacement of these fleets is planned for the 2025-2029 time frame to ensure locomotive and coach performance, reliability and customer satisfaction.

Grand Central Terminal, Stations and Parking

Grand Central Terminal: The Grand Central Terminal complex consists of the terminal building plus a multi-level, subsurface trainshed spread over approximately 75 acres, including 44 operating tracks, 47 platforms and a myriad of railroad, City-owned and private utilities and buildings above the trainshed and the Park Avenue

Tunnel. Metro-North has spent over $450 million to date on improvements to the Terminal and this restoration and revitalization work has been a spectacular success. Now, the investment of the past years must be protected with the proper level of investment and maintenance and these restored areas must not be allowed to slip back into disrepair.

Additionally, the extensive complex is still in need of substantial investment to complete the repair of the deteriorating basic infrastructure – from the sprawling trainshed and tunnel structures to the extensive network of utilities. This work may not be highly visible to customers or visitors, but without a modernized infrastructure the building will not continue to function as it does now. The trainshed will require substantial investment and rehabilitation over the next 20 years to repair the existing structures and to help prevent further degradation of the structure. Key utilities, including electrical, water conveyance systems (water, steam, sanitary and fire protection systems, track and storm drainage systems), as well as heating, ventilation and air conditioning must be updated as well. In many cases these utilities have not been rehabilitated in 80 to 90 years. Interior and exterior architectural elements, rehabilitated in the revitalization of the Terminal, require continued investment.

Metro-North must also ensure: that riders, both the growing Metro-North ridership base and new Long Island Rail Road passengers expected as a result of the East Side Access project, will continue to enjoy the benefits that the Terminal now offers; that the infrastructure can continue to support additional projected train service; and that the extraordinary building is preserved for generations to come.

Stations and Parking: There are 73 Metro-North passenger stations in New York State east of the Hudson, with twelve more stations located in the railroad's territory west of the Hudson. Metro-North owns and/or operates 26 station buildings, many of them historic. Over the past 20 years, the majority of stations in New York State have received substantial investment for rehabilitation or replacement, and a number of new stations have been constructed as well. Metro-North has worked to enhance the customer environmental and increase safety of the entire station area including station buildings, platforms, overpasses and underpasses, as well as provide ADA compliance and miscellaneous customer amenities. Metro-North must now continue investment in these facilities to rehabilitate station elements in order to extend useful life and maintain these elements in good repair. Funds are allocated for improvements at outlying stations on all branch lines. Additionally, by 2013, the current ticket selling system will be at or near the end of its useful life and a phased

replacement program will begin in coordination with regional fare technology initiatives. Finally, work must also continue to upgrade many of Metro-North's historic station buildings.

The parking inventory includes approximately 39,000 spaces of which over 13,700 are controlled by Metro-North. Rehabilitation of these spaces to maintain them in a State of Good Repair will continue. Metro-North's Strategic Intermodal Facilities Program provides for the creation of transportation hubs in key markets. These investments ensure station access and parking capacity is in place to promote the use of mass transit and accommodate anticipated ridership growth and customer demands, including regional station access. Work includes: new/expanded station facilities and intermodal facilities; major access improvements from interstate highways, and major and local roads; expanded parking; and complementary right of way improvements such as track, interlockings, signal and yard work. In addition, Metro-North will construct new facilities to accommodate increased ridership and increase access and parking opportunities, supporting local development opportunities as well.

Finally, Metro-North will improve customer communications through a program to provide real time train information to customers at all full time New York State stations on the Harlem, Hudson and New Haven Lines.

Track and Structures

There are 387 route miles and 795 track miles that constitute the Metro-North system in New York State and Connecticut. This infrastructure includes nearly 1,000 turnouts on the right-of-way and in Grand Central Terminal, almost 400 undergrade and overhead bridges, and miscellaneous tunnels, viaducts and culverts, as well as the significant Manhattan structures of the Park Avenue Tunnel and Viaduct. The long-term objective of investments in this area is to maintain the condition of the existing assets and achieve a State of Good Repair (for bridges). The ongoing rehabilitation of the trackage is essential to providing customers with a safe, reliable, and comfortable ride. To accomplish this, Metro-North has developed a cyclical program of track and turnout rehabilitation and replacement that maintains track structure components and switch facilities in proper operating condition without safety hazards or speed restrictions.

Similarly, the continued integrity of line structures along the railroad right-of-way is vital to its smooth and safe operation. This includes overhead and undergrade bridges, viaducts, tunnels, and retaining walls. Metro-North continues work to

maintain the bridges in safe, serviceable condition but progress to rehabilitate or replace the structures remains slow due to the volume of bridges, the level of investment for the required work, and the ability to schedule track outages for multiple bridge work locations around an operating railroad. One significant element identified in the Capital Needs Assessment is the rehabilitation of the Park Avenue Tunnel structure.

In addition, capacity improvements to meet growing demand and service expansion will be required as Metro-North ridership continues to increase. Projects to improve capacity include a third track from Crestwood to North White Plains, a flyover at Woodlawn and improvements at the Spuyten Duyvil rock cut.

Finally, in 2003 Metro-North assumed responsibility for the Port Jervis Line under a lease agreement with Norfolk Southern. Capital investment in State of Good Repair began on the aging and degraded infrastructure in the 2000-2004 Capital Program. With continued investment, track due for investment will reach a State of Good Repair by 2014, with normal cyclical replacement beginning in 2015. Structures work to date has been focused on keeping the structures safe and serviceable; many of these bridges must ultimately be replaced and State of Good Repair will not be achieved until post 2029.

Communications and Signals

Communications & Signal assets are essential elements of rail infrastructure and one of the most safety-critical systems on the railroad. Their impact on delivery of rail service is fundamental in meeting Metro-North's On-Time Performance goals and critical in providing improved customer service, information and security. Of the 795 track miles which constitute the Metro-North system in New York State and Connecticut, 579 track miles are signaled. These Communications & Signal assets (with the exception of the recently acquired Port Jervis Line infrastructure) are now on a normal replacement/ rehabilitation cycle, targeting specific components in order to maintain the assets in good repair.

The primary long-term objective of C&S investments is to replace existing systems as they reach the end of their useful lives with the latest technology to accommodate current operations and provide compatibility for future needs. Signal system replacement for various line segments began in the 2005-2009 Capital Program and will continue over the next 20 years. In addition, the federally mandated installation of Positive Train Control (PTC) for railroad safety requires PTC-readiness

investments during the 2010-2014 timeframe. Investments during the timeframe of the Capital Needs Assessment include the wayside and rolling stock components for PTC-readiness. Metro-North also plans to implement a comprehensive communications connectivity initiative systemwide to provide real time train information to customers, as well as enhanced ticket selling capabilities and improved CCTV monitoring and resolution.

These short-term and long-term objectives will require significant investment to support current service levels and expand capacity for future service growth over the next decades, while continuing to provide a safe and reliable operation.

Power

Metro-North's power infrastructure is comprised of traction power and auxiliary power systems. Of the 796 track miles in New York State and Connecticut, 545 miles are electrified, with 256 miles having DC third rail power and 289 miles having AC catenary power. The power supply for these systems include a significant number of substations, distribution systems and signal power generating stations and supply stations. Sufficient traction power allows electric cars to operate at maximum allowable speeds and contributes to meeting Metro-North's customer driven On-Time Performance goals.

The long-term objective of investments in this area is to maintain the condition of the existing assets and improve substation (third rail power) capacity, to support current train operation and expanded rail service projected over the next twenty years. The majority of the components of Metro-North's traction power supply system are approaching the end of their useful life. Inadequate traction power can result in reduced speeds and affect the operating characteristics of electric cars. A comprehensive system-wide Traction Power Study, completed in 2006, focused on traction power requirements for future service demand and new rolling stock electric cars. Critical traction power improvements to replace the aging assets and to meet future demand are now underway and will continue over multiple future Capital Programs. Work will include new substations on the Hudson and Harlem Lines, and replacement of Substation Bridge 23, the only source of traction power for the New York State portion of the New Haven Line. Delays in completing these needed improvements could impact Metro-North's ability to deliver added service.

Shops and Yards

Metro-North's long-term Shops and Yards strategy is to upgrade and adequately size its shops and yard facilities to accommodate new rolling stock (such as the M-7 electric cars), support Reliability Centered Maintenance, and improve On-Time Performance to ensure customers are provided with a safe, reliable and comfortable ride and the highest quality service. Currently, Metro-North operates 11 shops and/or yard facilities system-wide for fleet storage, maintenance and inspection services. Over the past 20 years, Shop and Yard facilities were constructed or modernized at Harmon, North White Plains, Brewster and Highbridge.

The most significant investment began in the mid-1990s with the first phase of the upgrade and replacement of Harmon Shop, Metro-North's oldest, largest, and most critical shop and yard complex. With 80% of the shop operations on the railroad, the Harmon Shop has received the largest investment for the last three capital programs and will continue to do so as Metro-North progresses the phased replacement of the 100 year old facility.

At the same time, the need for increased and improved overnight storage is becoming critical at multiple locations on both sides of the Hudson as ridership growth and related planned service expansions require streamlined operations and improved and expanded capacity at existing facilities. As a result, significant investments are needed at other locations, including Poughkeepsie, Port Jervis and Wassaic Yards, to support the new fleets and service expansion in all territories.

Miscellaneous

Included in this area are investments to meet environmental remediation requirements at Metro-North substations, yards and other locations.

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MTA Bus Company Capital Needs 2010-2029

In 2005 and 2006, seven private bus companies that had provided bus services under franchise agreements with the City of New York were merged to create MTA Bus. The company operates 45 local and 35 express routes across Manhattan, the Bronx, Brooklyn, and Queens, serving approximately 400,000 riders daily with a fleet of 740 standard buses for local service, and 106 standard and 481 over the road coach buses for express services. Operations are based out of eight depots – seven depots located throughout New York City along with one in Yonkers. Two depots, College Point and Spring Creek, are equipped to service compressed natural gas (CNG) vehicles.

Overall, 85% of the MTA bus fleet is in good repair (i.e. - less than 12 years of age). Though the Bus Company's express fleet is in a Normal Replacement cycle, about 200 standard buses, or 15%, have been kept in service beyond their stated 12-year useful life. Also, half of the depots were built in 1952 or earlier and are due for investment.

In 2008, the MTA initiated internal steps to integrate its three bus services (MTA Bus Company, New York City Transit, and Long Island Bus). These administrative measures will provide better coordination of management, service planning, operations, training and maintenance. The three agencies are still legally separate entities at the present time, and so their capital needs are addressed under existing fiscal structures. Therefore, the Bus Company's capital funding is limited to the amount of federal funding likely to be available, which by itself is insufficient to meet all the agency's capital needs, particularly for bus purchases, which utilize non-federal funds. In the long term, however, it is anticipated that a regional bus service organization will be established along with appropriate funding mechanisms to meet Bus Company capital needs.

Bus Company strategic needs focus on fleet replacement and facility rehabilitations, totaling $3.2 billion (Table 5), irrespective of funding source. It is important to note that the investment plan outlined here could change significantly depending on potential future organizational revisions.

Table 5
MTA Bus Summary of Needs 2010-2029
By Investment Category
(2008$ in millions)

Investment Category	2010-2014	2015-2019	2020-2024	2025-2029	Total
Buses	$373	$593	$457	400	$1,824
Depots and Equipment	308	360	347	227	1,242
Service Vehicles	7	15	15	15	52
Engineering	20	20	20	20	80
Total	$708	$988	$839	$663	$3,198

The fleet plan calls for the purchase of over 2,500 new buses in order to replace overage buses on a 12-year lifecycle and to meet projected ridership demands. As a result of vastly improved service and estimated New York City population growth, the size of the total fleet is projected to grow by 18% over the 20 year period. Articulated buses will be procured and will diversify the fleet, beginning in the 2010-2014 period, increasing to approximately 280 buses by 2029. Mostly due to the additional capacity of 60-foot articulated buses, standard bus equivalents will increase by 27% to accommodate higher ridership.

In the 2010-2014 Capital Program, initial facility investments address upgrading bus washers and HVAC systems, installing an elevator at College Point, providing a new green roof at Far Rockaway, improving security, and performing remediation as required. In subsequent periods, seven of the Bus Company's eight depots will require rehabilitation, and the eighth will need reconstruction. In addition, a new centralized maintenance facility will be needed to support the heavy maintenance needs of the Bus Company's projected 1,500-bus fleet. Additional critical investments include: a new, consolidated bus radio system, which will be coordinated with NYC Transit's replacement of its radio system, installation of security cameras on buses, and replacement of fareboxes for the fleet.

Bridges and Tunnels Capital Needs 2010-2029

Bridges & Tunnels (B&T) was established in 1933 as the Triborough Bridge Authority. Today, B&T operates seven bridges and two tunnels that form essential links for vehicular highway transportation in the New York City metropolitan area. It is the largest among the nation's bridge and tunnel toll authorities in terms of traffic volume, serving more than 800,000 vehicles that carry more than a million people daily in the New York Metropolitan area. In 2008, the nine crossings carried nearly 300 million vehicle trips and generated almost $1.3 billion in toll revenue. With close to 60% of this toll revenue dedicated to mass transit operations, Bridges and Tunnels performs a unique and vital function in support of regional mobility.

Bridges and Tunnels developed its first five-year capital program in 1992, investing over $3.3 billion of capital funding in its infrastructure to date. While all Bridges and Tunnels facilities are in a State of Good Repair, their average age is 61 years old. Even with regular maintenance, the structures and mechanical components of the bridges and tunnels eventually deteriorate from the combined effects of traffic loads and environmental exposure. As the components reach the end of their useful lives, they require substantial capital investment to keep them structurally sound.

In developing its Twenty Year Capital Needs Assessment, B&T is faced with unique challenges, primarily related to the need to address aging decks at four facilities (Bronx-Whitestone Bridge, Robert F. Kennedy Bridge, Verrazano-Narrows Bridge and Throgs Neck Bridge). Major deck replacement or rehabilitation programs for these facilities are scheduled during the 2010-2014 Capital Program, continuing over the next 20 years. While this work accounts for more than half of all the resources needed for the next 20 years and more than two-thirds of the 2010-2014 needs, other major structural elements of each facility will also need to be replaced or rehabilitated (see Table 6).

In addition, with technological advancements in the area of toll collection developing and a national trend emerging as other similar properties consider new alternatives, B&T is studying the possibility of implementing All-Electronic (video) Tolling on its facilities. In July 2009, both the North Texas Tollway Authority and the E-470 Toll Road in Colorado implemented All-Electronic tolling on major toll highway facilities – the largest implementations to date in the United States. Several other major American toll roads have announced plans to implement all-electronic tolling in the future. The results of the study, which is expected to be completed in 2010, as well

information gained from other agencies who have implemented or are studying such systems, will help inform B&T's decision-making as it moves forward to design or construct new toll plazas at its facilities over this plan period.

The Twenty Year Capital Needs investments are derived from Master Plans developed for each facility to address the on-going needs of the crossings, the timing and coordination of the improvements, opportunities to address functional obsolescence and aging structural components, and plan for future needs, while mitigating potentially significant burdens and constraints in maintaining efficient operations.

Table 6
MTA B&T Summary of Needs 2010-2029
By Facility
(2008 $ in millions)

By Facility	Age	2010-2014	2015-2019	2020-2024	2025-2029	Total
Bronx-Whitestone Bridge	70	$437	$254	$968	$580	$2,239
Brooklyn Battery Tunnel	59	185	82	483	428	1,177
Cross Bay Bridge	39	44	74	34	119	272
Henry Hudson Bridge	73	107	79	115	75	376
Marine Parkway Bridge	72	34	55	32	43	164
Queens Midtown Tunnel	69	134	278	779	127	1,318
Robert F. Kennedy Bridge	73	948	811	454	91	2,304
Throgs Neck Bridge	48	294	1,030	318	23	1,665
Verrazano-Narrows Bridge	45	703	606	775	70	2,154
Agency Wide		138	191	183	174	686
Total		$3,025	$3,459	$4,141	$1,731	$12,356

By Investment Category
(2008 $ in millions)

By Asset Category	2010-2014	2015-2019	2020-2024	2025-2029	Total
Structures	$392	$888	$1,461	$473	$3,214
Roadways and Decks	2,108	1,827	1,722	759	6,415
Toll Plaza	126	419	323	162	1,029
Utilities	$213	170	444	60	887
Buildings and Sites	153	119	153	239	663
Miscellaneous	34	37	38	39	147
Total	$3,025	$3,459	$4,141	$1,731	$12,356

Facility Investment Summaries

Bronx-Whitestone Bridge

The Bronx-Whitestone Bridge, one of two B&T suspension bridges connecting upper Queens with the Bronx, carried approximately 43 million vehicles in 2008. Capital investments of almost $560 million have been made in this facility over the last 17 years.

Most proposed investments over the next 20 years will address aging bridge structure elements and the toll plaza while also upgrading the various components to meet current standards and ensuring current and future traffic demands can be met with an acceptable level of service.

The replacement of the narrow approach viaducts with wider structures in the Bronx and Queens will continue efforts begun in previous capital programs, and should be completed by 2016. During the 2015-2029 timeframe, the structural needs of the main cables will be addressed by replacing the main cables and suspender ropes, while also widening the bridge structure on both the suspended spans and the approach viaducts to improve safety. In addition, a new toll plaza will be constructed with standardized toll lane widths to enable efficient vehicular flow. These investments will ensure the structural integrity of the bridge and improve the traffic carrying capacity and level of service.

Investment needs total approximately $2.2 billion over the 2010-2029 time frame with 95% for Normal Replacement investments and 5% for System Improvement work.

Robert F. Kennedy Bridge

The Robert F Kennedy Bridge (formerly known as the Triborough Bridge), the Authority's flagship facility, is comprised of three bridges, a viaduct and approach roads connecting Manhattan, Queens and the Bronx. The bridge's three branches meet on Randall's Island, where an interchange and two toll plazas sort out traffic flowing in 12 directions including access to the island itself. Since the first B&T Capital Program in 1992, capital investments of over $1 billion have been made at this facility. Approximately 59.7 million vehicles crossed the Robert F. Kennedy Bridge in 2008.

The overall rehabilitation program for this facility began in 1997, and will continue over the next 20 years. Projects already completed include the replacement of the Harlem River Lift Span deck and approaches, rehabilitation of the mechanical and electrical systems of the lift span, replacement of the decks of the Bronx approach, the Queens viaduct, Randall's Island and Ward's Island Viaduct, and the Queens suspended span. In addition, the bridge cable and suspender ropes were rehabilitated, the Queens to Manhattan ramp widened, and a new pedestrian ramp from Queens to Wards' Island and a new vehicular ramp from the Bronx to Ward's Island were constructed.

Over the next 20 years, the investment focus will continue to be on addressing aging bridge structural elements, the toll plazas and their associated components. This includes the reconstruction of the Bronx and Manhattan toll plazas, steel and concrete rehabilitation of the Manhattan approach and subsequent full replacement of the Manhattan approach ramps. Other planned investments include the installation of fire standpipe system, replacement of emergency generator, main cable rehabilitation, and construction of a new service building with combined maintenance shops and warehouse and seismic retrofit of the bridge.

Investment needs total approximately $2.3 billion over the 2010-2029 timeframe, with 98% for Normal Replacement investments and 2% for System Improvement work.

Throgs Neck Bridge

The Throgs Neck Bridge crosses the East River and connects the boroughs of Queens and the Bronx via Route I-295. The bridge carries three lanes in each direction with the toll plaza located on the Bronx side. Since the first B&T Capital Program in 1992 capital investments totaling $234.1 million have been made at this facility. In 2008 the Throgs Neck Bridge carried approximately 40.5 million vehicles.

The focus of investments over the next 20 years will be on rehabilitation and replacement of the bridge's approach and suspended span steel and decks, viaducts and anchorages. Structural needs will be addressed while also upgrading the bridge elements to current standards. Bridge lighting will be replaced and replacement of deck sections will incorporate the potential for adding a future seventh lane. The affected structure will also be seismically upgraded. Major projects planned will be prioritized and coordinated with the neighboring Bronx-Whitestone Bridge.

Investment needs total approximately $1.7 billion over the 2010-2029 timeframe, with 99% for Normal Replacement investments and 1% for System Improvement work.

Verrazano-Narrows Bridge

The Verrazano-Narrows Bridge (VNB), connecting Brooklyn and Staten Island, is the newest of B&T's suspension bridges. Since the first B&T Capital Program in 1992, capital investments of $286.3 million have been made at this facility. The Verrazano-Narrows Bridge carried approximately 68.9 million vehicles in 2008.

Certain elements, such as the concrete decks of the VNB's facility approach viaducts and suspended spans, are in the process of being rehabilitated. Along with the ongoing deck work, other superstructure and substructure rehabilitation is planned. Large Verrazano-Narrows Bridge capital deck projects, such as the upper level suspended span deck, the Belt Parkway ramps, the upper level approaches, and the lower level suspended span, are sequenced in order to maintain traffic flow while continuing to address the facility structural needs based on priority. Further improvements to traffic capacity, level of service, and travel times include provisions to improve Bus/HOV access on the upper level suspended span, a potential enhancement which will be closely coordinated with planned NYSDOT efforts. In addition, there are other ongoing initiatives at this facility, such as a program to modernize and rehabilitate the Staten Island Expressway/toll plaza interchange (mainline, ramps and toll booth removal) in close coordination with NYSDOT, rehabilitation of the westbound ramps, replacement of Electrical Substation #1, and various miscellaneous building improvements.

Investment needs total approximately $2.2 billion over the 2010-2029 timeframe, with 90% for Normal Replacement investments and 10% for System Improvement work.

Henry Hudson Bridge

The Henry Hudson Bridge connects the northern tip of Manhattan with the Bronx and points north across the Harlem River. Since the first B&T Capital Program in 1992, capital investments of $182.6 million have been made at this facility. Approximately 22.8 million vehicles crossed this bridge in 2008.

Over the next 20 years, planned investments include roadway and deck rehabilitation work at both the upper and lower levels of the bridges, as well as the approaches and toll plaza area. Investment needs total approximately $375.9 million over the 2010-

2029 timeframe, with 92% for Normal Replacement investments and 8% for System Improvement work.

Cross Bay Bridge

The Cross Bay Veterans Memorial Bridge spans Beach Channel in Jamaica Bay, providing access from Brooklyn and Queens to Rockaway and the beaches in the area. It was completely reconstructed in 1970 as a high-level fixed bridge with a wide main channel for marine passage. Since the first B&T Capital Program in 1992, capital investments of almost $85.0 million have been made at this facility. Approximately 7.6 million vehicles crossed the bridge in 2008.

Over the next 20 years, rehabilitation efforts at the Cross Bay Bridge will focus on the substructure and underwater elements, rehabilitation of the service building, toll plaza and related facilities, and the study and design for replacement of major sections of the bridge. Investment needs total approximately $272 million over the 2010-2029 timeframe, with 97% for Normal Replacement investments and 3% for System Improvement work.

Marine Parkway Bridge

The Marine Parkway Gil Hodges Memorial Bridge Facility consists of three bridges – the main bridge, the Rockaway Point Boulevard Overpass and the Jacob Riis Park Pedestrian Bridge. Capital investments totaling almost $150 million have been made since the first B&T capital program in 1992. Approximately 7.8 million vehicle trips crossed the bridge in 2008.

The investments planned over the next 20 years will largely focus on the rehabilitation of the substructure and underwater elements, as well as the electrical and mechanical components of the lift span. In addition, with the primary and most of the secondary structural steel repairs having been addressed in previous capital programs, the remaining secondary structural steel repairs will be addressed over the next 20 years. The rehabilitation of the Jacob Riis Park Pedestrian Bridge, Rockaway Point Boulevard Overpass and the toll plaza are also planned. Investment needs total approximately $164.2 million over the 2010-2029 time frame, all dedicated for Normal Replacement investments.

Brooklyn Battery Tunnel

The Brooklyn-Battery Tunnel is a twin tube four lane ventilated tunnel connecting lower Manhattan and Brooklyn. The facility includes two ventilation buildings located

in lower Manhattan, a third near the Brooklyn portal, and a fourth adjacent to Governors Island. In addition, the Battery Parking Garage (BPG), located just north of the Brooklyn Battery Tunnel is part of the original tunnel structure. Investments of $318 million have been made since the first B&T Capital Program in 1992. Approximately 16.9 million vehicles travelled through the tunnel in 2008.

The focus of rehabilitation efforts over the next 20 years will be on maintaining the life safety systems required for safe tunnel operation. Significant investments will be made in tunnel electrical power redundancy and reliability, rehabilitation/replacement of the mechanical systems (fans, motors and controls), and rehabilitation of tunnel structural elements, finishes and the Brooklyn Plaza bathtub section. In addition, rehabilitation of wall tiles, roadway drainage and waterlines, as well as tunnel ceiling repairs not addressed in previous capital programs will be carried out. Finally, the expansion of the service building and rehabilitation of other building structures is also planned.

Investment needs total approximately $1,177.3 million over the 2010-2029 timeframe, with 92% for Normal Replacement investments and 8% for System Improvement work.

Queens Midtown Tunnel

The Queens Midtown Tunnel is a twin tube four lane ventilated tunnel opened to traffic in 1940. The tunnel connects the Long Island Expressway and midtown Manhattan. Related structures in this facility include two ventilation buildings, one in Queens and one in Manhattan. The Queens Midtown Tunnel facility also includes 3 Manhattan Overpasses at 2nd Avenue, 36th Street, and 37th Street entry; along with approach & exit marginal streets between 34th and 41st Streets. Since 1992, capital investments in excess of $232.7 million have been made. Approximately 28.6 million vehicles travelled through the tunnel in 2008.

The majority of the proposed upcoming investments relate to the replacement of the Queens and Manhattan plazas bathtub, retaining walls, rehabilitation of roadways and overpasses and addressing the recurring structural needs of the tunnel. Obsolete mechanical and electrical elements and their related systems will be replaced as well. Several tunnel control systems will be upgraded to current standards. Finally, ventilation building systems and equipment such as the supply fan housings and rotors will be replaced.

Investment needs total approximately $1.3 billion over the 2010-2029 timeframe, with 94% for Normal Replacement work and 6% for System Improvement work.

Intelligent Transportation Systems (ITS)

MTA Bridges & Tunnels has been at the forefront of ITS technology implementation since the comprehensive national ITS program was established, over 15 years ago. B&T developed an ITS implementation plan to prioritize needs and plan for projects over the next 20 years. ITS initiatives are classified as either Electronic Toll Collection (ETC) systems or Non-Toll Collection systems (primarily traffic and incident management systems). Planned investments supporting these initiatives fall into several broad categories, including: Vehicle Infrastructure Initiative (VII) Toll Collection Systems; Advanced Traffic & Incident Management Systems; Commercial Vehicle Operations; Deployment & Integration of Advanced Communications Network; integration with the sub-regional and regional architecture; and Advanced Variable Message Signs.

Investment needs planned under the ITS program total approximately $476.2 million over the 2010-2029 time frame, with 25% for Normal Replacement and 74% for System Improvement work.

MTA Police Department/Security Capital Needs 2010-2029

Previously included within the agencies' capital programs, the MTA's police department was included for the first time in the MTA's capital program as a separate investment category in the 2005-2009 Capital Program. The long term vision continues to focus on investments needed to assist the MTA Police in accomplishing its mission of ensuring safety and security throughout the MTA network, introducing new communications technologies for safe, efficient police radio coverage, establishing and maintaining district office facilities system-wide, and preserving a state-of-the-art mobile emergency response fleet.

Additionally, in the wake of the September 11, 2001 terrorist attacks on the World Trade Center, the MTA initiated a comprehensive review of its infrastructure to determine how to best protect its customers and key assets from a terrorist incident. Security experts defined critical vulnerabilities and determined appropriate protective strategies. The result of these efforts was the implementation of a multi-faceted program including operating and capital investments. The program of capital investments included hardening vulnerable assets and implementing the networks and equipment necessary to conduct targeted surveillance, control access, stop intrusion and provide command and control systems to support incident response. The MTA plans to complete this program during the 2015-2019 Capital Program, at which time future security investments will be advanced by the MTA Operating Agency which owns the asset.

Forecasts for MTA Police and Security investments total $972 million through 2029 (Table 7).

Table 7
MTA Police / Security Summary of Needs 2010-2029
(2009 $ in millions)

Investment Category	2010-2014	2015-2019	2020-2024	2025-2029	Total
MTA Police Communications	$158	$9	$12	$25	$204
MTA Police Facilities	52	40	25	17	134
MTA Police Vehicles	0	0	2	1	3
MTA Security	441	190	0	0	631
Total	$651	$239	$39	$43	$972

Asset Investment Summaries

MTA Police Communications

The MTA Police Communications division is comprised of equipment utilized for dispatching police officers and mobile support in response to emergency conditions affecting transportation operations, including portable handheld radio and base station equipment, transmitter sites, Command and Control Communications (C3) center and backup, and other equipment needed in support of police communication operations.

In the short term, two important capital investments will mark a significant transformation for MTA Police communications. The completion of the C3 center and backup center budgeted in the 2000-2004 and 2005-2009 Capital Programs will provide state-of-the-art police dispatching and integrated emergency security operations capabilities. The ability to optimize this system is constrained by an existing radio system with coverage gaps that has become unreliable. To address this, MTA Police plans to replace this with a reliable public safety grade interoperable communications system for its police officers throughout the region.

MTA Police Facilities

MTA Police facilities are established throughout the commuter rail service area for a variety of police functions, including Patrol, Detective Division, Internal Affairs, Highway, K-9, Emergency Services, Training, T.R.A.C.K.S., Right Of Way Task Force, Fleet, Property and Evidence, Records, Supply, Communications and Integrated Electronic Security System monitoring and Counter Terrorism. The MTAPD currently operates from 28 facilities throughout the 12 Counties of New York State in which it has jurisdiction. In addition to the 28 existing facilities, 3 new facilities (C-3, K-9 Training, North Firearms Training) will be added and 2 replaced (Central Islip and Nassau District Headquarters), in the 2005-2009 Capital Program.

These facilities are established in a variety of ways: via leased office space and temporary structures, shared space in existing MTA commuter railroad structures such as station buildings and power substations, and permanent, dedicated facilities. Several of these locations are insufficient to meet operational needs. The continuing goal of the MTA Police is to maintain existing permanent facilities and replace inadequate facilities with permanent locations to minimize inefficient operating costs, such as leased space.

MTA Police Vehicles

This category is comprised primarily of rubber tire vehicles: Five Emergency Service Units (ESUs) and two mobile command buses. These units are used in various emergency response situations, as well as for routine ESU patrols. Officers assigned to these units utilize specialized training and expertise to support the patrol function by handling major incidents beyond the scope of the uniform patrol officer. These require use of various types of emergency equipment from Medical Supplies to Hazardous Material mitigation gear to meters for monitoring chemical and radiological levels in the air, all of which are equipped in the vehicles.

The units are deployed throughout the MTA service region, which includes the Metro-North Railroad, Long Island Rail Road and the Staten Island Railway. The long term goal for this category is to maintain the units and replace them at the end of their useful life, providing for technological upgrades where appropriate.

MTA Security

The primary long-term objective of this category is to complete the infrastructure investments in key assets as identified in the initial comprehensive review to address critical vulnerabilities in the event of a terrorist incident. Mitigation strategies include infrastructure hardening and perimeter protection, fire, life, safety/consequence management items, such as lighting and signage, and integrated electronic security. With Phase 1 nearing completion in the 2000-2004 Capital Program and Phase 2 ongoing in the 2005-2009 Capital Program, the remainder of the work is planned for the next two capital programs. Once these critical assets, as identified in the vulnerability assessment, are completed in the 2015-2019 Capital Program, security investments to protect MTA assets systemwide will continue under the specific Operating Agency which owns the asset.

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Expanding the Network

While these investments to rebuild the system promise to preserve the legacy of these systems and serve the region well when the economy rebounds from its current crisis, plans must be laid for expanding the system once the rebound occurs. The combination of rebuilding the system and planning for growth to come will ensure the legacy of the system continues and meets the future needs of the generations to come.

The MTA's system is paramount to the revival of New York City and the New York region. The investments in rebuilding the system have not only resulted in improved reliability and more convenient travel, but have also provided the foundation for the remarkable turn-around in economic conditions in the Manhattan CBD and throughout the NY region. Yet while substantial rebuilding and renewal of the system has been underway, the region has continued to grow further and the way customers use the system has continued to change. Since the late 1990s, MTA has been able to build on a solid foundation of renewal by starting to expand the network to meet growing needs.

The purpose of the Network Expansion section of the Twenty-Year Capital Needs Assessment is to identify the future growth expected in the region using City and regional forecasts and to identify proposals for network improvements that will meet the anticipated growth over the next 20 years.

Looking ahead, there is a broad regional consensus that, accompanied by a well financed, well-run MTA network, the rebound will allow the region to realize its future, with double digit population and employment growth as well as further expansion of non-Manhattan employment centers in Long Island City, Downtown Brooklyn, and in the suburbs such as White Plains, Stamford, Suffolk County's Route 110 Corridor and the Nassau Hub.

New York City is now on track to grow by 1 million people to over 9.4 million by 2030 – the equivalent of another large American city. Many city neighborhoods that experienced population declines in the 1970s and 1980s have rebounded as new residents take advantage of renewed housing stock and good access to an efficient public transportation system.

The region – also enjoying recent rapid growth overall through 2008 – is targeted to reach over 26 million (up from 22.1 million in 2005) over the next 25 years. Leading the way are outer counties like Orange, Dutchess, Sullivan and Suffolk and outer boroughs of NYC like Staten Island, with annual growth rates of up to 2.1%. With steady growth virtually region-wide, these counties are but a few of the many areas where the MTA network must meet rising travel demand.

Other factors promoting greater use of the MTA system as the region rebounds from the recent economic decline includes its 24 hour, service-based regional economy; and a continued expansion of MTA's commuter shed into central Connecticut, the upper Hudson Valley and southwestern NY State and even eastern Pennsylvania, as workers in the City and inner suburbs seek more affordable housing in the farthest reaches of the region.

Economists and regional planning experts from around the region in meetings with MTA Planning agree that the transit system remains critical to weathering the current recession and fulfilling the region's growth potential. They describe:

- A New York region better equipped to make it through the current downturn than significant downturns of the past due to advancements in infrastructure, notably MTA, housing, and education, and;
- A New York that will rebound with promising growth potential thanks to its density and connectivity, which will continue to allow it to link employment centers to a larger labor pool.

Their conclusion is that the potential for the region to maintain growth long term remains strong but continued, unabated public investment in key sectors such as transportation, notably MTA, is essential.

Travel Demand Growth

Between 1990 and 2008, MTA ridership on all modes increased by 55%. Bus ridership led the way with a 59% increase, fueled largely by the introduction of free transfers in 1997. Subway ridership also experienced healthy growth, with a 58% increase, to more than 1.6 billion trips in 2008.

Despite the recent declines in ridership linked to the economic slowdown, the daily overall patronage of the MTA system is greater than 2007, which itself was a near-

record year for customer use of the bus, subway, and commuter rail services of the MTA.

The travel patterns experienced over the past decade are forecast to persist and intensify as the economy improves. Manhattan will continue to be the economic engine for the region, largely due to the significant growth in employment forecasted for the Central Business District south of 60th Street, home to some the most unique business service, finance, creative and media services, non-profit, and international relations establishments and institutions in the world. The Manhattan core has a multiplier effect which induces activity and growth throughout the Tri-State Region, which generates greater travel demand to, from and within the 14 counties of the MTA service area.

Forecasts also foresee greater intra-borough travel, reverse commutation travel, and intra-suburban travel, fueled by robust population and employment growth outside of Manhattan. The trend toward longer suburban-to-core trips, which began to accelerate in the 1990s, will intensify as families seek more affordable housing in the outermost parts of the metropolitan region. It is also anticipated that demand will continue to spread beyond the traditional peak commuting hours as the region continues to move toward a 24 hour, seven day a week economy.

Annual MTA transit ridership is projected to grow from roughly 2.5 billion (including MTA Bus) in 2008 to almost 3 billion by 2030. These forecasts for regional population, employment, labor force and ridership growth are very much a projection of "potential". For the region to achieve that potential, MTA must expand capacity and improve its operations to respond to increasing demand.

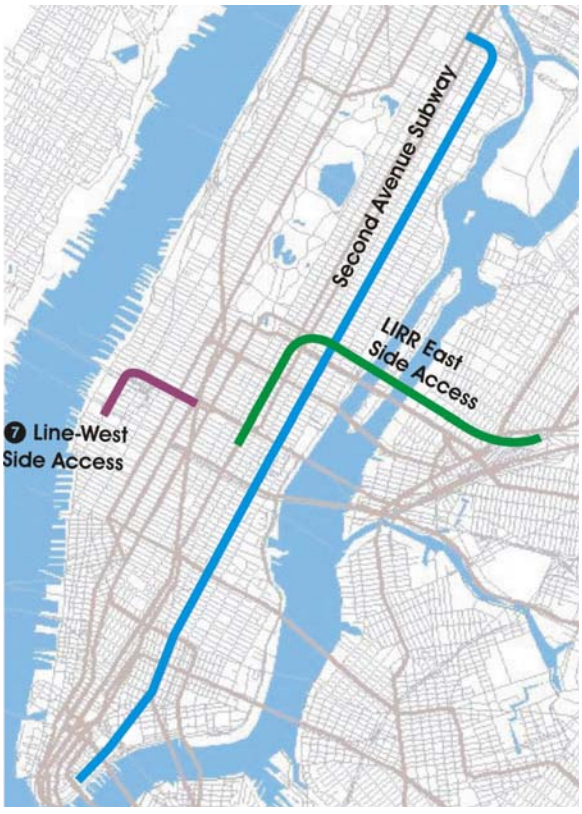
Record peak period ridership has already stretched the capacity of many existing subway and rail lines to their limits. Ridership growth has been so pervasive in recent years that tens of thousands of customers now use the commuter rail and subway systems in evening hours and throughout weekend days and nights. These are the same overnight and weekend windows within which system repair and maintenance are conducted, often resulting in delays to and rerouting of customer travel or extending the duration of work, or both. In fact, within the limits of network capacity, there is little room to reassign heavy customer loads among different lines to make room for badly needed maintenance.

Demand has grown with the advent of discounted fare media made possible by adopting new technologies; and new riders will be generated by future job and population growth.

A fully-funded core program that renews the existing MTA system alone will not be able to accommodate long-standing and emerging capacity and travel time problems. This new demand will impact the elements of the network that riders are most familiar with – trains, buses, stations – as well as supporting infrastructure, such as bus depots and train yards. The MTA must have the means to undertake a continuous and enduring campaign of expansion to enable the city and region to reach their economic potential.

Initial Network Expansion

Three new rail links – East Side Access, the Second Avenue Subway Phase I, and the 7 Line West Side Extension – are now under construction to address well known capacity shortfalls.



East Side Access

The East Side Access project will be the most significant improvement in LIRR's network in over a century. The creation of a one-seat LIRR ride from Long Island/Queens to the East Side of Manhattan will save an average of 40 minutes of daily travel time per commuter, improving access to jobs and quality of life for both LIRR commuters and those who utilize LIRR service for discretionary trips, leisure, and recreation. Linking Long Island with Grand Central Terminal will also create new opportunities for reverse-commute as well as access to JFK International Airport (via the Port Authority's AirTrain). The creation of new transit service will encourage more trips in the New York region to be taken via public transportation instead of by automobile, lessening roadway congestion and improving regional air quality. Specifically, East Side Access will:

- Serve 171,000 daily trips to Manhattan from Long Island and Queens;
- Attract more than 35,500 new riders to LIRR;
- Enable LIRR to expand peak hour service to Manhattan by 40%, from 37 trains per hour to a projected 61 trains, with 24 peak hour trains serving GCT;
- Shorten daily travel time for 67,000 LIRR morning peak riders destined for Manhattan's East Side by as much as 20 minutes per passenger and reduce crowding for 83,000 morning peak trips still going to Penn Station;
- Reduce crowding: approximately 70% of daily travel-time benefits would result from LIRR riders no longer traveling in overcrowded conditions Without ESA, many LIRR peak trains would be approximately 127% of guideline capacity;
- Improve travel throughout the LIRR network: more access from Midtown to JFK AirTrain, easy transfers between MNR east of Hudson trains and LIRR/ESA trains to Long Island and Queens;
- Bolster the regional economy by improving worker access to the nearly 540,000 jobs within a half-mile radius of GCT;
- Increase LIRR's tunnel capacity across the East River by 50% and provide strategic redundancy for LI-Manhattan travel to Penn Station; and
- Help the New York region meet federal air quality goals by providing options for motorists. ESA helps avoid 105.5 million highway vehicle miles of travel and resultant highway congestion and pollution.

The LIRR is also pursuing strategic investments which need to be implemented to make the LIRR network "East Side Access ready". These are discussed in detail in the Rebuilding the System section above.

Second Avenue Subway

The full-length Second Avenue Subway, with the first phase now under construction from 96th Street to 63rd Street, will reduce overcrowding on the Lexington Avenue line, the most crowded subway line in North America, and bring rapid transit coverage to the ever-growing far East side of Manhattan. The key benefits of Phase I include:

- Carrying 213,000 daily riders, many diverted from the Lexington Avenue Subway, the nation's busiest and most overcrowded subway. The "Lex" carries more trips than some of the largest transit systems in the country;

- Decreasing crowding on the Lexington Avenue Line by as much as 13%, with 23,500 fewer riders entering the Manhattan central business district on southbound express and local trains on an average weekday (58 fewer riders per train);
- Reducing morning peak hour boardings on the southbound Lexington Avenue Line by 48% at 86th Street;
- Reducing travel times by up to 10 minutes or more (up to 27%) from the Upper East Side to Midtown; and
- Attracting 1.6 million new annual transit riders to NYC Transit.

Phases II – IV will generate similar benefits and must be advanced in future Capital Programs.

7 Line West Side Extension

The Flushing Line, with the funding support of New York City, is being extended to serve the last major redevelopment area in the Manhattan core, the far West Side. This extension from Times Square to West 34th Street at 11th Avenue, uses the "best practice" approach of leveraging revenues from large land use redevelopment to fund greater transit capacity. This "value capture" approach is one of the largest ever undertaken, and will create a thriving West Midtown district of up to 34 million square feet of new residential, commercial and retail development.

Table 8
MTA's Initial Network Expansion Projects
($ in Billions)

Expansion Project	Total Cost	Invested to Date	2010-2014 Needs
East Side Access	$7.33	$4.37	$2.96
Second Ave Subway, Phase 1	$4.45	$2.96	$1.49
Flushing Line Extension	$2.15	$2.15	Funded

New Network Expansion Initiatives

In 2006-2007, the MTA conducted a region-wide review of the forecasted growth and the trends described above and concluded that despite a continuation of its rebuilding program and the completion of the ESA, full-length SAS and 7 Extension projects, significant gaps between demand for transit services, opportunities for redevelopment, and transit system capacity will remain. Since virtually all portions of

the region and travel markets are expected to experience growth over the next 20 years, the MTA's response must concentrate both on enhancing the existing network's ability to accommodate more customers as discussed in the core investment section above and expanding the network. This response will, of necessity, span many capital programs. In some cases, a determination has not yet been made of the transit investment that will best serve the area's identified service need; these areas will require investment studies early in the twenty year period to identify priority investments for future Twenty Year Capital Needs Assessments. In other cases, new expansion projects have already been identified as critical to the region's future growth. These studies and new expansion initiatives are discussed in the following section in greater detail.

Develop Strategies to Overcome Choke Points in the Network and Address Longstanding Travel Problems

Many of the travel issues that will result from anticipated growth will require the construction of new links to either tie remote portions of the region to commercial centers or to mitigate large capacity deficits. While these initiatives would require significant levels of investment, they could also incorporate new technologies and innovative uses of existing assets to reduce costs and increase benefits.

Overcoming Strategic Subway Network Choke Points

These areas were identified in MTA's regional review as places that will experience severe overcrowding or a significant degradation of service as a result of new demand induced by increased population and employment over this assessment period.

- **Queens Boulevard Corridor**

  Queens has experienced considerable population growth from the time of the introduction of rapid transit lines in the first half of the 20th Century, which helped transform the borough from a predominantly agricultural character to a bustling commercial and residential

community. The second half of the century saw continued growth, but development occurred in the eastern areas of the borough where there is no rapid transit and which are farther from Long Island Rail Road stations. A series of recent rezoning actions by the City of New York focus future development in the Long Island City and Jamaica business centers where there is existing public transit infrastructure to reduce the emphasis on the "auto-only" areas of the borough. However, continued growth may lead to crowding on subway lines that provide access to these two business centers.

MTA, with New York City Transit, forecasts that the NYC Transit Queens Boulevard express (E/F) lines and Flushing Line (7), the primary and well-patronized transit arteries of the borough, will experience even more congestion in the next quarter century due to anticipated population and employment growth. Though the area is densely developed, there may be possibilities to insert new services along existing rail rights-of-way or on wide arterials in the case of bus/BRT strategies. A "Queens Corridor" evaluation is needed to define the transit needs and opportunities and identify longer term solutions to address them. The solutions could include technological enhancements to the existing network, such as signalling innovations to increase throughput, and technologies to better balance use with capacity, such as BRT.

- **7th Avenue Corridor**

  MTA's and NYC Transit's analysis of future population and employment growth suggests that the 7th Ave-Broadway line (1/2/3) linking The Bronx, Brooklyn and Manhattan's Upper West Side will require additional capacity given the heavy peak use that continues to grow along that corridor. The population within the 7th Avenue commuter shed is expected to grow during the next 25 years; and the desire of residents to reach job and other destinations in Midtown Manhattan will result in greater ridership on the 1/2/3 lines and congested conditions.

  Some of the potential capacity of the Line is restricted by capacity limitations at key junctions and switching locations at the south end of the line in Brooklyn. A "7th Avenue Corridor Evaluation" is needed to examine these trends and develop a range of possible solutions to add capacity to the lines that could include:

- Rebuild Nostrand Junction and Brooklyn College/Flatbush Terminal to eliminate a capacity choke point
- Restructure service to maximize throughput
- Accelerate implementation of CBTC to best route trains and increase throughput

New Links to Address Longstanding Travel Problems

- **Staten Island Corridors**

Staten Island is the fastest growing borough in the city. Its population has increased by 24% since 1990 and is expected to grow by an additional 34% by 2035. The county is served by one rapid transit line in the eastern third of the island. Northern and Western Staten Island are a combination of residential neighborhoods and waterfront commercial sites, and include former rail corridors that were active over 50 years ago. The MTA and New York City Transit, in cooperation with the Staten Island Borough President, have begun a "Staten Island North Shore Alternatives Analysis," whose study area also includes the northern segment of Staten Island Economic Development Corporation's "West Shore Corridor Study." The MTA study will identify ways to improve travel in this corridor (intra-island and to other Boroughs and New Jersey) and to evaluate a variety of modal alternatives to support faster and more reliable transit service within the corridor, to the St. George Ferry Terminal and to destinations outside Staten Island.

Staten Island's West Shore travel corridor (extending from the Bayonne Bridge on the North to the Staten Island Railway line at Richmond Valley, between the Arthur Kill waterway and Richmond Ave on the South) presents significant obstacles to accessibility for travel on and off the island, including very long travel times and incomplete geographic coverage to areas of potential development. A foundation study to set the direction for future improvements is proposed.

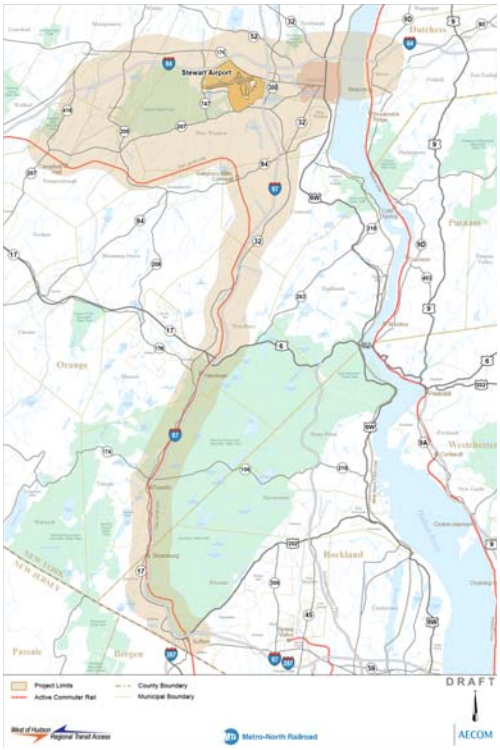
- **Tappan Zee Corridor**

The population of Rockland County has more than tripled in the past 50 years, and Westchester County is experiencing robust employment growth in areas around White Plains and the I-287 Platinum Mile. As a result, travelers in the I-287 highway corridor experience significant delays due to congestion, as corridor facilities often operate above capacity, particularly in the vicinity of the Tappan Zee Bridge. The Tappan Zee Bridge and the corridor provide a critical link between Rockland and Westchester Counties and to the overall regional transportation network. In addition to the capacity constraints of the corridor, the Bridge is aging and requires extensive ongoing maintenance. Population in Rockland and Orange Counties is forecasted to grow by over 22.9% by 2035, increasing travel demand in that already strained travel corridor.

This increased demand will require a new "mobility strategy" which must include mass transit. MTA Metro-North is partnering with the NYS Department of Transportation and the New York State Thruway Authority to conduct an Environmental Impact Statement (EIS) to evaluate alternatives, including transit, to reduce congestion and improve mobility in the I-287 corridor, and to address the structural and operational needs of the Tappan Zee Bridge. The EIS is being conducted in tiers to facilitate the environmental process. A Tier 2 Highway EIS is targeted for completion in 2010 and will result in a Record of Decision what would enable construction of a transit-enabled crossing to advance. A Tier 2 transit EIS process would be initiated in 2010 to flesh out the details of the transit element of the corridor overall. As the pressure to reduce auto use and develop travel alternatives grows, the Tappan Zee Bridge/I-287 Environmental Study will help provide the opportunity to meet the growing demand that requires the additional infrastructure to support transit.

- **West of Hudson Corridor**

Beyond the Tappan Zee corridor, Orange and Rockland have experienced rapid residential and commercial expansion since 1990. Population has grown by 17% and the number of jobs has increased by 21%. Double digit population and employment growth is forecast for the next two decades, further burdening the existing highway and transit networks. In addition, the Port Authority of New York & New Jersey has designated Stewart Airport (in Orange County and near the MNR Port Jervis Line) as a fourth regional jetport, which will increase travel demand from New York City and the surrounding areas to the Airport. The existing rail network has not kept pace with this growth.



Metro-North rail service from Orange and Rockland County to Manhattan is currently indirect, requiring a transfer at either Secaucus or Hoboken. However, NJ Transit's Access to the Region's Core (ARC) project, which will provide a direct link from New Jersey and Orange and Rockland Counties to a new rail terminal adjacent to Penn Station, will provide the opportunity to increase service to New York from New York's west of Hudson service area and to provide direct service from New York City and the Lower Hudson Valley to Stewart Airport. In order to maximize this opportunity, Metro-North needs to make targeted investments in its West of Hudson infrastructure, such as installation of a second track and upgrade of signal and communication systems, as well as expansion of yard capacity and structures (undergrade and overhead bridges). These investments will allow Metro-North to provide more peak period service and shorter trip times to residents of Rockland and Orange Counties and introduce reverse commuter services.

In addition, Metro-North is partnering with the Port Authority of New York and New Jersey to study possible rail, bus, ferry and other initiatives to improve travel

between Orange County and New York City and to provide improved regional access to Stewart Airport.

Extend Reach of the Regional Rail Network

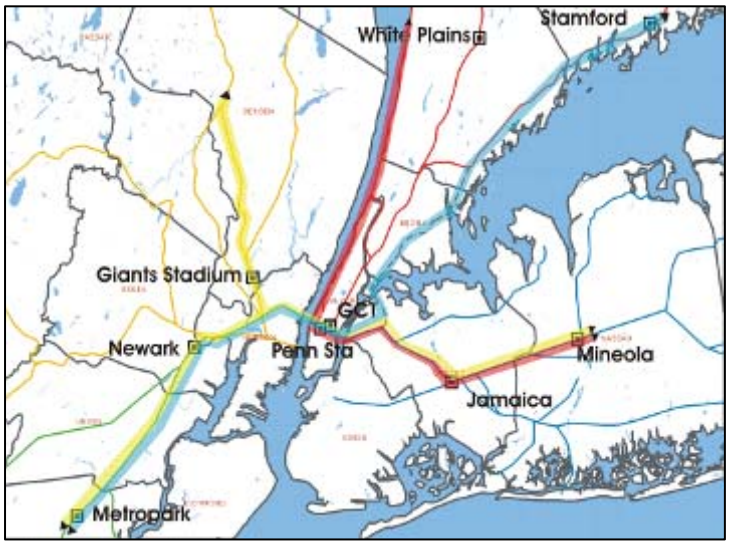
Additional commuter rail capacity is essential to meeting the growing demand to access different employment concentrations in Manhattan, creating new outer-borough linkages and serving the need to establish even longer distance linkages between workers and jobs. Beyond the implementation period of LIRR East Side Access and Metro-North Penn Station Access (which is discussed on the next page), is an even longer term need to look anew at Penn Station and its network approaches. As the railroad "crossroads of the region" as well as the busiest intercity rail hub in the United States, Penn Station plays a vital role in supporting the commuter, and inter-city travel in the New York area. While the LIRR East Side Access project and the NJ Transit "Access to the Region's Core" project will provide relief in the form new Midtown rail terminal capacity, post-2030 forecasts for travel by all the railroads argue for greater capacity in the Penn network of tracks and tunnels. In the long term, commuter rail service in the Tri-State Region, including MTA service between New York and Connecticut, and Amtrak service in the Northeast Corridor, create a service need for greater capacity along the shared Penn Station/Northeast Corridor network. Developing a more robust regional rail service deserves increased attention as a strategy to ease congestion on the region's major interstate highways and river crossings, and the limited ability to expand the highway system to accommodate projected growth. This is necessary to sustain the region's economy and support its growth in the future.

Optimizing the capacity of the rail network requires the railroads to operate in a cooperative, integrated manner on each other's networks. Through-running of trains from one agency's territory to another may offer greater capacity and a greater ability to respond to growing customer needs to travel among the key destinations of the region that are on opposite sides of the Manhattan CBD. For example, key regional resources along the I-95/New Haven Line-Northeast Corridor include Newark-Liberty International Airport, a number of major universities, research hospitals and bio-medical centers and regional sports and entertainment venues (all employment centers in their own right). Finally, creating linkages among the region's railroads may provide more efficient services to the Manhattan CBD without consuming valuable land adjacent to the terminals for railcar storage. Examples of potential solutions could include:

- **Penn Station Access**

East Side Access makes possible a new LIRR linkage to Manhattan's East side. The goal of the Metro-North Penn Station Access (PSA) project would be to provide new access for the MTA's Metro-North northern rail service to Manhattan's west side. The PSA project would provide regular Metro-North service between the New Haven Line and Penn Station via Amtrak's Hell Gate Line and add three new stations in the Bronx and a new link via the Hudson/Empire line from the west and potential intermediate Manhattan west side stations. The new service would decrease travel times for Metro-North customers traveling to the West Midtown Manhattan area by up to 21 minutes and provide greater mobility to residents and employees of underserved communities in eastern Bronx. Implementation would have to be coordinated with initiation of the new LIRR East Side Access service.

- **Greater Connectivity Through the Penn Station Hub**



MTA and its commuter railroads, along with Amtrak and NJT, are exploring the benefits of interoperability with a pilot service operating between New Haven and the Meadowlands with transfers to the link from LIRR and NYC Transit, starting in the fall of 2009.

There is also evidence that a number of regional trips within defined corridors that are today made mostly by automobile could be served by a regional rail service. These markets for greater rail connectivity are robust. Nearly

four of five jobs in the New York-New Jersey-Connecticut region are located within a 30 mile radius of Manhattan, and nearly two of every three jobs are located in counties[1] where a regional rail service might reasonably operate. A greater understanding of costs, benefits and infrastructure requirements is necessary and will be pursued, including a better understanding of potential shared yards, fleet and other facilities to the east and west of Penn Stations. There is a need to know more and a joint planning effort among all the railroads should be pursued.

As a first step, MTA and its two commuter railroads, with Amtrak and NJT, are conducting a cooperative rail simulation of the Penn Station network. The simulation will inform Metro-North's Penn Access planning, and on a larger scale, the longer-term capacity shortfalls of Penn Station. That effort should be followed by a cooperative process to define capital and operating solutions.

One strategy may be through-running, a potential through service which operates from one suburban sector to another with PSNY as a through hub and not as the final destination. Possible benefits include:

- Providing suburban and city access to an AirTrain airport station (e.g.- New Haven Line west of Stamford to Newark/Liberty International Airport AirTrain or Hudson Line to JFK International Airport's AirTrain);
- Providing suburban and city access to PSNY for Acela intercity service (e.g.- western New Haven Line to PSNY) for short-haul travel out of the region, say to Philadelphia and Washington, D.C.; and,
- Carrying other passengers to and from PSNY, as Manhattan remains the dominant regional employment and recreation center.

These potential regional travel markets require more extensive collaborative efforts between MTA, NJT and others.

[1] About 9.5 million jobs (2006 "covered employment") are located in the tri-state region bounded by roughly I-84 to the north, I-195 to the south, the Delaware River to the west and Quinnipiac River to the east. Of that number, 7.5 million jobs are located in counties within 30 miles of Manhattan, and 5.9 million jobs of the total are along the counties spanned by the NEC (New Brunswick to Stamford), Hudson Line (in Westchester) and LIRR Main Line (Nassau).

- **Penn Station Customer Experience**

Considerable attention is focused on the need to improve the capacity and reliability of Penn Station services at the tunnel-track-platform level. Yet the quality of the customer experience at PSNY— its concourse, waiting and street level areas also needs urgent renewal.

Just two blocks to the west of Penn Station, a development renaissance is taking place with its Hub at/above the site of the LIRR West Side Yards where over 6.2 million square feet of development is being led by the Related Companies in partnership with MTA. This historic undertaking in the development of Manhattan will transform West Midtown into a new community of residential commercial and cultural facilities surrounded by the City's even larger Hudson Yards – a renewal area targeted for 24 million square feet of offices, 12 million square feet of retail, 2 million square feet of hotels and 13,500 dwelling units.

Penn Station is now physically positioned as the transportation gateway to this new exciting area, which in its own right is as large as the downtown of many of the nation's largest cities.

To fulfill its regional transport mission serving over 500,000 commuter and intercity rail customers daily, and its emerging role as the portal to a new West Side, Penn Station must renew itself as a place not just a station. Recent studies among MTA and its Penn railroad partners with City Planning and New York State, have pointed out a number of shortcomings, including customer circulation pinch-points; inconvenient vertical access among platforms, concourses, and streets; counter-intuitive exterior signage and way-finding; a need for better 'back of house' spaces for rail crews, offices, and security personnel; and more significant presence within the dense fabric of West Midtown. A near-term solution to improve some of these conditions is the conversion of the Farley Post Office into an important, highly visible entrance

and concourse level annex. When completed, it would increase ambience and services for customers in the west end of the station complex, provide for additional 'back of house' flexibility and add an additional surface presence to the largely underground station complex.

However, Penn Station's "center of gravity" remains to the east in the area between 7th and 8th Avenues/ 34th to 30th streets. Much more is needed to improve the Stations' interior circulation function, customer experience and pedestrian access network. The long range regional planning initiative for Penn described above must address the unmet needs of the station at all levels not just the tracks and tunnels which comprise its regional rail capacity.

Evaluate Sustainability Investments

As interest in and commitment to dealing with climate change grows here in the U.S. and overseas, the MTA will need to make environmental sustainability investments to support economic development and redevelopment in the city and the region in the decades ahead. As regional climate change efforts progress, MTA's long term needs assessments will incorporate new investments as appropriate.

Conclusion

Protecting and enhancing this region's remarkable transportation legacy depends on an ongoing commitment to rebuild its infrastructure with its thousands of visible and invisible components and to expand the system to meet the future growth needs of the region. The investment needed to accomplish this task includes addressing backlogged State of Good Repair, ongoing rehabilitation and replacement and future system expansion needs. While this investment is massive, it's importance is one that has long been recognized by the federal, state and local funding partners in their ongoing choice to invest in public transportation, beginning with the MTA's first five-year capital program in 1982. And there is a new recognition at the Federal Transit Administration and among regional funding partners on the need to address the backlogged State of Good Repair of the major urban transit systems so critical to the economic wellbeing of the nation. As solutions for this need are sought, one thing is certain: this region will continue to invest in its transportation system. It is this commitment that brought the MTA back from the brink of collapse; the continuation of this commitment promises to ensure a well run system that secures the economic health of the region for generations to come.