



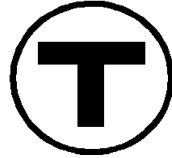
Capital Investment Program

FY2016



massDOT
Massachusetts Department of Transportation

 **Massachusetts Bay
Transportation Authority**



Capital Investment Program

FY2016

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LETTER FROM THE GENERAL MANAGER

To our customers:

I am pleased to present you with the FY2016 MBTA Capital Investment Plan (CIP). This annual plan provides you with an update on the current state of our transit infrastructure and the projects selected for funding that will improve the system. Unlike the CIP you may have seen in the past, this is not a five-year plan. In the coming months, the MBTA will develop and release a five-year CIP for FY17-FY21 that complies with the requirements of Chapter 161A of the General Laws of the Commonwealth.

The first capital investment plan was published in 2001. Every year since then, the MBTA reviews its needs, its infrastructure, and available funding to prioritize projects that will fix, modernize, and expand the system to meet the needs of the region. The FY2016 CIP provides an estimated \$1.05 billion to continue progress in ensuring that our residents have a safe, reliable transportation network. This plan, the first to be issued as part of the Baker-Polito Administration, reflects a commitment to sustainable mobility and the strategic and prudent expenditure of available capital resources. This one-year plan provides a transition as the MBTA continues to categorize and define its needs over the next five years and updates the criteria used in evaluating and prioritizing investments in the regional transit system.

The CIP allocates \$72 million out of an \$83.7 million total program in funding for critical upgrades – track heaters, new rail, and plows – necessary to mitigate service interruptions should another historic level of snow accumulate during next winter. This one year plan continues investment in the replacement of Red and Orange Line vehicles, 325 new buses to replace older, less reliable vehicles, replacement of track and signal systems, and hundreds of smaller projects that keep you, our customers, safe and on time. The CIP ensures progress in the construction of the Green Line Extension and the continued design and environmental permitting of the South Coast Railway (SCR). Over the next year we will begin a new Program for Mass Transit (our 25-year long range capital plan), take steps to ensure that all of the funds programmed in this FY16 CIP will be spent, and, in the short term, develop new

LETTER FROM THE GENERAL MANAGER

procurement programs to streamline project delivery and a new public performance management program that focuses on the effectiveness of our delivery of projects.

We are committed to planning for, managing, and maintaining our transportation system in a way that is prudent, forward-looking, generationally responsible, and – most of all – safe for our customers and employees. Please take a moment to review the FY2016 Capital Investment Plan to learn more about selected projects that will allow for the continued growth of the region through a resilient, reliable transit network. We look forward to your feedback and comments at public hearings or through our website at www.mbta.com.

Sincerely,

Frank DePaola
General Manager

INTRODUCTION

The Massachusetts Bay Transportation Authority (MBTA, or the Authority) Capital Investment Program (CIP) is a guide to the MBTA's planned capital spending for the next fiscal year. The document describes the MBTA's infrastructure and the capital needs to maintain the system, outlines ongoing and programmed capital projects, and details planned projects to expand the transportation network. Unlike the Program for Mass Transportation (PMT) and other planning documents, the CIP is financially constrained – only capital projects the MBTA can afford are included in the "Funded Projects" sections of this document. To provide the reader with an easy-to-follow resource guide to the MBTA's capital program, this CIP document classifies capital efforts into programmatic areas by asset category.

In 1897, America's first subway was constructed between the Park and Boylston Street stations. This half-mile section of subway is still operated today by the MBTA, making the MBTA the oldest continuously operating subway system in the country. For over a century, the Massachusetts public transportation system has remained a critical part of the city, and has grown dramatically in response to an ever-increasing demand for transit. The MBTA now serves 175 communities, providing transit alternatives to a population of almost 4.7 million people over an area of 3,200 square miles.

The MBTA is currently the fifth largest mass transit system in the United States as measured by ridership. The Authority serves a daily ridership of approximately 1.3 million passengers. To provide service, the Authority maintains 9 rapid transit lines of heavy and light rail, 183 rubber tire bus routes, 14 commuter rail lines, 3 ferry routes, and a flexible paratransit service. Its large roster of equipment currently consists of 651 heavy and light rail vehicles, 624 diesel buses, 360 compressed natural gas (CNG) buses, 32 electric/diesel buses, 25 hybrid buses, 28 trackless trolleys, 100 commuter rail locomotives, 393 commuter rail coaches, 2 ferry boats, and 656 vehicles for THE RIDE. Service is provided to more than 250 stations and stops.

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Overview of the MBTA Transportation System

Rapid Transit System

The Authority operates 4 rapid transit lines (the Red, Green, Orange, and Blue Lines) over 38 route-miles of heavy rail routes with 50 stations and 26 route-miles of light rail routes (the Green Line and the Mattapan Line) with 74 stations.



Commuter Rail Service

The Authority operates 100 rail locomotives and 393 coaches. This system provides service to over 50 communities and 134 rail stations on 14 commuter rail lines.

Bus Rapid Transit

The Silver Line is bus rapid transit service to Roxbury, downtown Boston, South Boston, and Logan Airport. Silver Line Washington Street has 14 stops and two variations, and operates in an exclusive bus-only lane of traffic on portions of Washington Street and Essex Street. Silver Line Waterfront, which started service in 2004, connects South Station to the South Boston Seaport District and Logan Airport with 3 underground stations and different variations that serve BMIP (Boston Marine Industrial Park) and the airport terminals.

Bus Service

MBTA Bus Operations maintains and operates a fleet of more than 1,000 buses, including compressed natural gas (CNG) buses, diesel and diesel-electric-hybrid buses, and trackless trolleys, all of which operate on 193 routes that cover approximately 763 route-miles. In addition to local services in the urban core areas, the Authority operates a frequent schedule of express buses to and from downtown Boston and surrounding communities. The Authority also manages six local service subsidy programs that provide intra-community and feeder services.



THE RIDE - Paratransit

To complement traditional fixed route service, the Authority has a door-to-door demand-response ADA paratransit program designed to serve people with disabilities and special needs. This program, known as THE RIDE, operates 656 vehicles in 62 cities and towns and averages over 2.1 million trips every year. This program provides customers with public transportation for work, medical treatment, social functions, shopping, and other activities.



Ferry Service

The MBTA operates ferry service on 3 routes between Boston and various points in the inner Boston Harbor and on the South Shore. Two of the operating ferry boats are owned by the Authority, while the rest are provided by outside service contractors. Ferry terminals are located at Pemberton Point in Hull, Hewitt's Cove in Hingham, Logan Airport, Charlestown Navy Yard, and Rowes Wharf and Long Wharf in Boston.

With over 3,000 vehicles, over 250 stations, over 150 shelters, 846 miles of track, 463 bridges, 20 miles of tunnels, and 22 light and heavy maintenance shops, the MBTA's infrastructure is extensive and has major capital investment needs. The Authority's asset management program addresses both short- and long-term capital planning for this infrastructure. One element of this program is the State of Good Repair (SGR) Database, which includes an inventory and assessment of MBTA-owned capital assets. A summary of this information is provided later in the Introduction.

MBTA Capital Investment Program

The MBTA's FY16 Capital Investment Program provides the authorization to reinvest in its transportation infrastructure and to build expansion projects. Various departments in the Authority, with strategic oversight from senior managers, have responsibility for the day-to-day functions of the capital program. The larger principles guiding the programming of funds are based on the MBTA's enabling legislation and the Authority's State of Good Repair standards.

Priorities and Decisions in the Capital Program

The MBTA developed its first CIP in 2001. This new program was created by the Legislature when it rewrote the Authority's enabling act as part of "Forward Funding." The CIP has proven to be a valuable tool both for interested parties and for the Authority itself. However, this CIP reflects a continuing evolution in CIP development. It strengthens the connection between short- and long-term planning and the programming of funds to address issues raised through planning.

Projects in the CIP are selected through a prioritization process that strives to balance capital needs across the entire range of MBTA transit services. Given the Authority's vast array of infrastructure and the need for prudent expansion, the number of capital needs identified each year usually exceeds the MBTA's capacity to provide capital funds. Therefore, the Authority engages in an annual prioritization and selection process to select the highest priority needs for funding and inclusion in the CIP.

One of the highest priorities for the MBTA is the pursuit of a "State of Good Repair" (SGR). To measure the need for capital expenditures devoted to maintaining and replacing existing infrastructure, transit systems often use the SGR standard, wherein all capital assets are functioning at their ideal capacity within their design life. While few transit systems are likely to achieve this ideal, the standard does identify a level of ongoing capital needs that must be addressed over the long-term for the existing infrastructure to continue to provide reliable service.

To assist in this, the MBTA employs a SGR database to help guide its capital decisions. Based on an inventory of all existing MBTA capital assets, the model allows the MBTA to track the capital investment needs for the Authority's existing infrastructure, and to develop scenarios for capital investment to maintain the system in a state of good repair. A summary of this information is provided later in the Introduction.

Prioritization of projects to be included in the CIP is based on the following criteria, as defined in the MBTA's enabling legislation: the impact of the project on the effectiveness of the Commonwealth's transportation system, service quality, the environment, health and safety; the state of repair of MBTA infrastructure; and the Authority's operating costs and debt service. Projects that receive the highest priority are those with the greatest benefit and the least cost, as prioritized by the following criteria:

- **Factor One: Impact on the Environment / Alignment to GreenDOT Objectives.** This criterion is used to assess the impact of the project on the environment including areas of focus as identified in the GreenDOT objectives. Assessments are based on two primary considerations:
 - *Reduce Pollution and Consumption of Natural Resources.* This criterion is used to assess the extent to which the project makes good use of technologies and capital assets that reduce pollution (GHG emissions, local emissions, water quality, or trash generation) and the consumption of natural resources (energy and water). This criterion is not used to assess the financial implications of the resources used, only the environmental implications.

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- *Promote Mode Shift.* This criterion is used to assess the extent to which the project encourages a shift in the mode of transportation utilized by travelers away from private vehicles and to the healthy transportation options (walking, biking, and public transit) identified in the GreenDOT objectives.
- **Factor Two: System Preservation.** This criterion is used to assess the impact of the project on system preservation. Assessments will be based on three primary considerations:
 - *SGR Database Rating.* This criterion is used to assess the extent to which the project is designed to rehabilitate, upgrade, or replace assets that are not in a state of good repair. It uses the quantitative SGR rating from the SGR Database, averaged for all assets that correspond to the project.
 - *Lifecycle Management.* This criterion is used to assess the extent to which a lifecycle management plan and the resources to implement that plan exist for the project. A lifecycle management plan describes the efficient management of assets' whole lifecycle costs to achieve cost savings, improve service reliability, and contribute to customer safety.
 - *Reduce Environmental Vulnerability.* This criterion is used to assess the extent to which the project makes good use of technologies and capital assets that reduce vulnerability to floods, storms, landslides, and drastic temperatures.
- **Factor Three: Financial Considerations.** This criterion is used to assess the impact the project has on factors tied directly to cost and revenue.
 - *Impact on Operating Costs.* This criterion is used to assess the impact the project has on operating costs. Those projects which help reduce operating costs will score higher when they are assessed.
 - *Impact on Operating Revenue.* This criterion is used to assess the extent to which the project has an impact on operating revenue. Those projects that can successfully drive up revenue (as offset by an increase in operating costs) will score higher when they are assessed.
- **Factor Four: Operations Impact.** This criterion is used to assess the extent to which the Project impacts/improves operations. Assessments will be based on four primary considerations:
 - *Improve Customer Experience.* This criterion is used to assess the extent to which the project has the potential to improve the customer experience/maximize customer satisfaction through improvements to service quality, accessibility improvements, and providing new services.
 - *Operations "Critical."* This criterion is used to assess the extent to which the assets addressed in the project are critical to operating services.
 - *Number of Riders Affected.* This criterion is used to assess the existing ridership (number of average weekday trips) that would be directly or indirectly affected by the project.
 - *Operational Sustainability.* This criterion is used to assess the extent to which the operational impact/benefits of the project are sustainable in future years. It measures whether the MBTA has the resources (sufficient skills, dedicated personnel, time and the availability of funding) to sustain the assets associated with the project.
- **Factor Five: Legal Commitments.** This criterion is used to assess the extent to which the project affects compliance and the potential consequences and risks of being out of compliance with the following: 1) existing environmental regulations; 2) existing accessibility regulations (such as ADA and other Federal mandates); 3) consent decree; 4) other legal requirements.

The MBTA also considers environmental justice in its capital investment decision-making process. The MBTA has worked with the Central Transportation Planning Staff (CTPS) to the

Boston Metropolitan Planning Organization (MPO) to ensure that minority and low-income regions are treated equitably regarding the delivery of transportation services.

MassDOT is currently engaged in a review of capital project selection processes across the Commonwealth as part of a Project Selection Advisory Council (PSAC). Depending on the PSAC's recommendations, the MBTA may change its future project selection criteria or weights associated with the criteria.



Expansion of MBTA Services

Since the implementation of the "Forward Funding" legislation, financial support for the Authority's expansion projects relies primarily on non-MBTA sources.

Legal Commitments

Chief among the projects programmed with non-MBTA funding sources are the SIP projects, which are Commonwealth priorities for transportation funding. In November 2006, the Department of Environmental Protection (DEP) issued final amendment to the transit regulation 310 CMR 7.36. As adopted, this regulatory change was reviewed in the summer of 2008 and approved by the U.S. Environmental Protection Agency (EPA) for inclusion into the Massachusetts SIP under the Clean Air Act. This regulatory change incorporates the proposal made by the Massachusetts Department of Transportation (MassDOT) to DEP to formalize SIP transit commitment projects as the following: Green Line extension beyond Lechmere to Somerville/Medford; Fairmount Line Improvements including new stations; and 1,000 new transit commuter parking spaces in the Boston region. Although the MBTA will not pay for these projects, it will play an important role in the design and implementation of these projects. While the Green Line extension is a SIP commitment, it is funded through a combination of Commonwealth funds and the FTA New Starts Program.

Funding the MBTA's Capital Investment Program

The level of capital funding programmed in this document is guided by and dependent on a number of federal, Commonwealth, and local funding programs.

Forward Funding

In 2000, the Commonwealth repealed and restated parts of the MBTA's enabling legislation, dramatically changing the way the state provides financial assistance to the MBTA. Beginning on July 1, 2000, the Authority no longer received Net Cost of Service or Section 28 Assistance. Instead, under the Enabling Act, the Authority now receives a dedicated revenue stream consisting of assessments paid by the 175 cities and towns in the new MBTA district established in accordance with the Enabling Act (the Assessments) and the greater of the amount raised by a 1% statewide sales tax, or the base revenue amount (\$645 million in 2001), in either case to be funded from existing sales tax receipts, subject to upward adjustment under certain circumstances set forth in the Enabling Act (the Dedicated Sales Tax and, together with the Assessments, the Dedicated Revenues). The Enabling Act and the new financing mechanism for the MBTA have been referred to as "Forward Funding" to reflect the fact that the MBTA's costs will no longer be funded in arrears. In addition, the Authority has other funding streams, such as fare revenue and non-fare revenue (e.g., parking and rental income).

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MBTA Finance Plan

The Authority has a long-range finance plan with a stated goal of balanced financial operations and a sustainable capital program. This finance plan maximizes the value of the revenue streams available to the MBTA under its Enabling Act to minimize the Authority's cost of capital and to provide access to capital markets even under adverse economic or capital market conditions. The finance plan supports the Authority's CIP by using a combination of sources of capital funds, including revenue bonds and federal grants. The purpose of the finance plan is to establish a fiscally sound and sustainable transit system that has the financial capacity to fund operations, maintenance, and capital replacement. As noted in other sections of this introduction, the MBTA continues to lack funding for all needed capital projects.

Capital Program Funding

The MBTA's capital program is funded by federal grants, revenue bonds, state infrastructure funds, pay-as-you-go capital, project financing, and other sources. Prior to Forward Funding, the MBTA's non-federal portion of the capital program was funded by General Transportation System Bonds issued by the MBTA and backed by the Commonwealth Guaranty. Under Forward Funding, the MBTA's share of the non-federal portion of its capital program is primarily funded by revenue bonds secured by the Dedicated Revenues under two separate credits (assessments and sales tax).

This enabling legislation places well-defined financial limits on the MBTA. Taking this into consideration, the MBTA's goal is to transition from a high reliance on debt financing to greater use of pay-as-you-go financing of capital projects. The transition from debt financing to pay-as-you-go capital funding will take time and discipline and depends, to some extent, on factors beyond the MBTA's control, such as ridership trends, and the growth in sales tax collections.

For the fiscal year 2016, the MBTA anticipates that approximately \$479 million of capital expenditures will be funded through federal sources. In addition, approximately \$169 million of revenue bonds will be issued both to match federal contributions and for other non-federal-eligible projects. The remaining MBTA sources (\$57 million) are composed of project financing (borrowing through a federal loan program), the capital maintenance fund (cash-in-hand), and reimbursements. The Commonwealth supports capital projects for approximately \$342 million.

Federal Program

Federal funding is a major component in determining the level of capital investment the Authority is able to program. Federal aid for transit programs has historically been provided pursuant to multi-year authorizations. The most recent two-year authorization, Moving Ahead for Progress in the 21st Century Act ("MAP-21")(P.L. 112-141), provides funding through the 2015 federal fiscal year. As of the date of this publication, MAP-21 had been authorized through May 2015 and its extension is anticipated thru July 2015. The MBTA assumes funding for federal fiscal year 2016 consistent at the 2015 federal fiscal year level.

State Program

Funding from the Commonwealth is authorized by legislation passed by the State Legislature and signed by the Governor. Commonwealth projects are separated into three categories that affect the MBTA: state of good repair, expansion, and modernization.

Managing the MBTA's Capital Program

Responsibility for management of the capital program is dispersed throughout the Authority. The Design and Construction Directorate oversees the construction of stations, tracks, signals, communications, bridges, tunnels and other infrastructure projects. The Environmental Department ensures conformity with environmental and land use regulations. The Operations Directorate has primary responsibility for maintaining safety and vehicle engineering (for overhaul programs and procurement of new vehicles). It also has oversight over track, signals, and the MBTA's electric power generation, transmission and distribution systems. The Financial Directorate manages cash flows, grant applications, and debt issuance and expenditure tracking. Various administrative departments share responsibility for the balance of the capital program.

In recent years, the CIP selection process has benefitted from increased participation from senior staff. The inclusion of senior staff affords them increased opportunities to advocate and provide input for their projects at meetings with the General Manager. Senior staff responsibilities include the prioritization of capital projects under their jurisdiction and project management within the authorized budget. The Authority's goal is to maintain the transit infrastructure in a state of good repair and to provide for prudent expansion of service. This document codifies and presents the Authority's plan to achieve these goals within the existing financial constraints.

As the Authority advances this plan, a corresponding performance and project tracking system will be implemented to identify and monitor progress in meeting the spending targets, and resulting outcomes, outlined in the plan. The MBTA is committed to communicating with our customers and stakeholders on the status of individual projects and improving the efficiency and effectiveness of project delivery through a public performance management program.

Through this new communications tool, the Authority hopes to better inform those that fund the MBTA's capital program – the citizens of the Commonwealth, the cities and towns in the MBTA service district, and the T's fare payers. The MBTA's infrastructure is among the most critical assets supporting the Massachusetts economy. As the stewards of these assets, the MBTA is committed to preserving its infrastructure to the most feasible extent, and better informing its owners – the people of the Commonwealth – about its condition.

State of Good Repair Database

The State of Good Repair (SGR) Database is a tool that inventories and forecasts the needs of major capital assets. The MBTA Budget Department uses the SGR Database to provide an SGR rating for capital funding requests as well as to establish funding programs for generalized asset categories. This SGR rating is on a 1-5 scale, with 5 representing a new asset, 1 representing a non-functional asset, and 2.5 representing the score at which an asset falls below a state of good repair. Generally, the SGR Database can estimate the "SGR backlog" (i.e., the current cost to bring all assets, operating past their useful life, into a state of good repair) for the entire Authority or specific asset categories as well as predict the year that funding for an asset's replacement should begin based on that asset's age, physical condition, and performance.

The MBTA is currently assembling its inventory of capital assets and will present an analysis of its data collected to date in a July 2015 report. This report will describe the inventory and estimate the SGR Backlog and SGR Rating for each asset category. In addition, the report will analyze three scenarios: how much SGR investment would be needed to eliminate the SGR Backlog over 25 years; how much SGR investment would be needed to maintain the SGR Backlog at its current level in 25 years; and how the planned investment in this and future CIPs affects the projected SGR Backlog.

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In February, the MBTA published preliminary estimates of the SGR rating and backlog for each asset and modal category included in the SGR Database. This preliminary analysis estimated that the size of the SGR backlog at that time was approximately \$6.7 billion.

Asset Category	Modal Category	Replacement Value (millions)	SGR Score	SGR Backlog (millions)
Total		\$21,563	3.05	\$6,692
Revenue Vehicles		\$6,807	2.83	\$2,634
	Bus	\$892	3.04	\$101
	Commuter Rail	\$2,366	2.87	\$976
	Ferry	\$9	3.79	\$0
	Subway	\$3,539	2.75	\$1,558
Non-Revenue Vehicles		\$77	2.70	\$34
	Systemwide	\$77	2.70	\$34
Track/Right-of-Way		\$823	2.69	\$305
	Commuter Rail	\$74	2.63	\$13
	Subway	\$750	2.69	\$292
Signals		\$2,901	2.57	\$1,369
	Commuter Rail	\$66	2.49	\$40
	Subway	\$2,835	2.57	\$1,329
Communications		\$173	4.25	\$3
	Bus	\$11	4.48	\$0.1
	Commuter Rail	\$2	2.88	\$1
	Subway	\$36	3.74	\$2
	Systemwide	\$123	4.40	\$0
Power		\$793	2.18	\$462
	Commuter Rail	\$8	1.31	\$8
	Subway	\$785	2.19	\$454
	Systemwide	\$1	1.84	\$0.8
Fare Equipment		\$64	3.79	\$0.4
	Systemwide	\$64	3.79	\$0.4
Stations		\$2,700	3.86	\$256
	Bus	\$47	3.66	\$3
	Commuter Rail	\$290	3.44	\$44
	Ferry	\$11	2.64	\$0
	Subway	\$2,350	3.92	\$209
	Systemwide	\$2	4.96	\$0
Elevators and Escalators		\$49	2.94	\$23
	Systemwide	\$49	2.94	\$23
Parking		\$228	2.12	\$172
	Commuter Rail	\$91	2.19	\$81
	Ferry	\$1	2.62	\$0.3
	Subway	\$136	2.07	\$90
	Systemwide	\$0.1	2.39	\$0.1
Facilities		\$1,527	3.19	\$478
	Bus	\$468	3.44	\$110
	Commuter Rail	\$78	2.36	\$49
	Subway	\$459	2.92	\$193
	Systemwide	\$522	3.34	\$125
Bridges		\$5,148	3.39	\$800
	Commuter Rail	\$3,723	3.33	\$724
	Subway	\$1,425	3.56	\$75
Tunnels		\$133	3.10	\$24
	Systemwide	\$133	3.10	\$24
Technology		\$138	1.39	\$132
	Bus	\$0.02	1.63	\$0.02
	Systemwide	\$138	1.39	\$132

CIP Winter Resiliency Program

In March and April of 2015, the American Public Transit Association (APTA) examined the MBTA's preparation and planning for severe winter weather. The APTA report made recommendations on how the MBTA, working with other state, federal, and municipal partners, could improve its ability to provide services during severe weather events such as the winter of 2015. Following the publication of these reports, the Interim General Manager established dedicated working groups to implement the recommendations. Over the course of the next fiscal year, the MBTA will complete the following set of projects to address and mitigate the challenges of operating the system reliably and safely in significant snow and ice. There will be lots of attention on the MBTA the next time it snows heavily. The projects proposed in the FY2016 CIP will not eliminate all disruptions on the system, but the work identified means that the disruptions will be less frequent, of a shorter duration, and that the entire transit community will respond more effectively.

The total program budget for the winter resiliency program is \$83.7 million. These funds are drawn from three primary sources: \$62 million in federal formula funds for capital investments, \$10 million in non-federal, MBTA capital funds, and \$11.7 million in MBTA operating funds.

The following is a sampling of priorities funded within the resiliency program:

1. Red Line third rail replacement and third rail heater upgrade. This project will replace third rail and switch heaters on the Red Line between Andrew Portal and North Quincy. The MBTA will install 150lb rail to replace aged infrastructure on which ice accumulates and impacts service. Estimated cost is \$6.7 million.
2. Revenue and non-revenue vehicle procurements designed to both remove snow and harden existing equipment against the elements. This program includes the purchase of specialized snow fighting equipment to clear tracks, stations, and other facilities. Estimated cost is \$10 million.
3. Orange Line third rail heater upgrade. This project includes the replacement and upgrade of third rail heaters on the Orange Line between North Station Portal and Oak Grove, and Back Bay and Forest Hills. The plan is to install new heaters, repair or upgrade wiring for remote control operation, and fill in gaps where no heat currently exists. Estimated cost is \$6.03 million.
4. Snow fence installation along at-grade sections of the Red and Orange Lines. This project will mitigate snow drift accumulation. The MBTA will prioritize locations where the clearance of commuter rail lines or local roads significantly blows snow onto tracks. Estimated cost is \$500,000.
5. Emergency demolition of compromised infrastructure at the Braintree busway canopy and the Lechmere busway canopy. Both structures have been determined to be structural deficient and may collapse with future snow loading. Removing the structure is the only way to ensure safe operations at both locations during the upcoming winter season. Estimated cost is \$1.5 million.
6. Procurement of third rail track materials that will allow for the replacement of older third rail and switch heaters on the Red Line between North Quincy and Braintree, and Andrew Portal and Ashmont. Estimated cost is \$7.5 million.
7. Maintenance facility overhead door replacement. This project will remove existing doors that are either inoperable or severely compromised. These doors are needed to properly maintain temperatures in the maintenance facilities when repairing and defrosting vehicles exposed to severe winter weather. Estimated cost is \$500,000.
8. Quincy Center parking garage. This garage has been deemed structurally deficient and is currently out of service for parking operations. The garage is at the upper limit of its safe weight load capacity and as such heavy snow accumulation may cause the entire facility to collapse. This project will implement shoring solutions to mitigate the risk of collapse. Estimated cost is \$3 million.

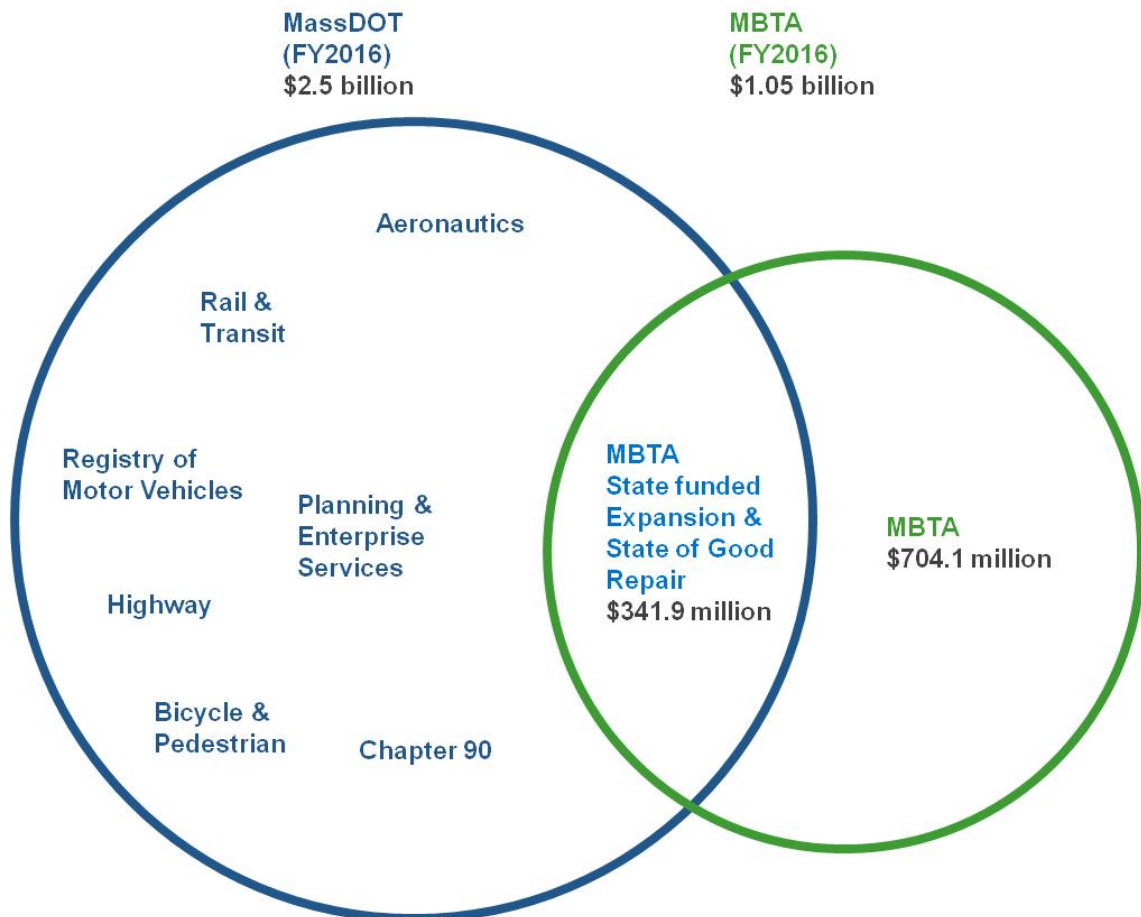
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9. Southwest Corridor structural repairs to expansion joints. This project will address deteriorated expansion joints along several sections that are impacting safe operations of the Orange Line, Commuter Rail, and Amtrak. The infrastructure is failing and is causing delays in service when ice buildup occurs along bridge and tunnel overhead sections. Estimated cost is \$1 million.
10. Procurement and delivery of a new portable 600 Volt DC Substation. The MBTA currently has only one portable substation. The power system is critical to subway operations and this substation is needed to ensure system resiliency, especially in the winter weather season. Estimated cost is \$2 million.
11. Emergency power generator procurement. The MBTA operates over a hundred stations and support facilities and all of them rely on consistent electricity. These facilities are critical for safe transit and maintenance operations. New generators are needed to ensure system resiliency, especially in the winter weather season. Estimated cost is \$950,000.
12. Red Line truck pad installation and Caddigan Yard switch installation. The current truck pad at Linden Street is too small to provide access for large snow fighting equipment. The truck pad will be enlarged to allow access for current and procured snow removal and other equipment. Additionally, the Red Line Caddigan Yard has a spur track that is unable to be used during severe weather. This project will install a new hand throw switch so Operations can have additional transportation flexibility in storing or moving trains to the mainline and yard. Estimated cost is \$400,000.
13. Through the annual operating budget, \$11.7 million has been allocated for additional contract services to remove snow and ice at stations, facilities, and other critical areas (\$10.5 million) and for procurement of small equipment and other resiliency improvements (\$1.2 million).

In addition to the items noted above, the MBTA is planning on allocating an estimated \$20 million for resiliency enhancements to the commuter rail network. As those projects are defined, additional information will be released on that portion of the program.

SOURCES AND USES OF FUNDS

This document is specific to the MBTA, but it is closely tied to the Capital Investment Program of the Massachusetts Department of Transportation (MassDOT). The Commonwealth has committed capital funding to a number of large, high-priority MBTA investments, including the extension of the Green Line to Somerville and Medford and the purchase of new Red and Orange Line cars. Those funds – \$342 million in FY2016 – flow through MassDOT to the MBTA via project-specific contracts. The \$342 million included in this plan is \$54 million lower than the amount shown in the MassDOT CIP. The \$54 million represents specific projects (e.g., upgrades to Forest Hills Station, undertaken as part of the Casey Arborway project) that are only included in the MassDOT CIP. The following diagram represents the connection between the MassDOT and MBTA capital plans.



The MBTA has programmed \$1.05 billion for the FY16 Capital Investment Program (CIP) and intends to ensure that this entire amount is spent. The funding sources for the CIP can be grouped into three general categories:

- \$479 million (45.8%) in federal government funding through federal formula funds, flexed federal highway funds, small starts, new starts, the Department of Homeland Security, and ARRA (the American Recovery and Reinvestment Act)

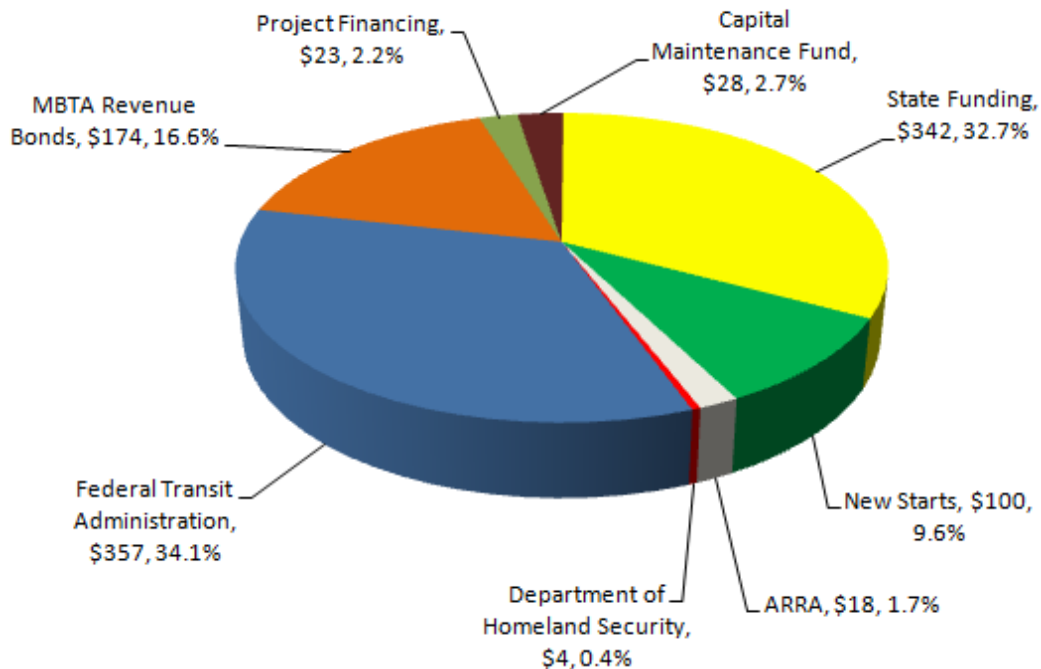
SOURCES AND USES OF FUNDS

- \$225 million (21.6%) in bonds supported by MBTA revenues, project financing (borrowing through a federal loan program), the capital maintenance fund (cash-in-hand), and reimbursements
- \$342 million (32.7%) for Commonwealth projects authorized in legislation (the MassDOT CIP authorizes \$396 million for MBTA projects; the difference is represented by projects that the Highway Division is doing on behalf of the MBTA)

Sources of Funds

Funding Source	FY16	% of Total
Federal Sources	\$478,632,525	45.8%
Annual Apportionment	\$263,626,404	25.2%
Carryover	\$87,197,181	8.3%
Earmarks and Small Starts	\$5,818,922	0.6%
New Starts	\$100,000,000	9.6%
ARRA	\$18,155,800	1.7%
Department of Homeland Security	\$3,834,217	0.4%
MBTA Sources	\$225,476,425	21.6%
Revenue Bonds for Federal Match	\$94,699,829	9.1%
Non-Federal Revenue Bonds	\$74,107,162	7.1%
Project Financing	\$23,459,390	2.2%
Capital Maintenance Fund	\$27,900,124	2.7%
Reimbursements	\$5,309,920	0.5%
State Sources	\$341,937,500	32.7%
Commonwealth Funding	\$341,937,500	32.7%
Total Sources	\$1,046,046,449	

Draft FY16 CIP All Sources of Funds: \$1,046 million (millions \$)



SOURCES AND USES OF FUNDS

Another way of looking at sources is by funding program, which filters these broader categories into more discrete programs. For example, a portion of MBTA revenue bonds is used as the local match for federal formula funds and is part of the federal program. When using the program view of funding, the CIP sources are:

- \$573 million (54.8%) in the federal program
- \$131 million (12.5%) in the MBTA program
- \$342 (32.7%) in the Commonwealth program

The federal program can be broken down into several additional subcategories. The annual apportionment represents the MBTA's expectation of future federal funds provided as part of the Federal Transit Administration's formula funding program. Carryover funds represent previous years' apportionments for which a federal grant has been previously awarded and work is ongoing or the MBTA plans to submit grant applications. Earmarks and small starts are funding awards that the MBTA has received for specific, federally-defined projects. New starts funding represents the federal portion of the cost of the Green Line Extension. Project financing represents the MBTA's commitment to fund positive train control on the commuter rail system.

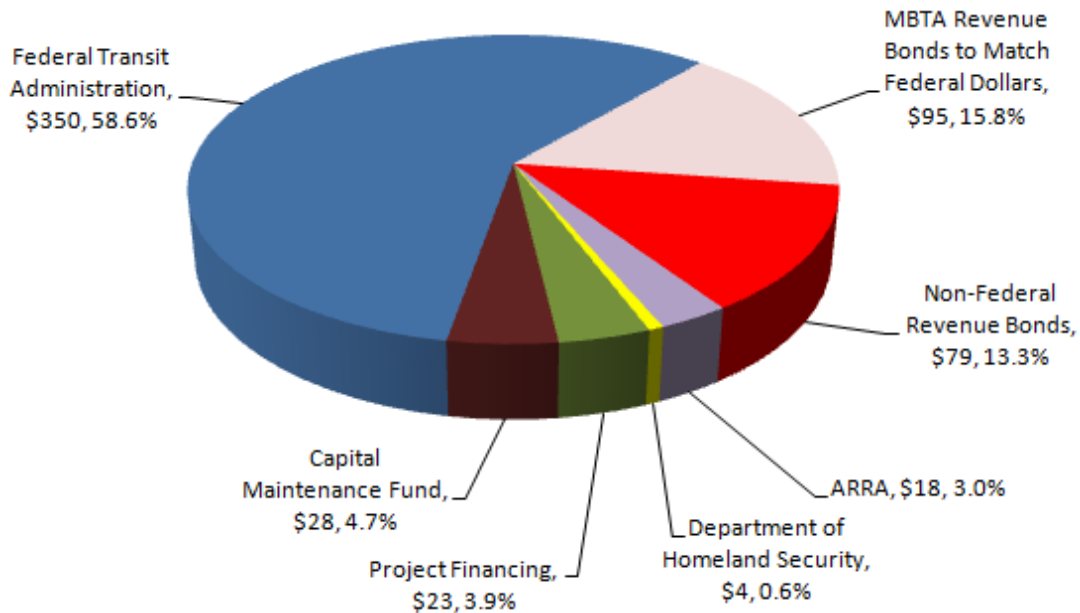
Sources of Funds – Funding Program

Funding Program	FY16	% of Total
Federal Program	\$573,332,354	54.8%
Annual Apportionment	\$329,533,005	31.5%
Federal Funds (80%)	\$263,626,404	25.2%
MBTA Match (20%)	\$65,906,601	6.3%
Carryover Funds	\$114,535,679	10.9%
Federal Funds	\$87,197,181	8.3%
MBTA Match	\$27,338,498	2.6%
Earmarks and Small Starts	\$7,273,653	0.7%
Federal Funds	\$5,818,922	0.6%
MBTA Match	\$1,454,731	0.1%
New Starts	\$100,000,000	9.6%
ARRA	\$18,155,800	1.7%
Department of Homeland Security	\$3,834,217	0.4%
MBTA Program	\$130,776,596	12.5%
Non-Federal Revenue Bonds	\$74,107,162	7.1%
Project Financing	\$23,459,390	2.2%
Capital Maintenance Fund	\$27,900,124	2.7%
Reimbursements	\$5,309,920	0.5%
State Program	\$341,937,500	32.7%
Commonwealth Funding	\$341,937,500	32.7%
Total Sources	\$1,046,046,449	

SOURCES AND USES OF FUNDS

Of the total \$1,046 million in the CIP, the MBTA's capacity to fund capital projects (\$598 million) as part of its annual selection process is composed of all non-State sources (not including the federal contribution to the Green Line Extension and federal highway funds flexed to the MBTA from the Boston Region Metropolitan Planning Organization for the construction of an additional extension of the Green Line). FTA funding makes up the largest share of this funding. When MBTA matching revenue bonds are added to FTA sources, this total for the federal program represents 74% of the MBTA's total capacity.

Draft FY16 CIP Federal and MBTA Sources of Funds: \$598 million (millions \$)



The uses of funding in the CIP can be broken down in several ways. Every project in the CIP is classified according to each of the following categories.

- **Modal Category:** Blue Line, Green Line, Orange Line, Red Line, Subway (for projects that affect multiple lines), Commuter Rail, Bus, Ferry, and Systemwide (for projects that affect multiple modes)
- **Asset Category:** Revenue Vehicles, Non-Revenue Vehicles, Track/Right-of-Way, Signals, Communications, Power, Fare Equipment, Stations, Elevators and Escalators, Parking, Facilities, Bridges, Tunnels, Technology, Enhancement (for projects that are neither replacements or overhauls of existing assets), and Expansion
- **Use Category:** State of Good Repair (SGR), Expansion, and Modernization: SGR projects represent replacements or overhauls of existing assets or address the maintenance of assets; expansion projects extend MBTA service; modernization projects do not fit under the definitions commonly used for SGR or expansion. In the coming years, as part of MAP-21 requirements, it is anticipated that FTA will help to clarify the definition of SGR.

The modal categories with the greatest projected spending are driven by selected projects. The Green Line has the largest share of CIP funding, with the vast majority of this spending devoted to the Green Line Extension. The largest projects under the Orange and Red Lines are the procurements of new vehicles for those lines, and bus overhauls and procurement make up more than half of all projected spending on the bus mode. The four largest projects under commuter rail are for the Wachusett Extension on the Fitchburg Line, Positive Train Control,

SOURCES AND USES OF FUNDS

Fitchburg Line Improvements, and South Coast Rail. Finally, various resiliency efforts represent the largest use of systemwide funding.

Use by Mode	FY16	% of Total
Blue Line	\$21,678,545	2.1%
Green Line	\$319,516,250	30.5%
Orange Line	\$89,767,426	8.6%
Red Line	\$64,879,519	6.2%
Subway	\$117,350,414	11.2%
Commuter Rail	\$222,010,708	21.2%
Bus	\$68,487,731	6.5%
Ferry	\$3,692,143	0.4%
Systemwide	\$138,663,713	13.3%
Total	\$1,046,046,449	

These same projects drive the relative projected spending levels by asset category. Revenue vehicles receive the largest share of CIP funding for any asset category; this reflects the procurement of new buses and Orange and Red Line vehicles. Projected spending on expansion reflects the Green Line Extension, the Wachusett Extension on the Fitchburg Line, and South Coast Rail. Positive Train Control makes up the majority of spending on enhancement.

Use by Asset Category	FY16	% of Total
Revenue Vehicles	\$214,432,725	20.5%
Non-Revenue Vehicles	\$11,469,722	1.1%
Track/Right-of-Way	\$55,058,565	5.3%
Signals	\$54,642,300	5.2%
Communications	\$9,873,724	0.9%
Power	\$46,655,857	4.5%
Fare Equipment	\$5,549,140	0.5%
Stations	\$59,894,468	5.7%
Elevators and Escalators	\$26,563,400	2.5%
Parking	\$18,058,210	1.7%
Facilities	\$43,911,077	4.2%
Bridges	\$54,580,006	5.2%
Tunnels	\$3,861,477	0.4%
Technology	\$14,257,620	1.4%
Enhancement	\$104,949,299	10.0%
Expansion	\$322,288,860	30.8%
Total	\$1,046,046,449	

Spending on expansion projects represents 30.8% of the total CIP. Expansion spending is driven largely by the Green Line Extension, along with the South Coast Rail project and the Wachusett Extension of the Fitchburg Line. The largest percentage of spending by use is for SGR projects. These include the procurement of new vehicles on the subway, commuter rail, and bus modes, the improvements to Government Center Station, and programs for various asset categories. The remaining uses are programmed for modernization projects – i.e. those that are neither SGR nor expansion. This includes Homeland Security funds, planning studies,

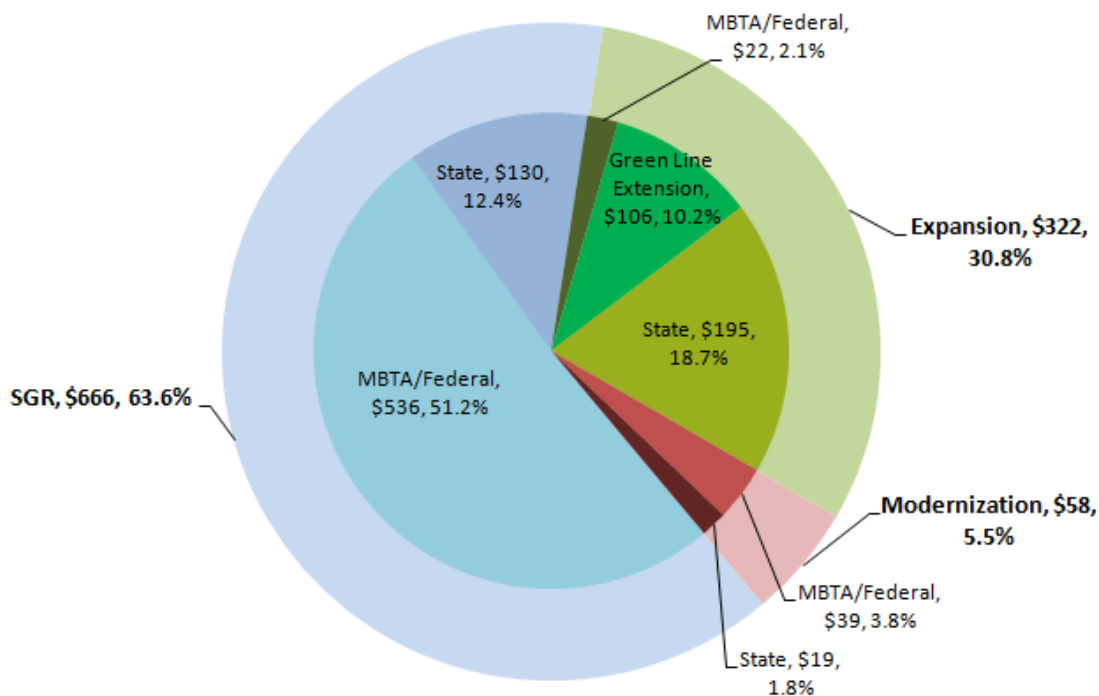
SOURCES AND USES OF FUNDS

and improvements to capital assets beyond ensuring their baseline state of good repair. The largest modernization project is Positive Train Control.

SGR vs. Expansion Total	FY16	% of Total
State of Good Repair (SGR)	\$665,725,352	63.6%
Expansion	\$322,288,860	30.8%
Modernization	\$58,032,238	5.5%
Total	\$1,046,046,449	

Uses (SGR, expansion, and modernization) can be further broken down by the source of funding (State and MBTA/Federal). The following chart shows, for example, that out of all SGR spending (\$665 million), the MBTA and Federal programs contribute \$536 million and the State program contributes \$130 million. For expansion, the MBTA is using only \$22 million of its own capacity while the State program is contributing \$195 million as well as driving the \$100 million in New Starts funding for the Green Line Extension and \$8 million in federal highway funding (20% assumed match by the Commonwealth) flexed from the Boston Metropolitan Planning Organization to the MBTA to plan an additional extension of the Green Line to Route 16.

Uses of Funds by Source (millions \$)



When considering only the MBTA's capacity to fund projects (i.e. excluding all State sources and funding for the Green Line Extension), the MBTA is using only 3.7% of sources under its control for expansion while 89.7% is programmed for SGR projects. The remaining uses are programmed for modernization projects.

SGR vs. Expansion MBTA-Only	FY16	% of Total
State of Good Repair (SGR)	\$536,173,586	89.7%
Expansion	\$22,157,650	3.7%
Modernization	\$39,377,714	6.6%
Total	\$597,708,950	

SOURCES AND USES OF FUNDS

State funding is broken down into three categories: state of good repair (SGR), expansion, and modernization. There is \$396 million in the MassDOT CIP authorized for the MBTA, which includes projects (e.g. upgrades to Forest Hills Station as part of the Casey Overpass project, South Coast Rail Bridges) that the Highway Division is doing on behalf of the MBTA but are not represented in the MBTA CIP. Please see the MassDOT CIP for information on these projects.

State of Good Repair

Legislation enacted in 2013 by the Commonwealth identifies several priorities that will affect the state of good repair at the MBTA over the next 10 years. These projects replace or overhaul vehicles, fund critical upgrades and improvements to decades-old infrastructure, and fund the development and piloting of innovative programs to provide better, faster, cleaner, and more efficient public transit. Together, these projects total \$140 million in State funds in the FY16 CIP.

Expansion

The 2013 legislation also highlighted several high priority "Mega" projects that involve the expansion of the current MBTA system. Several of these projects have received partial funding from non-MBTA sources as part of the CIP. The commuter rail expansion to New Bedford and Fall River (South Coast Rail) had received state and federal funding authorization for design and engineering activities, and the Green Line Extension had received state and federal commitments to fund construction. The provision of non-MBTA funds from the Commonwealth will permit the implementation of these projects. Together, these projects total \$194 million in State funds in the FY16 CIP.

Modernization

Several projects funded by the Commonwealth provide for new assets (parking garages at the Beverly and Salem commuter rail stations and upgrades to stations along the Fairmount Line). As these projects are therefore not "SGR" because they do not replace existing assets, nor do they fall under expansion, they are classified as modernization. Together, these projects total \$8 million in State funds in the FY16 CIP.

State FY16 Funding (\$ in millions)

Project	State CIP Funding
Commonwealth Avenue over I-90	\$1.00
Energy Conservation Program	\$11.50
Green Line Real-Time Tracking System*	\$7.41
Map Replacement	\$0.90
Orange Line Infrastructure	\$15.75
Orange Line Vehicle Procurement	\$64.23
Red Line Bridges	\$4.80
Red Line Infrastructure*	\$7.07
Red Line Vehicle Procurement	\$15.00
Trackless Trolley Temporary Replacement	\$0.19
Worcester Line Improvements*	\$12.15
Total State of Good Repair	\$140.00
Green Line Extension*	\$151.79
Green Line Extension - Mitigation Costs	\$12.76
Green Line Extension to Route 16	\$1.70
DMU Study	\$0.30
Fitchburg Line - Wachusett Extension*	\$5.41
Knowledge Corridor - HSIPR	\$3.90
South Coast Rail*	\$16.13
South Station Postal Site Acquisition	\$0.66
Silver Line to Chelsea	\$1.09
Total Expansion	\$193.73
Beverly Parking Garage*	\$0.60
Fairmount Line Improvements - Phase II	\$0.45
Salem Parking Garage*	\$7.16
Total Modernization	\$8.20
Total All Statewide Projects	\$341.94

** These projects receive funding from sources in addition to the Commonwealth. Non-State funding sources include federal funds, revenue bonds, and local contributions.*

SOURCES AND USES OF FUNDS

The capital investment plan is a “living” document. The delivery of expanded subway services, improvements to facilities, stations and power systems or the building of new subway cars takes careful coordination between dozens of public agencies and private stakeholders over the course of several fiscal years. The spending or “use” projections included in this capital plan are aggressive and will likely change based on a number of issues within and outside of the control of the MBTA, including environmental permitting and approvals, design considerations, public input, construction conditions, contract negotiations, weather and the timing of federal and state appropriations. For this reason, estimated spending on individual projects will change annually as resources are aligned to updated project schedules and delivery estimates.

CIP PROJECTS BY ASSET CATEGORY

For the purposes of the Capital Investment Program, funding in this section is organized by asset category. The following is an explanation of the categories used in this section to assist in understanding the CIP.

- **Revenue Vehicles:** All fleets of trains, buses, ferries, and other vehicles used for passenger service
- **Non-Revenue Vehicles:** Fleets of vehicles not used for passenger service as well as work equipment
- **Track/Right-of-Way:** Steel rails of track, rock or dirt ballast that act as the flat foundation for the track, and concrete or timber ties running perpendicular to the rails as well as assets that protect the right-of-way such as retaining walls and fencing
- **Signals:** Controls to maintain efficient and safe train separation, including alternating circuits, audio frequency track circuits, relays, processors, wayside cases and bungalows, train approach lights, switches, trip stops, and heaters
- **Communications:** All telecommunications equipment, the Wide Area Network, two-way radio systems, microwave links, emergency intercoms, public address systems, closed circuit television systems, Hub Monitoring and Control System, Supervisory Control and Data Acquisition System, and the Operations Control Center
- **Power:** Cables, substations, circuit breakers, switchboards, switch heaters, manholes, and ductile, as well as the catenary systems used on the Green and Blue Lines and the trackless trolley system
- **Fare Equipment:** All fare-collection equipment, including fare vending machines, faregates, fare validators, fareboxes, and retail sales terminals, as well as CharlieCard and CharlieTicket fare media and the facilities and equipment needed for revenue collection
- **Stations:** All building systems and structural components except those included in other asset categories of heavy rail, light rail, commuter rail, ferry, Silver Line, and bus stations as well as all assets at bus stops, including shelters
- **Elevators and Escalators:** All vertical transportation assets
- **Parking:** All parking lots and garages
- **Facilities:** All building systems and structural components except those included in other asset categories in non-station buildings, including administrative buildings, operators' lobbies, vent buildings, storage buildings, layover facilities, and maintenance buildings, as well as any maintenance equipment housed inside a facility
- **Bridges:** All MBTA-owned bridges, including bridges used for railroad, transit, highway, pedestrian, and freight
- **Tunnels:** All tunnels on the core subway system and the commuter rail network, including tunnel walls and ceilings, signage, dewatering equipment, ventilation systems, and electric and lighting systems
- **Technology:** All technology solutions deployed throughout the MBTA, including systems for maintenance control reporting, automated fare collection, Hub Station management, human resources, and accounting and budgeting, as well as for the MBTA website, the wide area network, and the Operations Control Center

CIP FUNDING BY ASSET CATEGORY

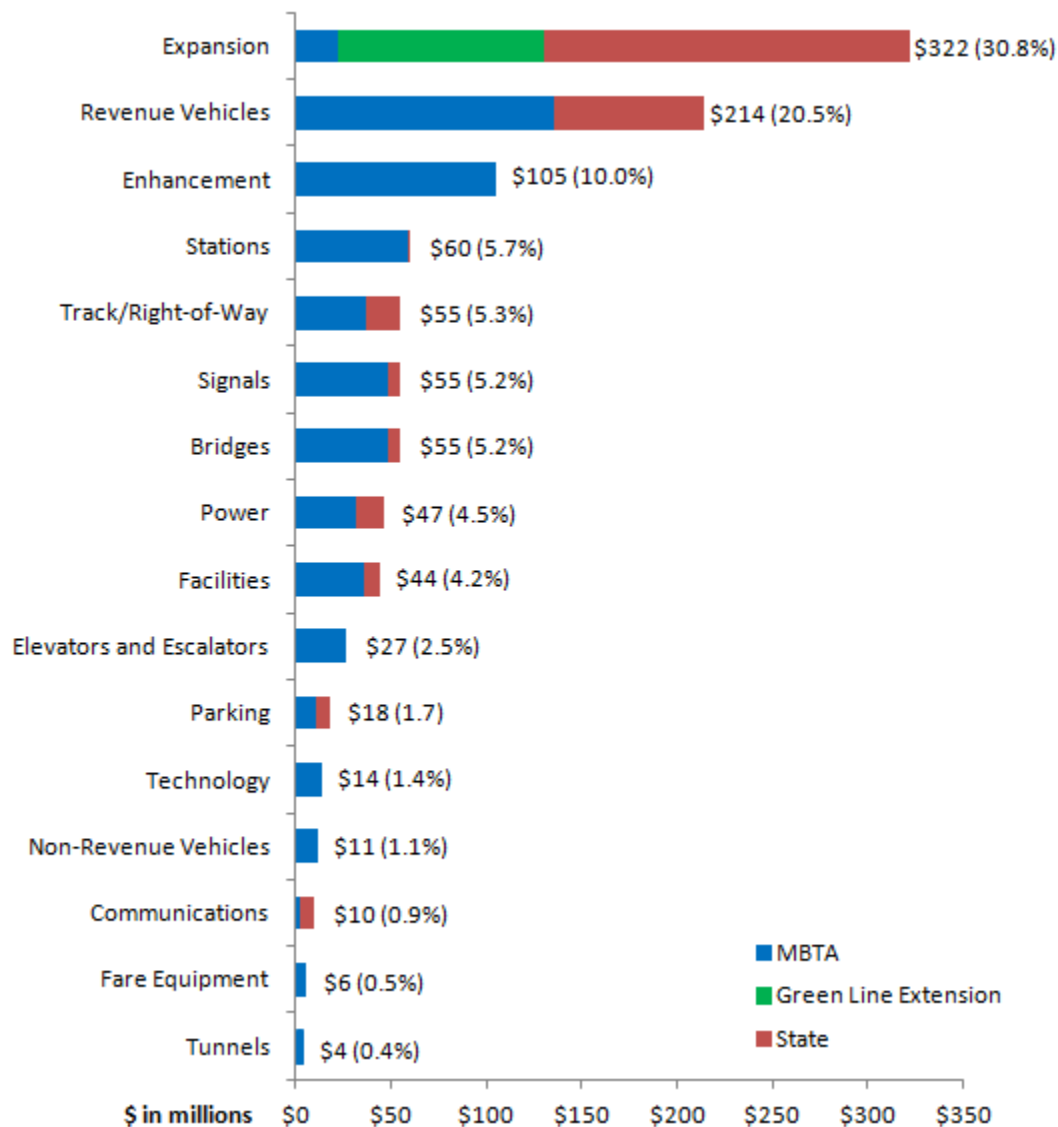
For the purposes of the CIP, projects that cannot be easily classified by a specific asset category are included under the following two categories.

- **Enhancement:** Investments to improve the existing system, aside from asset replacements or upgrades; this includes projects related to security, real estate, and planning studies as well as financial transactions and general funding sources for engineering studies, reimbursements, and miscellaneous capital projects and closeout costs
- **Expansion:** Investments to expand the existing system, including all assets needed for the expansion

It is important to note that some capital projects affect multiple assets. In the CIP, the funding for these projects is “split” into the various asset categories. In these cases, the project will appear in multiple asset categories.

The following chart shows funding in the FY16 Capital Investment Program summarized by the asset categories described above.

MBTA CIP Funding by Asset (\$ in millions, % of total CIP)



The following summaries describe the projects that are included in this FY16 CIP. Spending on many of these projects will continue beyond FY16. Please see the appendix for projections of spending in FY16 and beyond by project.

REVENUE VEHICLES

SUBWAY

Blue Line No. 5 Car Procurement

This project funds the procurement of 94 new Blue Line cars, allowing for six-car train service and increased capacity on the Blue Line. This procurement increased the overall size of the Blue Line fleet and has resulted in better service, passenger comfort, and reliability.

Reliability-Centered Maintenance (RCM) Pilot

This project identifies various maintenance tasks to support the long-term reliability of the Blue Line No. 5 fleet.

Green Line No. 7 Car Selective Systems Overhaul

This project encompasses a number of component repair and replacement efforts for the Green Line No. 7 fleet. The scope includes replacing and adjusting the obstruction-sensing system on the car doors, modifying the wheel profile to minimize wear on the track, upgrading and repairing the coupler support rods and spherical bearings, reengineering and upgrading the brake actuators, and replacing vehicle roofs. This project is an expansion of the No. 7 fleet modification program.

Green Line No. 8 Car Reliability Improvements Program

This project funds the upgrade of various components of the low-floor Green Line (No. 8) cars.

Orange Line Cars Reinvestment

This project funds the overhaul of the suspension system and the replacement of the propulsion cam controllers for the entire Orange Line fleet. This will ensure continued vehicle reliability and allow the vehicles to reach their full service life.

Orange Line Vehicle Procurement

This project funds the procurement of subway vehicles to replace the entire Orange Line fleet, as well as improvements to tracks, signals, and systems.

Red Line No. 1 Car Reinvestment

This project performs a component exchange on the Red Line No. 1 cars to ensure continued vehicle reliability and to extend vehicle service life.

Red Line No. 2 Car Selective Systems Overhaul

The purpose of this project is to perform a full midlife overhaul of the No. 2 vehicles. This program maintains major systems in a state of good repair and ensures the vehicle fulfills its useful life.

Red Line No. 3 Car Upgrade

This project funds the procurement, removal, and reinstallation of lithium batteries, including the replacement of the controller circuit cards and related software. In addition, the project replaces the monitoring terminal units (MTUs) in control cars. The main objective of this project is to ensure the reliability of the No. 3 vehicle fleet.

Red Line Vehicle Procurement

This project funds the procurement of subway vehicles to replace the Red Line No. 1 fleet, as well as improvements to tracks, signals, and systems.

CIP FUNDING BY ASSET CATEGORY

Red Line #1 and Orange Line #12 Preventive Maintenance

The Red Line #1 fleet currently contains 72 cars or 30% of the entire fleet. Built in 1969, and overhauled in 1986, they average 2.1 million miles of service incurred and will continue to be in service for the foreseeable future. Meanwhile, the Orange Line #12 fleet consists of all 120 Orange Line Cars. These cars were built in 1979 and average 1.5 million miles of service and have never undergone a midlife overhaul. Both fleets currently suffer from rapidly deteriorating conditions, resulting in decreasing reliability and increased failures. Maintenance is on-going for both fleets to keep them operational, the costs for which continue to escalate as more and more components become obsolete.

Various Subway Vehicles Projects

These efforts fund the procurement of various equipment, including wheels, gear units, and spin slide control boxes, as well as the overhaul and repair of various vehicle systems.

COMMUTER RAIL

Coach Overhaul – Kawasaki (75 units)

This project funds the full midlife overhaul of 75 bi-level Kawasaki coaches acquired in 1990-91. The overhaul work includes replacing and reconditioning trucks, couplers, HVAC system, electrical system, batteries and battery chargers, some interior fixtures and safety-emergency equipment.

Coach Procurement – Hyundai Rotem (75 units)

This project funds the procurement of 75 bi-level coaches. This project will allow the Authority to retire a portion of the coach fleet while increasing commuter rail passenger capacity.

Commuter Rail Various Upgrades

This project funds the procurement and/or rehabilitation of commuter rail locomotives and coaches, including top-deck and midlife overhaul work and other upgrades to vehicles.

Locomotive and Coach Reliability and Safety Program (CRASP)

This project funds the overhaul of key components of the locomotive and coach fleet. Included in this overhaul program are important safety components such as trucks, brakes, couplers, and gears, in addition to others such as air conditioning systems and toilets. The program encompasses approximately 270 coaches of the coach fleet.

Locomotive Procurement

This project funds the procurement of 42 locomotives, which will replace portions of the existing fleet while reducing emissions.

Top Deck Overhaul of (25) Locomotives

This effort funds the overhaul of 25 GP40-MC locomotives. Work consists of replacing rotating equipment such as power assemblies, turbochargers, camshafts, fuel injectors, pump compressors and fans. The completion of this overhaul will improve the service reliability of these units, help maintain on-time performance standards, and increase operating efficiency by reducing the number of failures.

BUS

Bus Overhaul Program

This is ongoing funding designed to ensure that the scheduled overhaul of buses is completed.

Bus Procurement

This project supports the procurement of 369 new buses. The base contract includes a combination of hybrid and CNG buses.

☑ Bus Systems Improvements

This effort includes a number of projects aimed at improving bus operational efficiency including the CNG fuel efficiency project and the “No Start” Failure in Service reduction effort.

☑ RIDE Vehicle Program

This project provides funding for 108 vans for The RIDE, the Authority’s demand-response ADA paratransit program, by procuring the vehicles through an existing MassDOT contract. This helps the MBTA to achieve its goal to increase the level of MBTA-owned vehicles, thus reducing annual operating costs associated with operator-owned vehicles.

☑ Trackless Trolley Temporary Replacement

This project funds the temporary replacement of trackless trolleys with diesel buses along Trapelo Road and Belmont Street.

FERRY**☑ Boat Engine Overhaul Program**

This project funds the overhaul and upgrade of 10 ferry engines for two vessels.

☑ Catamarans for Ferry Service

This project funds the procurement of two high-speed catamarans for MBTA Harbor Express serving Hull, Hingham, Boston and Logan Airport.

NON-REVENUE VEHICLES**☑ Snow Fighting Equipment**

This project funds the replacement of aging snow-fighting equipment.

☑ Systemwide NRV Program

Based on a comprehensive fleet plan that prioritizes future ongoing replacement needs for all modes, this project provides funding for the procurement of non-revenue vehicles and equipment.

TRACK/RIGHT-OF-WAY**SUBWAY****☑ Orange Line Infrastructure**

This project represents the design and construction costs for Orange Line track infrastructure improvements in advance of the arrival of new Orange Line vehicles. It includes track work on the following projects: (1) Wellington Carhouse Expansion and Improvements, (2) Wellington Yard renovation of tracks 33-38, (3) Wellington Yard renewal.

☑ Red Line Infrastructure

This project represents the design and construction costs for Red Line track infrastructure improvements in advance of the arrival of new Red Line vehicles. It includes track work on the following projects: (1) Cabot Carhouse Improvements, (2) Cabot Test Track, (3) Cabot Yard renewal.

☑ Systemwide Track Upgrades

This project funds the replacement of mechanical switches and track segments.

COMMUTER RAIL

Commuter Rail Track Upgrades

This project funds general upgrades to various commuter rail track systems.

Fitchburg Line Double Tracking and Interlocking

This project funds Fitchburg interlocking work, which will provide improved reliability and on-time performance for the line, and double tracking between West Acton and Ayer, including at Littleton Station.

Fitchburg Line Improvements

This project funds key track improvements along the Fitchburg Line.

Haverhill Double Tracking

This project provides double tracking segments on the Haverhill Line (about 6 miles, from Andover to Lawrence). The project also includes signal improvements and new interlockings.

Worcester Line Improvements

This project funds track improvements on the Worcester Line between Boston and Worcester.

SIGNALS

SUBWAY

Green Line Central Tunnel 25-Cycle Signal System

This project includes the complete replacement of all 25-cycle track circuit equipment from Auditorium to Haymarket on the Green Line. Completed field locations will be tied to the Operations Control Center to allow for enhanced supervisory control over the central tunnel area of the Green Line.

Green Line Signals

This effort provides improved signalization at a number of locations along the Green Line.

Orange Line Infrastructure

This project represents the design and construction costs for Orange Line infrastructure improvements in advance of the arrival of new Orange Line vehicles. It includes signal work on the following projects: (1) Wellington Yard renewal including track, signals and power, (4) Wellington test track third rail heater installation, (2) Orange Line systemwide DC feeder cable and return cable replacements, (3) Orange Line SWC interlocking AFTC circuit replacements, (3) Orange Line safe braking and block spacing study.

Red Line Infrastructure

This project represents the design and construction costs for Red Line infrastructure improvements in advance of the arrival of new Red Line vehicles. It includes signal work on the following projects: (1) Red Line systemwide DC feeder cable and return cable replacements, (2) Red Line safe braking and block spacing study.

Red Line Signal Cable Replacement

This effort will fund the replacement of signal cables on various segments along the Red Line network.

Red Line Signals - Columbia Junction

This project funds the installation of new switches, cables and track modules, which will increase service reliability at this critical junction on the Red Line.

☑ Systemwide Signal Upgrades

This project represents funding that has been set aside to address subway signal infrastructure needs. The project will maintain and replace third rail heaters, signal lights, track circuitry, and cable plant across the subway system.

COMMUTER RAIL**☑ Fitchburg Line Improvements**

This project funds key signal improvements along the Fitchburg Line.

☑ Signal System Upgrades

This project funds various upgrades to the commuter rail signal system, including between Reading Junction and Fells and on the Lowell Line.

☑ Worcester Line Improvements

This project includes signal improvements on the Worcester Line between Boston and Worcester.

COMMUNICATIONS**SUBWAY****☑ Green Line Real-Time Tracking System**

Project covers both a consolidated real-time prediction and alerts system and a full Computer-Aided Design and Automatic Vehicle Location (CAD/AVL) system for the Green Line.

☑ Public Announcement System/Light-Emitting Diode Station Sign

This project funds the installation of new public address equipment and fiber optic links for all subway stations. Existing voice storage units and control systems were upgraded or replaced. This project encompassed the installation of automatic light-emitting diode (LED) signage on the station platforms and in the lobby areas of subway stations. These signs, through a new connection to head-end equipment at the operations control center, provide customers with notices of delays and train arrival information.

COMMUTER RAIL**☑ Narrow Band Conversion**

As mandated by the Association of American Railroads (AAR), the MBTA is upgrading its radios to the new 12.5KHz channels.

☑ Worcester Line Improvements

This project includes communications improvements on the Worcester Line between Boston and Worcester.

SYSTEMWIDE**☑ Systemwide Communications Enhancements**

This major project seeks to expand and overhaul the entire existing radio system and to replace the tunnel antenna system. The project deploys an upgraded digital system, taking advantage of 20 channels licensed by the Federal Communications Commission.

POWER

SUBWAY

Green Line Power Study

The project funds a study of power needs and capacity on the Green Line based on use of the No. 8 car.

Highland Branch AC Cable Replacement

This project funds the replacement of power cables along the Highland Branch as part of the track upgrade project.

Orange Line DC Cable Upgrade Ph 1 Back Bay – North Station

This effort funds the replacement of 110,000 feet of 600V DC cables from Back Bay Station to North Station.

Orange Line Infrastructure

This project, part of the State's commitment for the procurement of new Red and Orange Line vehicles, represents the design and construction costs for Orange Line power infrastructure improvements in advance of the arrival of new Orange Line vehicles. It includes power work on the following projects: (1) Wellington Yard renewal, (2) Wellington test track third rail heater installation.

Orange Line Power Infrastructure Improvements

This program provides funding for various power projects and other infrastructure work, necessary for the operation of the next generation Orange Line vehicles.

Orange Line Traction Power Upgrade

This project entails major refurbishment of AC and DC traction power equipment in four substations that supply power to the Orange Line north of Haymarket Station.

Red Line DC Cable Upgrade - Phase 1 [Andrew-Kendall]

This project funds the replacement of 110,000 feet of 600V DC cables from Andrew Square Station to Kendall Station.

Red Line Infrastructure

This project represents the design and construction costs for Red Line infrastructure improvements in advance of the arrival of new Red Line vehicles. It includes power work on the following projects: (1) Cabot Yard renewal, (4) Red Line systemwide DC feeder cable and return cable replacements.

Red Line Traction Power Upgrade

The project involves a complete refurbishment of five traction power substations on the Red Line: Columbia, Tenean, Wollaston, North Quincy, and Quincy Center. In addition, the project replaces two open-faced/elevated DC breakers on the Red Line. This will improve safety for MBTA personnel and service reliability for passengers.

Energy Conservation Program

This project consists of three elements: 3rd rail heaters, switch heaters, and installation of low wattage heating elements. The 3rd rail and switch heaters allow for remote control of the units so that they are turned on only in advance of a winter storm (as opposed to being on all winter) while the low wattage heating elements reduce the electricity amount needed at each individual unit.

Power Program

This project funds the overhaul of the jet engines at the South Boston power generation plant and other critical components.

☑ Transformer Replacement Program - Phases 2-4 (All modes)

This project includes the rehabilitation or replacement of traction power substations throughout the system (except for those along the Orange Line), which have exceeded their useful life.

☑ Unit Substation Upgrades

This program includes upgrades to unit substations in the Red Line (Alewife to Harvard) and the Green Line.

COMMUTER RAIL

☑ Commuter Rail Power Upgrades

This project will design and construct a shore power facility along the commuter rail tracks at Yard 61. This facility will serve trains that run to and from South Station. The project scope of work will include the installation of: a primary supply circuit from the local utility, distribution switchgear, and branch circuits to six 600 amp ground power plugs. The service will be capable of powering four nine-car consists and two six car consists.

☑ Rockport Station Layover Power Upgrade

The project includes a new electrical substation, underground electrical transmission duct banks, new power packs (APU's) at the locomotives, trench and lot restoration.

BUS

☑ Trackless Trolley Overhead Replacement

This effort funds the complete rebuilding of the Authority's Trackless Trolley Overhead System (OCS). Most of the work needed will take place in Cambridge, Watertown, and Belmont.

SYSTEMWIDE

☑ Energy Management System

The project involves the preparation of environmental remediation response documents and design remediation for oil and/or hazardous waste releases throughout the Authority, and provides environmental consulting services to audit and fix non-compliant matters.

FARE EQUIPMENT

☑ AFC Equipment Overhaul

The midlife overhaul upgrades many of the electronic components and other essential moving parts of the fare vending machines, fare media validators, ticket office machines, fare gates (partial) and retail sales terminals to keep the equipment available to meet revenue collection goals.

☑ Station Management Program - Phase I

The Station Management Program funds the procurement and installation of new fare equipment, and fiber optic network.

STATIONS

SUBWAY

Blue Line Station Modernization

This project has provided funding for the modernization of Airport, Maverick, Orient Heights, and State Street Stations to facilitate 6-car trains along lengthened platforms, among other improvements. Most of the remaining funding is being used to renovate the Blue Line section of Government Center Station by lengthening the platforms, rebuilding the existing headhouse with a new glass and steel structure, and constructing a new entrance and headhouse on City Hall Plaza. This renovation is being done in conjunction with accessibility-related work.

Light Rail Accessibility Project (LRAP):

LRAP - Boston College Station

This project makes accessibility modifications and improvements to conform to ADA guidelines and will include relocating the station to the median of Commonwealth Avenue, constructing two new raised platforms, and installing shelters, lighting, tactile edging, and pedestrian crossings.

LRAP - Commonwealth Ave Stations Access Improvements

This project funds various access improvements to Commonwealth Avenue Stations.

LRAP - Government Center Station

Modifications for this station include a new headhouse on City Hall Plaza, new raised platforms, a new electrical substation, the installation of a new elevator, LED signage and accessible fare collection equipment, and lighting and other station finishes. This project is in design phases, and will be coordinated with the Blue Line modernization efforts also taking place at that station.

LRAP - Kenmore Station

This project funds the close-out of the following efforts: elevator and escalator installation, platform raising, landscaping, street lighting, a new MBTA bus canopy and a kiosk entrance.

LRAP - Surface Stations

This effort represents the close-out of a number of accessibility improvements to surface stations along the Green Line.

Science Park Accessibility

This project funds the close-out of design and accessibility upgrades for Science Park Station.

Assembly Square Station

In 2014, the MBTA completed a new Orange Line station at Assembly Square. The remaining costs are for the close-out of this project.

Wollaston Accessibility and Drainage

This project funds the design of accessibility and drainage improvements for Wollaston Station.

Drainage Improvements

This project funds the remediation of leaks along the north wall of the Old South Meeting House caused by construction of an entrance to the State Street Station. It provides funding to fix leaks at Haymarket Station.

☑ Station Platform Improvement Program

This project funds repairs and upgrades to platforms at various subway stations, including, but not limited to, the replacement of yellow tactile strips at Oak Grove Station.

☑ Station Rehabilitation

This effort provides new lighting, painting, signage, Customer Service Agent booth repairs, and other similar elements systemwide at various heavy rail, light rail, and bus stations. This project will enhance the comfort and convenience of MBTA stations for passengers.

☑ Wayfinding - Back Bay Station

This effort provides new lighting, painting, signage, Customer Service Agent booth repairs, and other similar elements systemwide at Back Bay Station. This project will enhance the comfort and convenience for passengers.

COMMUTER RAIL**☑ Auburndale Station Accessibility - Design**

This project funds the design of accessibility improvements at Auburndale Station.

☑ Commuter Rail Accessibility Program

The effort includes funding for the design and study of accessibility improvements at various locations.

☑ Fairmount Line Improvements - Phase II

This project consists of constructing a new Commuter Rail Station along the Fairmont Line in the Mattapan neighborhood of Boston, in an area between Blue Hill Avenue (Rte. 28) and Cummins Highway.

☑ Fitchburg Line Improvements

This project funds key station improvements along the Fitchburg Line.

☑ Mansfield Station Accessibility

This project implements several accessibility improvements to the Mansfield commuter rail station.

☑ Rockport Station Improvements

This project provides funding for preliminary design work for a future rehabilitation and accessibility upgrade of the Rockport commuter rail station and layover facility.

☑ Ruggles Station Upgrades

This project addresses longstanding commuter rail capacity needs at Ruggles Station by adding an additional platform. This will allow a greater number of inbound trains to stop at the station.

☑ Sharon Station Accessibility - Design

This project funds the design of accessibility improvements at Sharon Station.

☑ Station Upgrades

This project entails the upgrade and renovation of commuter rail stations.

☑ Wedgemere Station Accessibility

This project funds the close-out of an effort to improve accessibility at this commuter rail station.

☑ Winchester Center Station Accessibility - Design

This project funds the design of accessibility improvements at Winchester Center Station.

CIP FUNDING BY ASSET CATEGORY

BUS

Bus Stations Improvements

This effort funds improvements to enhance customer service at heavily used bus stations.

Bus Stop and Route 23 Customer Enhancements

This project funds bus stop amenities (e.g., shelters, benches, signage, pavement markings, ADA improvements) and improvements.

FERRY

Ferry System Improvements

This project funds a variety of efforts aimed at improving ferry services including, but not limited to, docking facility refurbishment at Hull and Boston.

Hingham Boat Terminal Improvements

This project funds various improvements to the Hingham Boat Terminal, including dock repairs.

Hingham Marine Intermodal Center

This project funds infrastructure improvements, such as lighting, to the Hingham Shipyard. This project is funded with federal funds and a local match provided by the project sponsor.

SYSTEMWIDE

Back Bay Station

This project funds improvements in ventilation and air quality within the lobby area of Back Bay Station (e.g., roof units, fans, door systems).

Map Replacement

This project funds the replacement of over 1,200 maps located in stations and another 9,500 located in vehicles.

Plan for Accessible Transit Infrastructure (PATI)

The purpose of PATI is to identify all meaningful barriers to accessibility within MBTA stations and bus stops and develop a set of criteria for the prioritization of their removal. These priorities will then be used as the basis for a long-term plan for achieving accessibility investments.

Systemwide Safety and Reliability

This line item supports various system safety, reliability, and efficiency enhancements at stations throughout the Authority.

Wayfinding Program

This project provides funds to design, fabricate and install signage, path of travel, visual aids, and doors throughout the system to assist ADA customers and enhance overall accessibility.

ELEVATORS AND ESCALATORS

Elevator and Escalator Program

This program provides funding for the replacement/modernization of elevators and escalators throughout the system.

PARKING

SUBWAY

Revere - Wonderland Station Parking Garage

This project provides funding for the close-out of construction of a parking garage at Wonderland Station.

Alewife Garage Improvements

The Alewife parking garage project consists of concrete repairs to the parking garage, including precast concrete double tees, concrete columns, and concrete beam; repairs to damaged drain pipes; removing and replacing expansion joints; re-caulking joints; replacing damaged skylight panels; replacing scupper grates and floor plates; and performing an inspection of the existing drainage system.

South Shore Parking Garages Rehab

The project funds the design and rehabilitation of multi-level parking facilities along the South Shore Branch on the Red Line, at Braintree, Quincy Adams, and Quincy Center.

COMMUTER RAIL

Beverly Parking Garage

This effort provides parking improvements at the Beverly commuter rail station. This project is being funded with federal, state, and MBTA funds.

Lynn Parking Garage

The project entails the restoration of the Lynn Garage. The scope of work includes concrete repair throughout the garage and stairways, new expansion joints, repairing the atrium stairs, windows and tile roof and painting all metal structures throughout the garage.

Salem Parking Garage

This effort provides parking improvements at the Salem commuter rail station. This project is being funded with federal and state funds.

SYSTEMWIDE

Parking System Upgrades

This effort helps fund general parking system upgrades.

FACILITIES

SUBWAY

Green Line Infrastructure

This project funds various infrastructure improvements on the Green Line, including the installation of mezzanines at carhouses, upgraded wheel truing machines, and bench test equipment and an upgrade to the electronics room at Riverside.

Orange Line Infrastructure

This project represents the design and construction costs for Orange Line facility infrastructure improvements in advance of the arrival of new Orange Line vehicles. It includes the expansion and improvements to the Wellington carhouse.

CIP FUNDING BY ASSET CATEGORY

Cabot Maintenance Facility

The project funds various improvements to the Cabot Maintenance Facility, including PCB remediation, HVAC improvements, and the design, engineering, and replacement of rail car lifts.

Red Line Infrastructure

This project represents the design and construction costs for Red Line facility infrastructure improvements in advance of the arrival of new Red Line vehicles.

Everett Maintenance Facility

This project funds various improvements to the Everett Maintenance Facility, including wheel lathes and other shop equipment.

Subway Facility Improvements

Various facilities improvements include, but are not limited to the following: Everett Subway Building Roof Repair (the replacement of the roof at Building #2 at Everett Shops will ensure worker safety, protect recent capital investments in the facility, and ensure productivity and efficiency in heavy maintenance for all subway line), Wellington Maintenance Facility (the project involves improvements to the spray paint booth to ensure the Orange Line vehicles meet their useful life), and Cabot Maintenance Facility (the project funds the replacement of car hoists at the Cabot Maintenance Facility).

COMMUTER RAIL

Commuter Rail Facility Environmental Management

The project provides funding for the storage of vehicles and fuel at commuter rail facilities with environmentally safe policies.

Commuter Rail Maintenance Facilities Upgrades

This effort funds work for various commuter rail facility needs, including fire alarm upgrades, fan and vent installation, and environmental and safety improvements.

Facilities Equipment Replacement

This program funds the replacement and modification of various equipment at commuter rail maintenance facilities, including a jib crane, a train wash system, wheel truing machines, and fuel dispensing systems.

Readville Facility Remediation

This project funds the remediation of Readville Facility. The Authority has completed the site assessment and risk characterization. This assessment determined the level and extent of remediation that will be required for the ultimate use of the property. The majority of solid waste and the discarded railroad ties and other railroad-related equipment have been removed from the site.

Worcester Line Improvements

This project includes improvements to facilities on the Worcester Line between Boston and Worcester.

BUS

Arborway Facility

This project involves the design of a bus maintenance and storage facility at the Arborway Yard. The use of this space since 2004 has permitted the aged and undersized Bartlett garage to be shuttered.

Bus Facilities Upgrades

This project encompasses a wide range of modernization, component upgrades, CNG compliance efforts, capital maintenance, and safety improvements at the bus garages. The

program will substantially modernize these aging garages and prepare them to service the bus fleets.

☑ Charlestown Facility Improvements

This project funds a number of improvements at and surrounding the Charlestown facility.

☑ CNG Facility Retrofit

This project involves the conversion and retrofit of existing facilities (Cabot, Charlestown, and Everett) to fuel, store, and maintain CNG buses. This includes all work to construct new fueling stations, upgrade structural capacity, replace roof structures, and install all necessary sprinkler, fire, and security systems. In addition, the project equips the Everett automotive shop with new dynamometers that allow service personnel to test bus engines, transmissions, and chassis, increasing the engines' serviceability and reliability.

SYSTEMWIDE

☑ 45 High Street Building Improvements

This project funds the investigation and re-design of the fire protection and mechanical systems of 45 High Street. This effort is important due to the fragile and unreliable nature of the current fire protection systems within this 10-story facility. The systems are at or near their functional life cycle, so this is a safety critical, code compliance effort first and foremost, and it extends to also having operational benefits.

☑ Environmental Compliance Management - Systemwide

The project provides funding for the environmental program generally, as well as specific funding for environmental remediation at storage areas and a soil management program.

☑ Fuel Management Program

This program supports various initiatives to track fuel dispensing throughout the system to allow for efficient use of fuels.

☑ Groundwater Remediation

This project funds a study and potentially the remediation of groundwater issues in the City of Boston.

☑ Miller's Outfall Structure

This project involves improvements to the conduits that carry stormwater from the MBTA commuter rail rights of way and the Commuter Rail Maintenance Facility and conveys the stormwater to its discharge point at the Miller's River. Over time, the pipes were damaged and as a result, flooding on MBTA tracks and surrounding areas occurs. Major elements of the upgrades have been completed. The remaining repairs to the stormwater system are being completed under the Green Line Extension project.

☑ Operations and Maintenance Facilities Needs Evaluation

This project is intended to develop a prioritized implementation program of infrastructure improvements to MBTA system-wide Operations Support and Maintenance Facilities.

☑ Remediation Projects

This project funds various MBTA remediation projects.

☑ Systemwide Facilities Upgrades and Repairs

This project funds various upgrades and repairs for facilities systemwide, including the procurement and installation of a 25-ton air conditioning unit for the 7th floor operations at 45 High Street due to increased failure rates of the building's HVAC system and the installation of 6-to-8 valves and related piping to main-chilled water heaters at 45 High Street.

CIP FUNDING BY ASSET CATEGORY

Systemwide Fire Suppression Systems

This effort will encompass a number of efforts to improve safety throughout the system's facilities, including the installation of fire-alarm and sprinkler systems.

Underground and Aboveground Storage Tank Program (Systemwide)

The goal of this program is to audit the existing fluids storage and delivery systems, assess the existing infrastructure across the concentration of underground storage tanks (UST), above ground storage tanks (AST) and their associated fluid delivery systems and sub-systems for current state of repair leading to identifying deficiencies in operational readiness, efficiencies, and regulatory compliance. Once audited and assessed, the MBTA will then establish a comprehensive plan of continuous improvement, including but not limited to repairs, improvements and replacements, to obtain and maintain a state of good repair of all considered systems.

BRIDGES

SUBWAY

Red Line Bridges

This project addresses three bridges. The Clayton Street Bridge is on the Red Line in Dorchester and the scope of work includes the rehabilitation of the existing substructure and the replacement of the entire superstructure. The Savin Hill Overpass consists of a structure on the Red Line that passes over a dead-end spur which is out of service and discontinued. The work consists of stabilizing the overpass by constructing walls to seal the tunnel section below and filling the void with concrete. The Longfellow Approach is an eleven-span structure that carries the Red Line over the Charles Circle Roadways and connects to the Longfellow Bridge. The scope of work includes the design of the replacement of all the concrete decks and the repair of selected structural steel members.

COMMUTER RAIL

Amtrak Corridor Spandrel Beam

This project funds the repair of structural cracks on the spandrel beam on the Amtrak corridor.

Beverly Drawbridge Rehab

This project funds two Beverly Drawbridge Contracts. The first contract funds concrete pile repair and approach work and the second contract funds the replacement of the bridge superstructure.

Commonwealth Avenue over I-90

MassDOT plans to reconstruct the bridge carrying Commonwealth Avenue over Interstate 90 and the Worcester/Framingham Commuter Rail Line. This funding is relative to a utility force account agreement between MassDOT and the MBTA.

Commuter Rail Bridges

This project funds the design and remediation of selected commuter rail bridges.

Concord, Main St Bridge

This project funds the reconstruction and repair of the bridge that carries the Fitchburg Line commuter rail trains over Route 62 in Concord.

☑ Gloucester Drawbridge

This project funds a complete replacement of the bridge superstructure, the east approach timber trestle, and the relocation of the control tower from the west side to the east side to optimize routine maintenance operations. The scope also includes complete replacement of the electrical and the mechanical components.

☑ LaGrange Street Bridge Reconstruction

This project involves the replacement of the existing steel superstructure, lowering of the roadway, installation of new sidewalks and curb cuts on LaGrange Street, and masonry cleaning and restoration of the existing abutments. This work contributes to raising the vertical clearance of the bridge from the existing dimension of 13'4" to a height of 14'. Work also includes the temporary relocation of signal and conduits on the bridge before being placed on to the new structure. It is anticipated that replacement of the superstructure will occur over a long weekend. A temporary extension of the existing pier will be constructed as a staging area for the new superstructure before it is put into its final place.

☑ Merrimack River Bridge

This project involves the design and rehabilitation of the Merrimack River Bridge. The bridge, which currently carries Haverhill commuter rail trains, freight trains, and Amtrak trains, is in need of bearing work, steel repairs, and timber deck replacement.

☑ Rehab of 2 Shawsheen River Bridges

This project funds the rehabilitation of two Shawsheen River bridges. One of the bridges will require the rehabilitation of the structure by providing a new steel liner and grouting the annular space between the arch and the new liner.

☑ Shoreline Bridge Rehab

The project includes the rehabilitation and replacement of the entire superstructure, rehabilitation of existing substructures or construction of new support structures for the girders and trusses, rehabilitation of existing abutment and pier supports, and new retaining walls, etc.

SYSTEMWIDE**☑ Bridge Program**

This project funds the design and remediation of selected bridges throughout the MBTA.

TUNNELS**☑ Orange Line Ventilation Study**

This project funds a discrete study and design of ventilation in the Orange Line tunnel between Tufts Medical Center and North Station.

☑ Subway Tunnel Studies

This project funds the initial design of comprehensive emergency ventilation on the Orange Line between Tufts and North Stations as well as an assessment of tunnel envelopes on the Red, Orange, and Green Lines.

☑ Systemwide Tunnel Lighting

This project involves the renovation of all electric and lighting systems within the tunnels.

CIP FUNDING BY ASSET CATEGORY

Tunnel Rehabilitation

This project involves performing repair and rehabilitation of tunnel walls and ceiling slab on various tunnel sections.

TECHNOLOGY

BUS

Bus Training Simulator

This project funds the procurement of two bus simulators for the training of bus operators in an effort to reduce vehicle accidents.

THE RIDE - Information Management System

This effort funds an upgrade of THE RIDE information management system.

SYSTEMWIDE

AFC IT Upgrades

This project includes all design, procurement, implementation, testing, and documentation required to bring the AFC IT infrastructure up to a state of good repair. The project will improve the overall reliability and fault-tolerance of the AFC system.

Computer Tech. Upgrades

The Authority needs to increase its data storage capacity, upgrade its software environment, expand the WAN/LAN (local area network) to remote locations, purchase additional servers, and continue to replace administrative computers on a regular basis to conduct business. These efforts reflect increasing demand for electronic data interchange and demand for broader access to data across the Authority as the result of new and upgraded programs and ongoing network access expansion.

Daily Operations Resource Management (DORM) - Phase 1

The Daily Operations Resource Management (DORM) project will revolutionize the way transportation district offices are operated at the MBTA, moving from manual, decentralized processes to standardized, technology-supported processes designed to improve accountability and efficiency. Specifically, the DORM project will replace several obsolete systems in use in Operations, some of which are nearly 20 years old, and design and implement associated process improvements. This phase of the project funds the design of the system.

Daily Operations Resource Management (DORM) - Phase 2

To improve operational efficiency, this project funds the implementation of a Daily Operations Resource Management System.

HR Business Continuity

This effort digitizes critical information, such as benefits and employment history, which is on file in the Human Resource Department.

Maintenance Management System

The Enterprise Asset Management (EAM) system for The Engineering and Maintenance Division will allow whole-life optimal management of the physical assets of the MBTA to maximize value. This EAM System covers design, construction, commissioning, operations, maintenance, and decommissioning/replacement of plant, equipment and facilities. "Enterprise" refers to the management of the assets across departments, locations, facilities, and, in some cases, business units. By managing assets in this way, organizations can improve utilization and performance, reduce capital costs, reduce asset-related operating costs, extend asset life, and subsequently improve ROA (return on assets). The current funding is intended for software procurement and initial data collection efforts.

ENHANCEMENT**SUBWAY** **Green Line Collision Avoidance Program**

The purpose of this study is to identify technologies that can improve safety by reducing/eliminating collisions under current operating conditions.

COMMUTER RAIL **Commuter Rail Positive Train Control (PTC)**

The purpose of this project is to upgrade the commuter rail communications and signals systems in order to comply with federal requirements.

SYSTEMWIDE **Bond Costs**

This effort supports the Authority's cost of bond issuance. In addition, this funding source supports special programs for minorities, women and disadvantaged business organizations.

 Capital Maintenance Improvements

This effort provides funding for new, discrete capital projects throughout the MBTA, such as the procurement of medical lab equipment, for all transportation modes and general administration programs on an as-needed basis.

 Climate Change Adaptation Strategy

This project provides funding to develop preliminary Climate Change Vulnerability and Adaptation planning work to help identify those assets and operations that will be affected by climate change and extreme storm events and to help develop programs and procedures to address these threats.

 Homeland Security Funds

Every year the Authority receives Homeland Security funds, which are programmed to enhance system efforts already underway.

- FY10 Homeland Security Funds
- FY11 Homeland Security Funds
- FY12-FY16 Homeland Security Funds

 Independent Engineering Review

This provides funding of independent engineering reviews, which can include task order contracts used to comply with Massachusetts Building Code and to produce survey maps to support in-house design efforts, to perform subsurface testing, soil borings and archeological surveys, and audits, and to develop data for conservation commission submissions. The FTA requires that a value engineering study be performed for all the major projects that are federally funded.

CIP FUNDING BY ASSET CATEGORY

Misc. Project Closeout Costs

This project represents a group of past completed capital projects that have yet to incur their final closeout costs.

Transit Asset Management (TAM) Pilot

The TAM pilot program funds three asset management initiatives that the FTA wishes transit agencies to adopt. These are the adoption of an Asset Management Plan (AMP), the construction of an asset inventory with condition assessments as part of upgrades to the MBTA's State of Good Repair (SGR) Database, and the use of a decision-support tool in the capital project prioritization process for the CIP.

Unified Planning Work Program

This program funds various planning efforts regarding development of the MBTA system in coordination with various outside planning agencies.

Winter Resiliency Program

The funding supports the procurement of equipment for weather resiliency efforts. It also funds resiliency improvements to existing infrastructure.

EXPANSION

SUBWAY

Green Line Extension

This project funds the extension of the Green Line to Union Square in Somerville and College Avenue in Medford from a relocated Lechmere Station. This project includes the procurement of 24 Green Line vehicles. The Federal Transit Administration and the Commonwealth are each funding half of the total project cost of \$1.992 billion, which limits the federal contribution to \$996.1 million. The federal contribution was memorialized in a full funding grant agreement (FFGA) that was executed in 2014.

Green Line Extension – Mitigation Costs

As a requirement of a legal settlement associated with the Central Artery project and the delay in constructing the Green Line Extension, this program funds two specific Green Line Extension mitigation initiatives: 1) Additional off-peak bus service along existing routes serving the Green Line Extension corridor; and 2) The purchase of 142 Hybrid Ford Fusion Sedans for the RIDE.

Green Line Extension to Route 16

This funding is for design and planning, leading to future extension of the Green Line from College Avenue to Route 16.

COMMUTER RAIL

DMU Study

This project funds an overall planning study, including two phases - the first being a pilot program to implement Diesel Multiple Units (DMUs) along the Fairmount corridor, and the second being implementation over 5 other corridors in the metro area.

Fitchburg Line - Wachusett Extension

This project will extend the Fitchburg commuter rail line about 4.5 miles, with a new Wachusett station and layover facility. This FTA grant was awarded to the Montachusett RTA on November 10, 2010. Through an agreement with FTA and the RTA, the MBTA is the direct recipient of the TIGER funds and is managing the construction project.

Greenbush Line Construction

The scope of work of this project included the rehabilitation and preparation of the Old Colony Greenbush Line for full commuter rail service to South Station in Boston. The scope

included construction of 17.1 miles of track, seven stations, a layover facility, a tunnel through historic Hingham Square, the purchase of necessary passenger coaches, and personnel training costs. This project has been completed and now offers transportation services to the towns of Weymouth, Braintree, Hingham, Cohasset, and Scituate. The funding in place is for a few closeout line items.

Knowledge Corridor - HSI PR

This project will rehabilitate the existing Connecticut River rail line in western Massachusetts, which will allow for rerouted Amtrak Vermonter service to Northampton and Greenfield. FRA awarded the grant to MassDOT on July 1, 2011. MBTA will manage the construction project and MassDOT will provide funding.

South Coast Rail

This project funds the continued design, permitting as well as “early action” improvements to rail ties, existing signal systems, and grade crossings in the South Coast Region. These early action investments will improve the reliability of existing freight service in the South Coast while contributing to future passenger rail service.

South Station Postal Site Acquisition

This project funds the relocation of the U.S. Postal Service General Mail Facility located on Dorchester Avenue, creating an appropriate adjacent site for expanding South Station.

BUS

Silver Line to Chelsea

This project will include the creation of a 1.1-mile busway, the reconstruction/rehabilitation of two bridges, the reconstruction/modernization of the Chelsea Commuter Rail Station, and several station and bus stop improvements.

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APPENDIX: PROJECT BUDGETS

The following tables list the budget for each of the projects included in the FY16 Capital Investment Program. Projects are organized by their corresponding asset category and modal category. The total authorized budget is presented for each project and equals the sum of the following three columns: spending thru FY15, FY16 spending, and spending post-FY16.

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Revenue Vehicles	Blue Line	Blue Line No. 5 Car - Procurement	\$207,347,067	\$200,711,769	\$6,635,298	\$0
Revenue Vehicles	Blue Line	Reliability-Centered Maintenance (RCM) Pilot	\$101,000	\$79,601	\$21,399	\$0
Revenue Vehicles	Green Line	Green Line No. 7 Car Selective Systems Overhaul	\$162,448,594	\$61,956,293	\$12,321,311	\$88,170,991
Revenue Vehicles	Green Line	Green Line No. 8 Car Reliability Improvements Program	\$39,872,352	\$688,151	\$8,929,405	\$30,254,796
Revenue Vehicles	Orange Line	Orange Line Cars Reinvestment	\$15,603,545	\$13,583,309	\$2,020,236	\$0
Revenue Vehicles	Orange Line	Orange Line Vehicle Procurement	\$490,279,666	\$29,217,198	\$64,230,000	\$396,832,468
Revenue Vehicles	Red Line	Red Line No. 1 Car Reinvestment	\$2,160,895	\$0	\$1,080,447	\$1,080,448
Revenue Vehicles	Red Line	Red Line No. 2 Car Selective Systems Overhaul	\$53,463,394	\$44,533,611	\$8,929,783	\$0
Revenue Vehicles	Red Line	Red Line No. 3 Car Upgrade	\$8,703,126	\$7,410,907	\$411,402	\$880,817
Revenue Vehicles	Red Line	Red Line Vehicle Procurement	\$238,688,790	\$7,713,161	\$15,000,000	\$215,975,629
Revenue Vehicles	Subway	Red Line #1 and Orange Line #12 Preventive Maintenance	\$29,801,193	\$9,020,260	\$6,094,632	\$14,686,301
Revenue Vehicles	Subway	Various Subway Vehicle Projects	\$19,236,667	\$2,212,889	\$8,730,580	\$8,293,198
Total Subway Revenue Vehicles			\$1,267,706,289	\$377,127,149	\$134,404,492	\$756,174,647
Revenue Vehicles	Commuter Rail	Coach Overhaul - Kawasaki (75 units)	\$125,674,124	\$30,514,657	\$49,456	\$95,110,011
Revenue Vehicles	Commuter Rail	Coach Procurement - Hyundai Rotem (75 units)	\$216,484,374	\$190,372,767	\$6,860,510	\$19,086,064
Revenue Vehicles	Commuter Rail	Commuter Rail Vehicle Upgrades	\$38,772,486	\$7,420,002	\$186,100	\$31,166,384
Revenue Vehicles	Commuter Rail	Locomotive & Coach Maintenance Program (CRASP)	\$47,640,000	\$37,275,625	\$6,024,684	\$4,339,691
Revenue Vehicles	Commuter Rail	Locomotive Procurement (42 units)	\$266,388,189	\$257,707,287	\$2,989,417	\$5,691,485
Revenue Vehicles	Commuter Rail	Top Deck Overhaul of (25) Locomotives	\$39,564,949	\$15,908,152	\$11,546,711	\$12,110,086
Total Commuter Rail Revenue Vehicles			\$734,524,122	\$539,198,490	\$27,656,878	\$167,503,722
Revenue Vehicles	Bus	Bus Overhaul Program	\$234,170,132	\$161,110,099	\$23,904,249	\$49,197,836
Revenue Vehicles	Bus	Bus Procurement	\$319,958,861	\$747,278	\$19,574,388	\$299,637,195
Revenue Vehicles	Bus	Bus Systems Improvements	\$1,231,225	\$0	\$1,231,225	\$0
Revenue Vehicles	Bus	RIDE Vehicle Program	\$30,279,224	\$7,312,376	\$7,346,650	\$15,620,198
Revenue Vehicles	Bus	Trackless Trolley Temporary Replacement	\$612,428	\$420,721	\$191,707	\$0
Total Bus Revenue Vehicles			\$586,251,870	\$169,590,473	\$52,248,220	\$364,455,229
Revenue Vehicles	Ferry	Boat Engine Overhaul Program	\$2,905,267	\$2,539,502	\$52,213	\$313,552
Revenue Vehicles	Ferry	Catamarans for Ferry Service	\$13,577,998	\$294,204	\$70,923	\$13,212,871
Total Ferry Revenue Vehicles			\$16,483,265	\$2,833,706	\$123,136	\$13,526,423
Total Revenue Vehicles			\$2,604,965,546	\$1,088,749,818	\$214,432,725	\$1,301,660,022
Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Non-Revenue Vehicles	Systemwide	Snow Fighting Equipment	\$3,575,290	\$747,698	\$50,000	\$2,777,592
Non-Revenue Vehicles	Systemwide	Systemwide NRV Program	\$38,858,974	\$13,947,452	\$11,419,722	\$13,491,800
Total Systemwide Non-Revenue Vehicles			\$42,434,264	\$14,695,150	\$11,469,722	\$16,269,392
Total Non-Revenue Vehicles			\$42,434,264	\$14,695,150	\$11,469,722	\$16,269,392

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Track/Right-of-Way	Orange Line	Orange Line Infrastructure	\$110,540,577	\$34,865	\$4,747,140	\$105,758,572
Track/Right-of-Way	Red Line	Red Line Infrastructure	\$63,068,965	\$17,785	\$2,501,168	\$60,550,012
Track/Right-of-Way	Subway	Systemwide Track Upgrades	\$63,223,089	\$35,492,273	\$18,730,816	\$9,000,000
Total Subway Track/Right-of-Way			\$236,832,631	\$35,544,923	\$25,979,125	\$175,308,583
Track/Right-of-Way	Commuter Rail	Commuter Rail Track Upgrades	\$27,079,104	\$25,548,579	\$30,525	\$1,500,000
Track/Right-of-Way	Commuter Rail	Fitchburg Line Double Tracking and Interlocking	\$51,442,723	\$51,355,968	\$86,755	\$0
Track/Right-of-Way	Commuter Rail	Fitchburg Line Improvements	\$59,929,345	\$40,310,768	\$12,809,219	\$6,809,358
Track/Right-of-Way	Commuter Rail	Haverhill Double Tracking/Other Track Improvements	\$27,273,910	\$22,924,479	\$4,349,431	\$0
Track/Right-of-Way	Commuter Rail	Worcester Line Improvements	\$22,943,840	\$4,441,985	\$11,803,511	\$6,698,344
Total Commuter Rail Track/Right-of-Way			\$188,668,921	\$144,581,779	\$29,079,441	\$15,007,702
Total Track/Right-of-Way			\$425,501,552	\$180,126,702	\$55,058,565	\$190,316,285
Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Signals	Green Line	Green Line Central Tunnel 25-Cycle Signal System	\$34,132,665	\$0	\$1,000,000	\$33,132,665
Signals	Green Line	Green Line Signals	\$10,741,626	\$243,305	\$223,060	\$10,275,261
Signals	Orange Line	Orange Line Infrastructure	\$73,727,051	\$23,243	\$3,170,094	\$70,533,714
Signals	Red Line	Red Line Infrastructure	\$42,045,977	\$11,857	\$1,649,295	\$40,384,826
Signals	Red Line	Red Line Signal Cable Replacement	\$29,000,000	\$11,926,256	\$5,073,744	\$12,000,000
Signals	Red Line	Red Line Signals - Columbia Junction	\$91,770,219	\$68,205,573	\$6,220,380	\$17,344,266
Signals	Subway	Systemwide Signal Upgrades	\$44,738,654	\$20,636,992	\$18,956,695	\$5,144,967
Total Subway Signals			\$326,156,193	\$101,047,226	\$36,293,268	\$188,815,699
Signals	Commuter Rail	Fitchburg Line Improvements	\$76,832,493	\$51,680,471	\$16,485,566	\$8,666,456
Signals	Commuter Rail	Signal System Upgrades	\$24,730,655	\$3,502	\$42,153	\$24,685,000
Signals	Commuter Rail	Worcester Line Improvements	\$2,576,250	\$754,938	\$1,821,312	\$0
Total Commuter Rail Signals			\$104,139,398	\$52,438,911	\$18,349,032	\$33,351,456
Total Signals			\$430,295,591	\$153,486,137	\$54,642,300	\$222,167,155
Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Communications	Green Line	Green Line Real-Time Tracking System	\$15,691,934	\$8,184,891	\$7,507,043	\$0
Communications	Subway	Public Announcement System/Light-Emitting Diode Station Sign	\$29,394,230	\$28,806,590	\$587,640	\$0
Total Subway Communications			\$45,086,164	\$36,991,481	\$8,094,683	\$0
Communications	Commuter Rail	Narrow Band Conversion	\$1,200,000	\$966,712	\$233,288	\$0
Communications	Commuter Rail	Worcester Line Improvements	\$250,000	\$59,855	\$190,145	\$0
Total Commuter Rail Communications			\$1,450,000	\$1,026,567	\$423,433	\$0
Communications	Systemwide	Systemwide Communications Enhancements	\$70,744,852	\$68,555,941	\$1,355,608	\$833,302
Total Systemwide Communications			\$70,744,852	\$68,555,941	\$1,355,608	\$833,302
Total Communications			\$117,281,016	\$106,573,989	\$9,873,724	\$833,302

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Power	Green Line	Green Line Power Study	\$4,108,519	\$2,126,709	\$249,722	\$1,732,088
Power	Green Line	Highland Branch AC Cable Replacement	\$13,441,521	\$13,208,671	\$193,749	\$0
Power	Orange Line	Orange Line DC Cable Upgrade Ph 1 Back Bay - North Station	\$21,728,332	\$8,866,111	\$800,000	\$12,062,221
Power	Orange Line	Orange Line Infrastructure	\$48,183,071	\$15,198	\$2,069,061	\$46,098,812
Power	Orange Line	Orange Line Power Infrastructure Improvements	\$8,000,000	\$2,841,479	\$1,196,569	\$3,961,952
Power	Orange Line	Orange Line Traction Power Upgrade	\$43,265,826	\$638,543	\$2,537,707	\$40,089,576
Power	Red Line	Red Line DC Cable Upgrade - Phase 1 [Andrew-Kendall]	\$28,509,657	\$8,475,086	\$798,021	\$19,236,550
Power	Red Line	Red Line Infrastructure	\$27,480,062	\$7,752	\$1,076,539	\$26,395,771
Power	Red Line	Red Line Traction Power Upgrade	\$27,115,242	\$15,907,111	\$2,789,993	\$8,418,138
Power	Subway	Energy Conservation Program	\$25,089,789	\$5,428,761	\$11,500,000	\$8,161,028
Power	Subway	Power Program	\$32,901,302	\$12,743,529	\$2,101,202	\$18,056,571
Power	Subway	Transformer Replacement Program - Phases 2-4 (All modes)	\$44,516,261	\$8,545,155	\$7,093,646	\$28,877,460
Power	Subway	Unit Substation Upgrades	\$53,138,959	\$37,744,853	\$4,566,253	\$10,827,853
Total Subway Power			\$377,478,541	\$116,548,959	\$36,972,463	\$223,918,019
Power	Commuter Rail	Commuter Rail Power Upgrades	\$15,455,340	\$545,109	\$1,204,891	\$13,705,340
Power	Commuter Rail	Rockport Station Layover Power Upgrade	\$3,900,000	\$0	\$500,000	\$3,400,000
Total Commuter Rail Power			\$19,355,340	\$545,109	\$1,704,891	\$17,105,340
Power	Bus	Trackless Trolley Overhead Replacement	\$36,703,233	\$244,980	\$4,478,503	\$31,979,750
Total Bus Power			\$36,703,233	\$244,980	\$4,478,503	\$31,979,750
Power	Systemwide	Energy Management System	\$3,500,000	\$0	\$3,500,000	\$0
Total Systemwide Power			\$3,500,000	\$0	\$3,500,000	\$0
Total Power			\$437,037,114	\$117,339,048	\$46,655,857	\$273,003,109
Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Fare Equipment	Systemwide	AFC Equipment Overhaul	\$28,932,634	\$8,204,500	\$5,000,000	\$15,728,134
Fare Equipment	Systemwide	Station Management Program - Phase I	\$175,101,981	\$174,552,842	\$549,140	\$0
Total Systemwide Fare Equipment			\$204,034,615	\$182,757,342	\$5,549,140	\$15,728,134
Total Fare Equipment			\$204,034,615	\$182,757,342	\$5,549,140	\$15,728,134

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post- FY16
Stations	Blue Line	Blue Line Station Modernization	\$482,628,440	\$436,654,279	\$14,129,816	\$31,844,210
Stations	Green Line	LRAP - Boston College Station	\$1,117,108	\$914,430	\$202,678	\$0
Stations	Green Line	LRAP - Commonwealth Ave Stations Access Improvements	\$8,300,000	\$287,209	\$112,791	\$7,900,000
Stations	Green Line	LRAP - Government Center Station	\$79,917,050	\$49,207,207	\$9,366,445	\$21,343,398
Stations	Green Line	LRAP - Kenmore Station	\$44,024,105	\$44,014,105	\$10,000	\$0
Stations	Green Line	LRAP - Surface Stations	\$32,704,683	\$32,429,683	\$275,000	\$0
Stations	Green Line	Science Park Accessibility	\$22,000,000	\$21,805,692	\$194,308	\$0
Stations	Orange Line	Assembly Square Station	\$56,507,377	\$53,269,834	\$3,237,242	\$0
Stations	Red Line	Wollaston Accessibility and Drainage	\$4,100,024	\$1,100,024	\$3,000,000	\$0
Stations	Subway	Drainage Improvements	\$1,420,000	\$0	\$1,030,000	\$390,000
Stations	Subway	Station Platform Improvement Program	\$11,118,812	\$5,112,634	\$488,074	\$5,518,104
Stations	Subway	Station Rehabilitation	\$44,000,022	\$25,060,121	\$1,945,622	\$16,994,279
Stations	Subway	Wayfinding - Back Bay Station	\$730,000	\$0	\$365,000	\$365,000
Total Subway Stations			\$788,567,620	\$669,855,217	\$34,356,975	\$84,354,991
Stations	Commuter Rail	Auburndale Station Accessibility - Design	\$3,479,078	\$323,741	\$2,159,547	\$995,789
Stations	Commuter Rail	Commuter Rail Accessibility Program	\$6,349,270	\$103,145	\$71,855	\$6,174,270
Stations	Commuter Rail	Fairmount Line Improvements - Phase II	\$95,477,584	\$69,127,584	\$447,000	\$25,903,000
Stations	Commuter Rail	Fitchburg Line Improvements	\$16,903,148	\$11,390,505	\$3,655,546	\$1,857,098
Stations	Commuter Rail	Mansfield Station Accessibility	\$8,158,291	\$701,406	\$1,542,768	\$5,914,117
Stations	Commuter Rail	Rockport Station Improvements	\$3,808,423	\$1,647,345	\$2,161,078	\$0
Stations	Commuter Rail	Ruggles Station Upgrades	\$30,000,000	\$2,500,000	\$1,000,000	\$26,500,000
Stations	Commuter Rail	Sharon Station Accessibility - Design	\$4,400,000	\$3,223,780	\$1,176,220	\$0
Stations	Commuter Rail	Station Upgrades	\$16,178,259	\$9,908,785	\$2,269,474	\$4,000,000
Stations	Commuter Rail	Wedgemere Station Accessibility	\$3,907,372	\$3,875,136	\$32,236	\$0
Stations	Commuter Rail	Winchester Center Station Accessibility - Design	\$2,050,000	\$427,086	\$990,000	\$632,914
Total Commuter Rail Stations			\$190,711,425	\$103,228,513	\$15,505,724	\$71,977,188
Stations	Bus	Bus Stations Improvements	\$13,677,700	\$7,476,563	\$622,387	\$5,578,750
Stations	Bus	Bus Stop and Route 23 Customer Enhancements	\$8,385,831	\$8,057,896	\$327,935	\$0
Total Bus Stations			\$22,063,531	\$15,534,459	\$950,323	\$5,578,750
Stations	Ferry	Ferry System Improvements	\$5,384,596	\$3,098,026	\$286,570	\$2,000,000
Stations	Ferry	Hingham Boat Terminal Improvements	\$10,745,001	\$1,023,810	\$1,016,990	\$8,704,201
Stations	Ferry	Hingham Marine Intermodal Center	\$12,725,000	\$4,690,742	\$2,265,447	\$5,768,811
Total Ferry Stations			\$28,854,597	\$8,812,578	\$3,569,007	\$16,473,012
Stations	Systemwide	Back Bay Station	\$8,008,327	\$3,108,326	\$4,000,000	\$900,000
Stations	Systemwide	Map Replacement	\$1,710,000	\$807,558	\$902,442	\$0
Stations	Systemwide	Plan for Accessible Transit Infrastructure (PATI)	\$3,317,500	\$1,617,500	\$500,000	\$1,200,000
Stations	Systemwide	Systemwide Safety and Reliability	\$40,863,039	\$17,863,039	\$11,146	\$22,988,854
Stations	Systemwide	Wayfinding Program	\$14,836,826	\$4,737,975	\$98,851	\$10,000,000
Total Systemwide Stations			\$68,735,692	\$28,134,399	\$5,512,439	\$35,088,854
Total Stations			\$1,098,932,866	\$825,565,165	\$59,894,468	\$213,472,796

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Elevators and Escalators	Subway	Elevator and Escalator Program	\$192,434,972	\$80,554,122	\$26,563,400	\$85,274,283
Total Subway Elevators and Escalators			\$192,434,972	\$80,554,122	\$26,563,400	\$85,274,283
Total Elevators and Escalators			\$192,434,972	\$80,554,122	\$26,563,400	\$85,274,283

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Parking	Blue Line	Revere - Wonderland Station Parking Garage	\$59,347,955	\$58,455,922	\$892,033	\$0
Parking	Red Line	Alewife Garage Improvements	\$11,512,114	\$7,994,455	\$1,276,503	\$2,241,156
Parking	Red Line	South Shore Parking Garages Rehab	\$88,700,000	\$9,371,828	\$2,334,858	\$76,993,314
Total Subway Parking			\$159,560,069	\$75,822,206	\$4,503,393	\$79,234,470

Parking	Commuter Rail	Beverly Parking Garage	\$34,109,074	\$32,272,283	\$1,836,791	\$0
Parking	Commuter Rail	Lynn Parking Garage	\$3,500,000	\$0	\$3,500,000	\$0
Parking	Commuter Rail	Salem Parking Garage	\$44,540,286	\$37,058,469	\$7,481,811	\$0
Total Commuter Rail Parking			\$82,149,360	\$69,330,752	\$12,818,602	\$0

Parking	Systemwide	Parking System Upgrades	\$12,808,664	\$3,345,579	\$736,215	\$8,726,870
Total Systemwide Parking			\$12,808,664	\$3,345,579	\$736,215	\$8,726,870

Total Parking			\$254,518,093	\$148,498,537	\$18,058,210	\$87,961,340
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APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post- FY16
Facilities	Green Line	Green Line Infrastructure	\$11,350,326	\$754,735	\$5,774,126	\$4,821,465
Facilities	Orange Line	Orange Line Infrastructure	\$92,153,761	\$2,459,715	\$5,759,377	\$83,934,669
Facilities	Red Line	Cabot Maintenance Facility	\$9,767,035	\$1,492,596	\$3,263,185	\$5,011,254
Facilities	Red Line	Red Line Infrastructure	\$48,122,310	\$12,601	\$2,932,717	\$45,176,992
Facilities	Subway	Everett Maintenance Facility	\$7,374,613	\$6,039,608	\$1,335,005	\$0
Facilities	Subway	Subway Facility Improvements	\$26,831,728	\$11,778,932	\$3,400,372	\$11,652,424
Total Subway Facilities			\$195,599,772	\$22,538,187	\$22,464,782	\$150,596,803
Facilities	Commuter Rail	Commuter Rail Facility Environmental Management	\$5,025,000	\$0	\$1,675,000	\$3,350,000
Facilities	Commuter Rail	Commuter Rail Maintenance Facilities Upgrades	\$32,516,950	\$26,453,902	\$2,000,000	\$4,063,048
Facilities	Commuter Rail	Facilities Equipment Replacement	\$9,525,098	\$0	\$1,205,900	\$8,319,198
Facilities	Commuter Rail	Readville Facility Remediation	\$4,956,793	\$4,549,930	\$295,474	\$111,389
Facilities	Commuter Rail	Worcester Line Improvements	\$461,250	\$201,535	\$259,715	\$0
Total Commuter Rail Facilities			\$52,485,091	\$31,205,367	\$5,436,089	\$15,843,635
Facilities	Bus	Arborway Facility	\$32,948,109	\$31,448,109	\$1,500,000	\$0
Facilities	Bus	Bus Facilities Upgrades	\$44,600,684	\$36,035,242	\$3,524,566	\$5,040,876
Facilities	Bus	Charlestown Facility Improvements	\$15,687,297	\$396,729	\$1,940,568	\$13,350,000
Facilities	Bus	CNG Facility Retrofit	\$77,739,049	\$64,901,577	\$1,840,815	\$10,996,657
Total Bus Facilities			\$170,975,139	\$132,781,656	\$8,805,950	\$29,387,533
Facilities	Systemwide	45 High Street Building Improvements	\$15,840,000	\$951,883	\$3,200,000	\$11,688,117
Facilities	Systemwide	Environmental Compliance Management - Systemwide	\$9,472,072	\$6,383,272	\$1,207,600	\$1,881,200
Facilities	Systemwide	Fuel Management Program	\$424,251	\$0	\$424,251	\$0
Facilities	Systemwide	Groundwater Remediation	\$4,970,000	\$1,610,891	\$915,732	\$2,443,377
Facilities	Systemwide	Miller's Outfall Structure	\$6,000,000	\$4,601,170	\$613,665	\$785,165
Facilities	Systemwide	Operations and Maintenance Facilities Needs Evaluation	\$2,600,000	\$0	\$500,000	\$2,100,000
Facilities	Systemwide	Remediation Projects	\$28,555,730	\$26,056,107	\$24,469	\$2,475,154
Facilities	Systemwide	Systemwide Fire Suppression Systems	\$5,072,613	\$72,613	\$50,000	\$4,950,000
Facilities	Systemwide	Underground and Aboveground Storage Tank Program (Systemwide)	\$10,930,280	\$171,461	\$268,539	\$10,490,280
Total Systemwide Facilities			\$83,864,946	\$39,847,396	\$7,204,257	\$36,813,293
Total Facilities			\$502,924,948	\$226,372,606	\$43,911,077	\$232,641,264

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Bridges	Red Line	Red Line Bridges	\$26,401,656	\$11,976,933	\$6,541,484	\$7,883,239
Total Subway Bridges			\$26,401,656	\$11,976,933	\$6,541,484	\$7,883,239
Bridges	Commuter Rail	Amtrak Corridor Spandrel Beam	\$1,200,000	\$0	\$1,200,000	\$0
Bridges	Commuter Rail	Beverly Drawbridge Rehab	\$56,000,000	\$3,402	\$3,500,000	\$52,496,598
Bridges	Commuter Rail	Commonwealth Avenue over I-90	\$2,464,176	\$9,998	\$1,000,000	\$1,454,178
Bridges	Commuter Rail	Commuter Rail Bridges	\$18,966,001	\$9,897,021	\$9,068,980	\$0
Bridges	Commuter Rail	Concord, Main St Bridge	\$9,003,224	\$8,700,858	\$302,366	\$0
Bridges	Commuter Rail	Gloucester Drawbridge	\$60,000,000	\$153,104	\$572,603	\$59,274,293
Bridges	Commuter Rail	LaGrange Street Bridge Reconstruction	\$8,200,000	\$0	\$3,000,000	\$5,200,000
Bridges	Commuter Rail	Merrimack River Bridge	\$99,431,825	\$17,645,617	\$9,722,443	\$72,063,765
Bridges	Commuter Rail	Rehab of 2 Shawsheen River Bridges	\$15,000,000	\$14,453,283	\$546,717	\$0
Bridges	Commuter Rail	Shoreline Bridge Rehab	\$24,330,912	\$1,633,821	\$9,784,304	\$12,912,787
Total Commuter Rail Bridges			\$294,596,138	\$52,497,104	\$38,697,413	\$203,401,621
Bridges	Systemwide	Bridge Program	\$183,468,237	\$41,526,177	\$9,341,109	\$132,600,951
Total Systemwide Bridges			\$183,468,237	\$41,526,177	\$9,341,109	\$132,600,951
Total Bridges			\$504,466,032	\$106,000,214	\$54,580,006	\$343,885,812

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Tunnels	Subway	Orange Line Ventilation Study	\$4,290,461	\$236,645	\$1,513,355	\$2,540,461
Tunnels	Subway	Subway Tunnel Studies	\$300,000	\$294,790	\$5,210	\$0
Tunnels	Subway	Systemwide Tunnel Lighting	\$8,000,000	\$7,000,000	\$250,000	\$750,000
Tunnels	Subway	Tunnel Rehabilitation	\$38,453,658	\$24,765,358	\$2,092,912	\$11,595,388
Total Subway Tunnels			\$51,044,119	\$32,296,793	\$3,861,477	\$14,885,849
Total Tunnels			\$51,044,119	\$32,296,793	\$3,861,477	\$14,885,849

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Technology	Bus	Bus Training Simulator	\$2,000,000	\$1,239,650	\$760,350	\$0
Technology	Bus	THE RIDE - Information Management System	\$4,442,871	\$736,375	\$153,625	\$3,552,871
Total Bus Technology			\$6,442,871	\$1,976,025	\$913,975	\$3,552,871
Technology	Systemwide	AFC IT Upgrades	\$5,100,000	\$247,291	\$463,725	\$4,388,984
Technology	Systemwide	Computer Tech. Upgrades	\$18,885,585	\$10,621,417	\$5,830,017	\$2,434,150
Technology	Systemwide	Daily Operations Resource Management (DORM) - Phase 1	\$2,576,739	\$2,256,776	\$319,963	\$0
Technology	Systemwide	Daily Operations Resource Management (DORM) - Phase 2	\$4,427,983	\$0	\$815,831	\$3,612,152
Technology	Systemwide	HR Business Continuity	\$250,000	\$79,410	\$170,590	\$0
Technology	Systemwide	Maintenance Management System	\$6,367,106	\$623,588	\$5,743,518	\$0
Total Systemwide Technology			\$37,607,413	\$13,828,482	\$13,343,644	\$10,435,286
Total Technology			\$44,050,284	\$15,804,507	\$14,257,620	\$13,988,157
Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Enhancement	Green Line	Green Line Collision Avoidance Program	\$7,726,604	\$2,385,861	\$510,743	\$4,830,000
Total Green Line Enhancement			\$7,726,604	\$2,385,861	\$510,743	\$4,830,000
Enhancement	Commuter Rail	Commuter Rail Positive Train Control (PTC)	\$439,600,000	\$1,693,645	\$23,786,977	\$414,119,378
Total Commuter Rail Enhancement			\$439,600,000	\$1,693,645	\$23,786,977	\$414,119,378
Enhancement	Systemwide	Bond Costs	\$25,109,511	\$24,564,688	\$44,435	\$500,388
Enhancement	Systemwide	Capital Maintenance Improvements	\$9,488,225	\$285,796	\$1,505,704	\$7,696,725
Enhancement	Systemwide	Climate Change Adaptation Strategy	\$4,493,500	\$2,320,000	\$719,250	\$1,454,250
Enhancement	Systemwide	FY10 Homeland Security Funds	\$22,936,497	\$22,467,698	\$365,516	\$0
Enhancement	Systemwide	FY11 Homeland Security Funds	\$9,307,601	\$8,257,413	\$323,507	\$726,681
Enhancement	Systemwide	FY12- FY16 Homeland Security Funds	\$14,317,163	\$9,871,091	\$4,446,072	\$0
Enhancement	Systemwide	Independent Engineering Review	\$11,995,824	\$7,795,451	\$503,631	\$3,696,742
Enhancement	Systemwide	Misc. Project Closeout Costs	\$9,100,023	\$7,999,955	\$209,198	\$890,870
Enhancement	Systemwide	Transit Asset Management (TAM) Pilot	\$3,057,509	\$2,897,042	\$160,467	\$0
Enhancement	Systemwide	Unified Planning Work Program	\$5,172,963	\$2,963,504	\$525,000	\$1,684,459
Enhancement	Systemwide	Winter Resiliency Program	\$72,000,000	\$151,200	\$71,848,800	\$0
Total Systemwide Enhancement			\$186,978,816	\$89,573,839	\$80,651,580	\$16,650,115
Total Enhancement			\$634,305,420	\$93,653,345	\$104,949,299	\$435,599,493

APPENDIX: PROJECT BUDGETS

Category	Mode	Project	Authorized	Thru FY15	FY16	Post-FY16
Expansion	Green Line	Green Line Extension	\$1,992,243,001	\$360,504,772	\$251,788,470	\$1,379,949,759
Expansion	Green Line	Green Line Extension - Mitigation Costs	\$94,319,146	\$11,425,955	\$12,757,400	\$70,135,791
Expansion	Green Line	Green Line Extension to Route 16	\$190,092,544	\$92,544	\$8,100,000	\$181,900,000
Total Subway Expansion			\$2,276,654,691	\$372,023,271	\$272,645,870	\$1,631,985,550
Expansion	Commuter Rail	DMU Implementation	\$1,831,102	\$1,531,102	\$300,000	\$0
Expansion	Commuter Rail	Fitchburg Line - Wachusett Extension	\$74,329,755	\$42,133,964	\$24,776,096	\$7,419,695
Expansion	Commuter Rail	Greenbush Line Construction	\$542,225,634	\$538,870,928	\$2,779,376	\$575,330
Expansion	Commuter Rail	Knowledge Corridor - HSIPR	\$115,200,090	\$89,910,628	\$3,900,000	\$21,389,462
Expansion	Commuter Rail	South Coast Rail	\$258,810,000	\$10,838,122	\$16,136,876	\$231,835,002
Expansion	Commuter Rail	South Station Postal Site Acquisition	\$9,930,857	\$9,270,976	\$659,881	\$0
Total Commuter Rail Expansion			\$1,002,327,438	\$692,555,721	\$48,552,229	\$261,219,489
Expansion	Bus	Silver Line to Chelsea	\$29,006,333	\$15,572	\$1,090,761	\$27,900,000
Total Bus Expansion			\$29,006,333	\$15,572	\$1,090,761	\$27,900,000
Total Expansion			\$3,307,988,462	\$1,064,594,564	\$322,288,860	\$1,921,105,038
Total CIP			\$10,852,214,894	\$4,437,068,037	\$1,046,046,449	\$5,368,791,431