



SUSTAINABILITY BOND PROGRESS REPORT- 2018

Massachusetts Bay Transportation Authority
December 2018

Subordinated Sales Tax Bonds 2017 Subseries A-1 (Sustainability Bonds) & Subordinated Sales Tax Bond Anticipation Notes Series 2017 (Sustainability Bonds)

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Introduction

In 2017, the Massachusetts Bay Transportation Authority (“MBTA”) became the nation’s first issuer of tax-exempt sustainability bonds, following in the wake of several corporate and foreign government issuers such as Starbucks, Region Ile-de-France, and Apple Inc. Since that time, global issuance of sustainability bonds has grown to \$11.66 billion, across 20 issuers in seven currencies, according to a year-to-date 2018 International Capital Market Association report.

The decision to issue sustainability bonds is consistent with the Authority’s overall strategic plan, which describes environmental stewardship, honesty, transparency, and equitability as key values of the organization. Every year, the MBTA publishes a Sustainability Report that highlights steps it is taking to achieve positive social and environmental outcomes and that tracks water usage, greenhouse gas emissions, energy use, and passenger trips, among other metrics.

It is in this same vein in which we developed a Sustainable Bond Framework to guide the investment of public money in projects of significant importance towards reaching the system’s sustainability goals. We believe the 2017 bond issue fully conforms to the guidelines set forth in the MBTA Sustainability Bond Framework.

In this report, you will find background on the MBTA’s Series 2017 Sustainability Bonds; data related to the use of proceeds; and a few key project highlights. Due to the positive reception the Sustainability Bond received in the market, we expect this issue of sustainability bonds to be the first of several issues to follow.

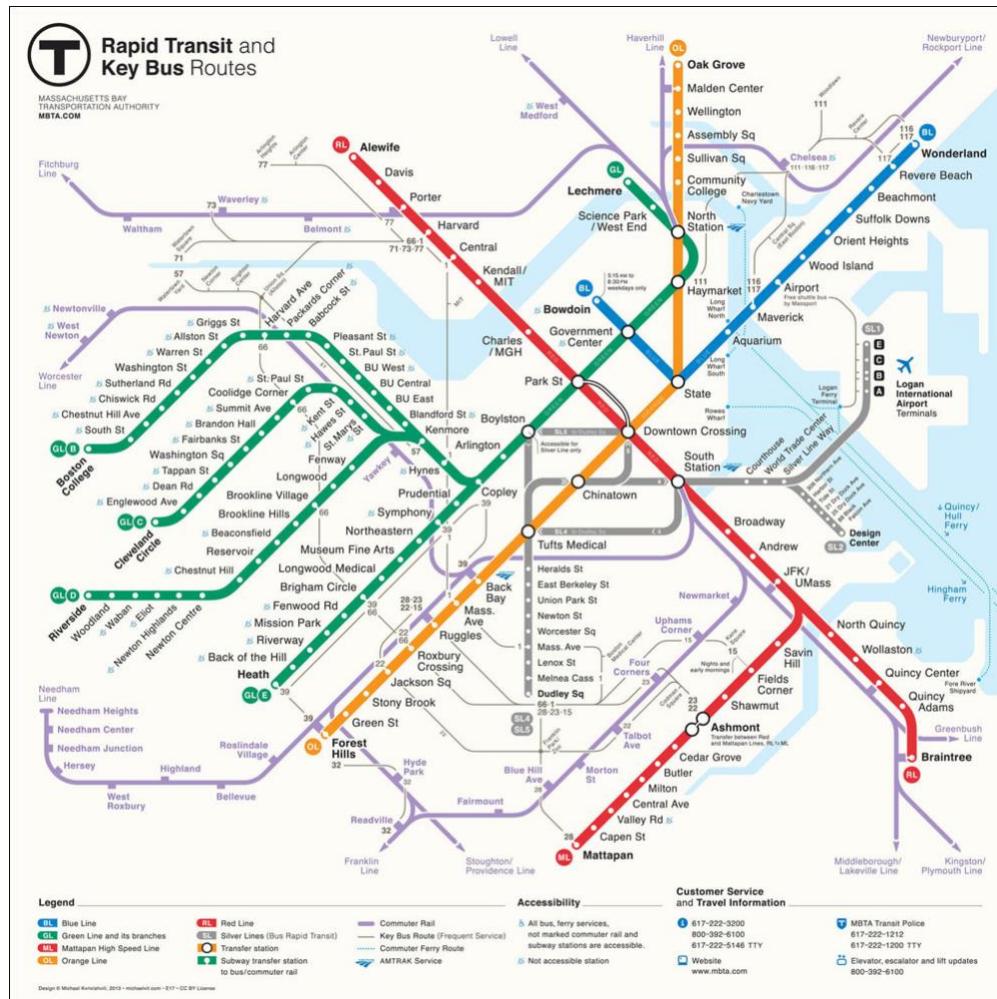
We are privileged to serve as a pioneer in the ESG space, and we are committed to providing timely disclosures. We welcome any feedback that can make this report more useful to you. Thank you for your support of a more sustainable, environmentally-friendly and socially-conscious public transportation network.

Sincerely,

Paul Brandley, CFO and Treasurer
John Markowitz, Director of Treasury Services
Christina Marin, Deputy Director of Treasury Services
Jordan Mooney, former Deputy Director of Treasury Services

MBTA System Overview

The MBTA is the oldest and fifth largest transit system in the country, providing extensive and integrated mass transit services, along with parking facilities for the greater Boston metropolitan region. It serves a total of 176 cities and towns with a service area of 4.8 million residents. More than 1.3 million passengers rely on the MBTA daily, providing approximately 55% of all work trips to/from Boston. In addition to operating on 38 miles of 'heavy' rail routes and 26 miles of 'light' rail routes; the authority owns more than 1,000 buses covering 763 miles. The system is supported by 6,000 employees and a \$2 billion operating budget.



Background - Sustainability Bond

In September 2017, the MBTA issued the first tax-exempt Sustainability Bond in the United States. The \$99 million issue finances 115 projects (up from 74 projects originally identified) within the agency's capital improvement plan with clear environmental, social, and economic benefits.

The projects range from seawall reconstruction to elevator installation, and adhere to the MBTA's Sustainability Bond Framework, which the MBTA introduced in 2017 to identify projects fulfilling the system's commitment to sustainability. Additionally, the Authority issued \$271 million in sustainability bond anticipation notes to finance its Positive Train Control program, a key safety initiative.

Nine banks bid on the MBTA's Sustainability Bonds (compared to eight banks that bid on the simultaneously-issued traditional bonds) and garnered more aggressive pricing. This strong market demand translated to lower borrowing costs for the MBTA. The issue was recognized as The Bond Buyer's 2017 Northeast Regional Deal of the Year, and was a finalist for the National Deal of the Year.

The bonds are rated AA by S&P Global and Aa3 by Moody's Investor Services.



Figure 1 The 2016 opening of the Government Center Station marks the first time the 118-year-old station was accessible to people with disabilities. Bond proceeds helped finance the last remaining capital improvements on the station.

The MBTA Sustainability Bond Framework

The MBTA formed an internal Sustainability Committee and drafted a Sustainability Bond Framework ahead of its first issue of Sustainability Bonds. The Framework incorporates guidance from investor groups and the academic community and is consistent with the Sustainability Bond Principles (“SBP”) established by the International Capital Market Association.

The Framework evaluates the environmental and social benefits of financing the projects. Environmental considerations include the transition to a low-carbon, climate resilient and sustainable community. Social considerations include access to essential services and affordable infrastructure, critical health and safety improvements, and socioeconomic advancement.

The use of proceeds from a Sustainability Bond should fall into the following categories:

Environment

The Massachusetts Bay Transportation Authority is dedicated to providing safe, reliable, world-class public transportation in an environmentally responsible manner.

Built environment: Respecting, protecting and improving the built environment and enhancing the quality of the travel experience;

Capacity: Reducing emissions from personal vehicle trips by increasing capacity to carry passengers and increasing the attractiveness of public transit by offering more frequent, reliable, and comfortable service;

Carbon, energy and climate resilience: Reducing carbon emissions and preparing for the potential impacts of climate change and extreme weather;

Natural environment: Respecting, protecting and enhancing the natural environment and its contribution to the quality of life;

Noise: Managing and controlling transport-related noise and vibration;

Pollution prevention: Proactively managing activities to minimize and control pollution;

Resource management: Using resources (including water) wisely and minimizing waste.

Social

The MBTA acknowledges that high quality public transportation and transit-oriented development can produce meaningful social benefits.

Affordability: Balancing our customers’ means, particularly low-income riders, with the organization’s financial constraints;

Accessibility: Operating an inclusive system with facilities designed to accommodate a diverse customer base;

Availability: Ensuring that communities within the service area have reasonable, equitable access to the system;

Equity: Offsetting social and environmental burdens experienced by populations or communities within the service area and/or striving for an even distribution of benefits and burdens across the diverse modes, customer bases, and service area;

Safety: Protecting the well-being of passengers, operators, and the general public;

Workplace environment: Maintaining a safe, empowering, and satisfying workplace environment for MBTA and affiliated employees.

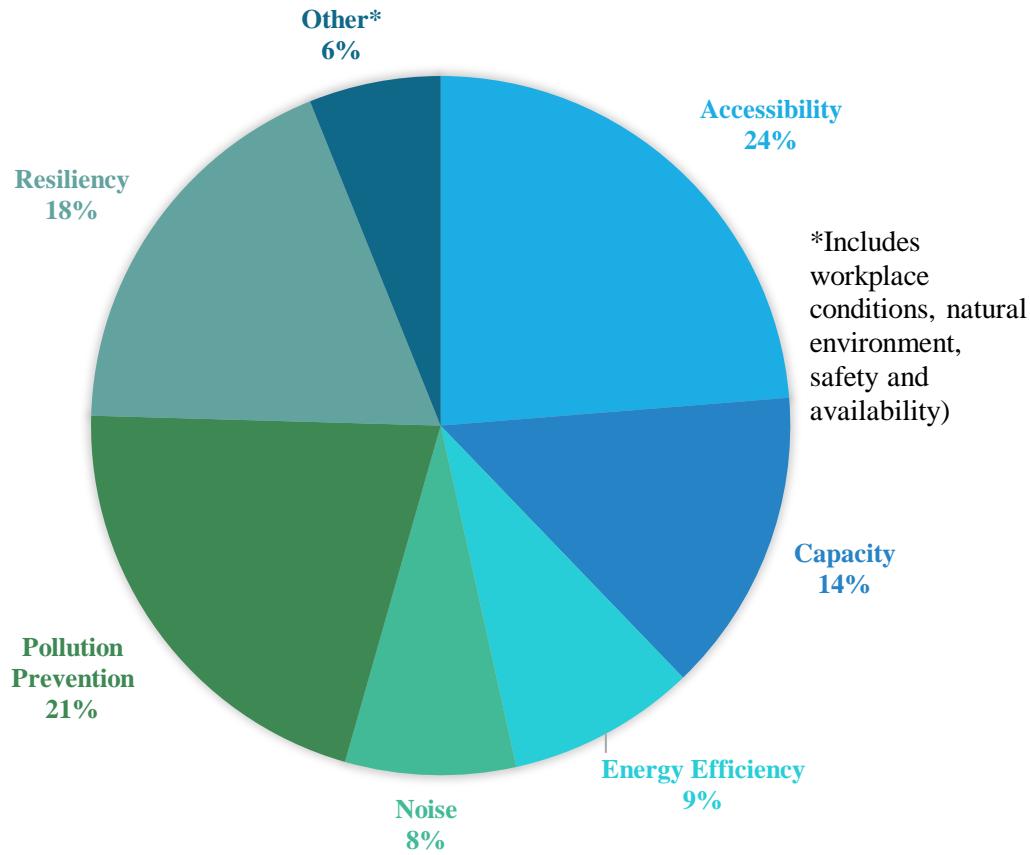


Sustainability Bond - Year One

In the first year, \$68.8 million bond proceeds were spent on 115 projects system-wide (up from the 74 original projects identified). The majority of funds were spent on accessibility improvements (24%), pollution prevention (21%), and resiliency (18%). In the first year, the largest three projects funded by bond proceeds were Neoplan 60'DMA Bus Overhaul (\$8.9 million); Wollaston Station/Quincy Center Garage Demolition (\$6 million), and the New Flyer 325 Bus Procurement project (\$4.5 million). The balance of unspent sustainability bond proceeds at the end of the reporting period was \$30 million.

Of the \$271.7 million issued in Sustainability Bond Anticipation Notes for the Positive Train Control project, \$140 million was spent in the first year.

SPENDING CATEGORY FOR SUSTAINABILITY BONDS -
YEAR ONE



NOT SHOWN: All \$140 million of BAN proceeds funded Positive Train Control, a safety initiative.

Project Highlights

Positive Train Control - Safety

Positive Train Control is an initiative designed to ensure safety for riders and employees by reducing the probability of collision and over-speed derailments and accidents. Using GPS-based safety technology, the system works to stop or slow a train that is not being operated safely.

The MBTA has introduced Positive Train Control in 96 locomotives and 84 control cars; installed 3,097 of transponder units and 232 miles of 394 miles of fiber optic cable; and trained 538 of 1,277 employees. Currently, PTC is in operation on 38 of the system's 394 miles of rail. The MBTA is currently on track to meet the federally-mandated PTC requirements by Dec. 31, 2020 (an extended deadline).

During PTC installation, crews have logged 264,117 safe man hours, i.e. there have been no safety incidents that have caused workers to miss work.

Sustainability Note Proceeds Spent to Date:
\$140 million



As part of a federal mandate passed by Congress in 2008, the MBTA is installing Positive Train Control (PTC) technology across all Commuter Rail lines.

Hybrid Buses – Pollution Prevention

The MBTA is modernizing its bus fleet, replacing old buses with fuel-efficient hybrid vehicles that consume 44% less fuel. Bond proceeds partially fund the cost to replace 325 buses with diesel hybrids. The estimated lifetime fuel reduction for the entire new fleet is 4.69 million gallons. Greenhouse gas reductions are expected to be nearly 69,000 tons according to the manufacturer, in addition to a 47,000-ton nitrogen oxide emission reduction. Further, idling time is projected to be cut by 1.5 million hours.

Sustainability Bond Proceeds Spent to Date: \$4.5 million



Hybrid buses use 44% less fuel than traditional diesel buses, which is estimated to save more than 800,000 gallons of fuel annually.

4.69 million
fuel
reduction



69k ton
reduction in
GHG



47k ton
reduction in
NOx



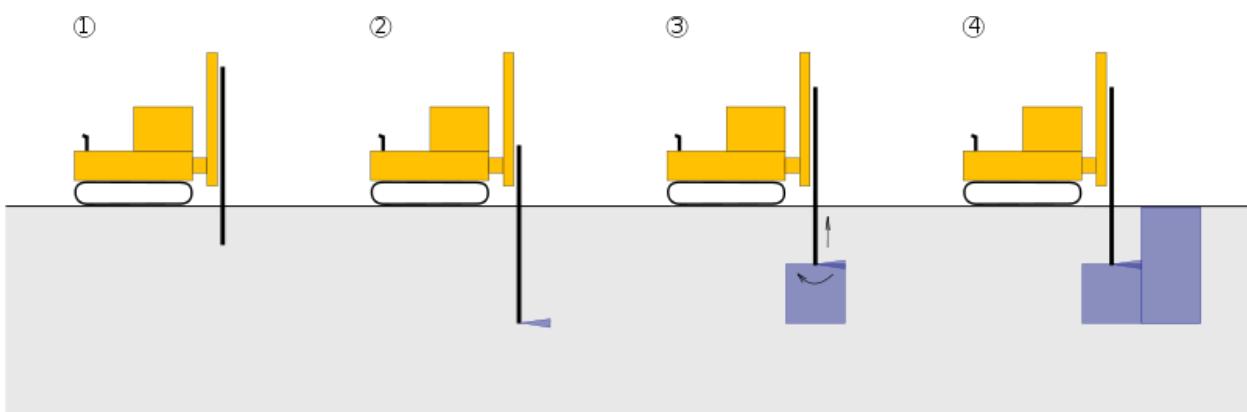
Charlestown Seawall - Climate Resiliency

The Charlestown seawall protects an essential bus facility from increasingly worse storms, prevents scour and erosion, and minimizes run-off. The project rebuilds a dilapidated retaining wall, modernizes drainage, and upgrades utilities; which will ensure that the site remains stable and completely functional, while protecting habitat and water quality along the Mystic River. The seawall was constructed using a new technology called jet-grouting (see diagram below) and protects more than \$140 million of MBTA assets.



Left: An image of ongoing work to build a seawall next to the Charlestown bus garage.

Below: Crews are employing a new technology in building the seawall called jet-grouting, which works by drilling a hole and pumping high velocity jets of grout through the side of a grout monitor, attached at the end of a drill. As the drill rotates and retracts, it leaves wide pillars that provide lateral stabilization against hydraulic pressure. The new technology has the same climate resiliency as more traditional methods, but at a lower cost, shorter construction time, and reduced risk of safety incidents during construction.



Sustainability Bond Proceeds Spent to Date: \$3.2 million



Massachusetts Bay
Transportation Authority

Additional Spending Categories¹

Project Name	MBTA Sustainability Priority Satisfied	Bond Proceeds Spent 10/31/17-10/31/18
OVERHAUL OF NEOPLAN 60' DMA BUSES Mid-life overhaul of Dual-Mode Articulated (DMA) buses operated on the Silver Line bus rapid transit service. These dual-mode assets operate on overhead catenary within the transit way and on diesel power on city streets.	Energy Efficiency, Accessibility, Noise	\$8,902,389
WOLLASTON STATION/QUINCY CENTER GARAGE DEMOLITION This project funds the design of accessibility and drainage improvements for Wollaston Station, as well as the Quincy Center garage demolition, which 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.	Pollution Prevention	\$6,023,741
ELEVATOR PROGRAM This program provides funding for the replacement/modernization of elevators and escalators throughout the system, ensuring improved accessibility.	Accessibility	\$4,516,398
NEW FLYER 325 BUS PROCUREMENT Purchase and delivery of 325 compressed natural gas (CNG) and diesel-electric hybrid buses to replace assets beyond their useful life	Capacity, Accessibility, Noise	\$4,491,224
ELEVATOR PROGRAM This program provides funding for the replacement/modernization of elevators and escalators throughout the system, ensuring improved accessibility.	Accessibility	\$4,516,398
TUNNEL REHAB This project involves performing repair and rehabilitation of tunnel walls and ceiling slab on various tunnel sections.	Resiliency	\$3,551,954
RUGGLES STATION UPGRADE 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.	Capacity, Availability, Resiliency	\$2,627,851
RED LINE SIGNAL TROUGH AND WINTER RESILIENCY 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.	Capacity, Safety, Resiliency	\$2,308,158
EMERGENCY BRIDGE REPAIR This project funds the design and remediation of selected bridges that are of immediate concern throughout the MBTA.	Safety, Resiliency	\$2,202,489

¹ Includes only projects in which more than \$100,000 in bond proceeds were spent in the first year.



Project Name	MBTA Sustainability Priority Satisfied	Bond Proceeds Spent 10/31/17-10/31/18
NORTH SIDE OPERATIONS CONTROL CENTER (NSOCC) Construction of Iron Horse Park Operations Control Center building to provide an updated dispatch facility for Commuter Rail North (CRN) and Pan Am freight and to house the back-up Positive Train Control (PTC) data center.	Resiliency	\$1,879,678
OVERHAUL OF 155 OPTION NEW FLYER BUSES Recondition 155 diesel buses to improve mileage and efficiency.	Energy Efficiency, Accessibility, Noise	\$1,744,165
ORANGE LINE TRACTION POWER UPGRADE This program provides funding for various power projects and other infrastructure work, necessary for the operation of the next generation Orange Line vehicles.	Energy Efficiency	\$1,410,362
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.	Capacity, Resiliency	\$1,265,198
EAST STREET BRIDGE REPLACEMENT The current bridge design has low clearance, and the roadway beneath has no sidewalks, posing a safety hazard to vehicles and pedestrians passing under it. The project allows for improved vertical clearance of 13 feet, 6 inches and five feet for sidewalks.	Safety, Capacity, Resiliency, Pollution Prevention	\$1,218,395
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.	Capacity, Resiliency, Pollution Prevention, Natural Environment	\$1,107,303
QUINCY HIGHSPEED CATAMARAN This project funds the procurement of a high-speed catamaran for MBTA Harbor Express serving Quincy.	Pollution Prevention, Capacity	\$886,368
ROCKPORT COMMUTER RAIL LAYOVER FACILITY PWR 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.	Pollution Prevention	\$633,460
COMMUTER RAIL MISC. EQUIPMENT (WINTER RESILIENCY) Upgrades to commuter rail equipment that improve winter resiliency.	Availability, Safety	\$626,258
LOCOMOTIVE OVERHAUL 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.	Capacity, Pollution Prevention	\$582,331
CABOT MAINTENANCE FACILITY - PCB REMEDIATION 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.	Safety, Pollution Prevention	\$546,813



Project Name	MBTA Sustainability Priority Satisfied	Bond Proceeds Spent 10/31/17-10/31/18
GREEN LINE #7 CAR MIDLIFE OVERHAUL 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.	Energy Efficiency, Pollution	\$535,838
AUBURNDALE/NEWTON COMMUTER RAIL STATIONS STUDY This project funds the design of accessibility improvements.	Accessibility	\$521,588
SYMPHONY STATION IMPROVEMENTS This scope includes the design of four new elevators, along with significant station modifications consisting of raising boarding platforms, new egress points at the platforms, a renovated station lobby, and reconditioning of the currently defunct restrooms.	Accessibility, Capacity	\$519,175
FOREST HILLS IMPROVEMENT PROJECT Finances improvements at the Forest Hills Station to comply with ADA and Massachusetts Architectural Access Board (MAAB) accessibility standards. Work also includes infrastructure and other improvements (e.g., wayfinding signage, installation of tactile platform edges).	Accessibility	\$475,624
45 HIGH STREET - DATA CENTER UPGRADES 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.	Energy Efficiency	\$410,181
NATICK CENTER STATION ACCESSIBILITY PROJECT The MBTA's Natick Center Commuter Rail Station ranks in the top 25% of busiest commuter rail stations. This project installed high-level platforms and a new set of crossovers east of the station to improve operational flexibility.	Accessibility	\$392,835
NEWTON HIGHLANDS GREEN LINE STATION ACCESSIBILITY PROJECT This project enhances accessibility to the existing Newton Highlands station on the Green Line D Branch.	Accessibility	\$374,664
ALEWIFE CROSSING IMPROVEMENTS As part of the Red/Orange Line Infrastructure Improvement Program, this project involves the upgrade of track switches at Alewife Station and associated retrofits to accommodate these new components.	Capacity	\$322,994
HARVARD SQUARE BUSWAY REPAIRS Rehabilitation of roadway, drainage and catenary infrastructure at the Harvard Square Busway.	Pollution Prevention	\$277,580
MANSFIELD STATION ACCESSIBILITY This project includes new stairs and ramps, canopies, accessible platforms, guardrails, improved lighting and a paved parking lot.	Accessibility	\$263,278



Project Name	MBTA Sustainability Priority Satisfied	Bond Proceeds Spent 10/31/17-10/31/18
RED LINE SUBSTATION TRACTION POWER UPGRADES 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.	Capacity, Energy Efficiency, Safety	\$248,571
FITCHBURG LINE SMALL STARTS Improvements to the Commuter Rail Fitchburg Line, including installing double track, construction of high-level platforms for better accessibility, replacement and updating of grade crossing warning system, construction of new and modified interlocking, transfer of the Waltham Tower to MBTA Control Center, and bridge repair and replacement.	Capacity	\$247,495
OAK GROVE STATION VERTICAL TRANSPORTATION IMPROVEMENTS Upgrades at Oak Grove Station will improve accessibility by adding new elevators and improving existing elevators. The project scope also includes upgrades to sidewalks and electrical equipment.	Accessibility	\$221,246
SHAWSHEEN WILMINGTON BRIDGE REHABILITATION This project is for the rehabilitation of the Shawsheen River Bridge located on the Wilmington/Billerica border, which carries the Lowell Commuter Rail over the Shawsheen River. The project will make for more reliable commuter rail service, bring the bridge into a state of good repair, and reduce maintenance costs and service impacts.	Capacity, Resiliency, Pollution Prevention, Natural Environment	\$219,439
GREEN LINE TRAIN PROTECTION Reduce the risk of red signal violations and train-to-train collisions on the Green Line and prevent overspeed derailments and unsafe intrusions into work zones.	Safety	\$214,386
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.	Capacity, Accessibility, Resiliency, Pollution Prevention	\$208,205
RED LINE #2 CAR OVERHAUL Overhaul of 58 Red Line No. 2 cars originally delivered in 1988 to improve reliability and reduce maintenance costs.	Capacity, Resiliency, Accessibility	\$206,156
PROCURE COMMUTER RAIL LOCOMOTIVES (BASE) 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.	Pollution Prevention	\$205,977
FENWAY PORTAL FLOOD PROTECTION This project involves the construction of flood control measures at the entrance to the Green Line subway tunnel adjacent to Fenway station. Large steel doors installed at the entrance to the Green Line tunnel to protect the subway from potential future flooding.	Resiliency	\$200,074



Project Name	MBTA Sustainability Priority Satisfied	Bond Proceeds Spent 10/31/17-10/31/18
BUS ROUTE SAFETY AND SERVICE IMPROVEMENTS Improvements at bus stops that have been identified as not accessible to seniors and individuals with disabilities. Retrofits by location may include: bus stop lengthening, new sidewalk landing pads, reconstructed sidewalks, curb ramps and crosswalks, pedestrian crossing signals, signage and pavement markings.	Capacity, Safety, Accessibility	\$188,862
LOCOMOTIVE RESTORATION TO INCREASE FLEET SIZE 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.	Capacity, Pollution Prevention	\$180,486
EVERETT BUS - FLOWFILL REPAIRS This project involves filling a large portion of the Everett basement with super air-entrained concrete in one area. This remedy will address the structural foundation issues as well as provide an engineered barrier for the earthen floor areas which have been contaminated with heavy metals.	Pollution Prevention, Natural Resource	\$167,963
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.	Capacity	\$150,989
PUBLIC SAFETY IMPROVEMENTS TO SYSTEMWIDE RADIO 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.	Safety	\$138,211
SYSTEMWIDE TRANSFORMER REPLACEMENT, PHASE 2 This project includes the rehabilitation or replacement of traction power substations throughout the system.	Energy Efficiency, Pollution Prevention	\$135,771
SHORELINE AND SAUGUS BRIDGES Full replacements of the 100-year-old Saugus drawbridge on the Newburyport/Rockport line and the Shoreline bridge on the Franklin line.	Capacity, Resiliency, Pollution Prevention, Natural Environment	\$135,258
LOCOMOTIVE/COACH IMPROVEMENTS Overhaul of key components of existing commuter rail revenue vehicles, with production years dating back to 1979.	Capacity	\$122,461
DORCHESTER AVENUE BRIDGE The design and construction for rehabilitation or replacement of three bridges along Dorchester Avenue in Boston that span MBTA rail lines. One of the three structures spans the Old Colony Commuter Rail Line that services Kingston, Plymouth, Middleborough, and Lakeville.	Safety, Resiliency	\$119,049
FEASIBILITY STUDY OF REMAINING INACCESSIBLE STATIONS Commissioning a feasibility study for all stations that remain inaccessible.	Accessibility	\$118,059



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