



# Administrator's Message

Dear Maryland Residents,

The Maryland Department of Transportation Maryland Transit Administration (MDOT MTA) has been providing transit services to the State for almost 50 years since its inception as the Metropolitan Transit Authority in 1969. Today, MDOT MTA operates the 12th largest multimodal transit system in the country with over 250,000 daily riders, five transit modes, and paratransit service, while providing support to locally operated transit systems throughout Maryland. Core bus service accounted for 68 percent of MDOT MTA's passenger trips and 42 percent of operating expenses.

MDOT MTA is committed to continually improving our customers' transit experience. To this end, we have adopted the following vision statement:

To provide safe, efficient, and reliable transit across Maryland with world-class customer service.

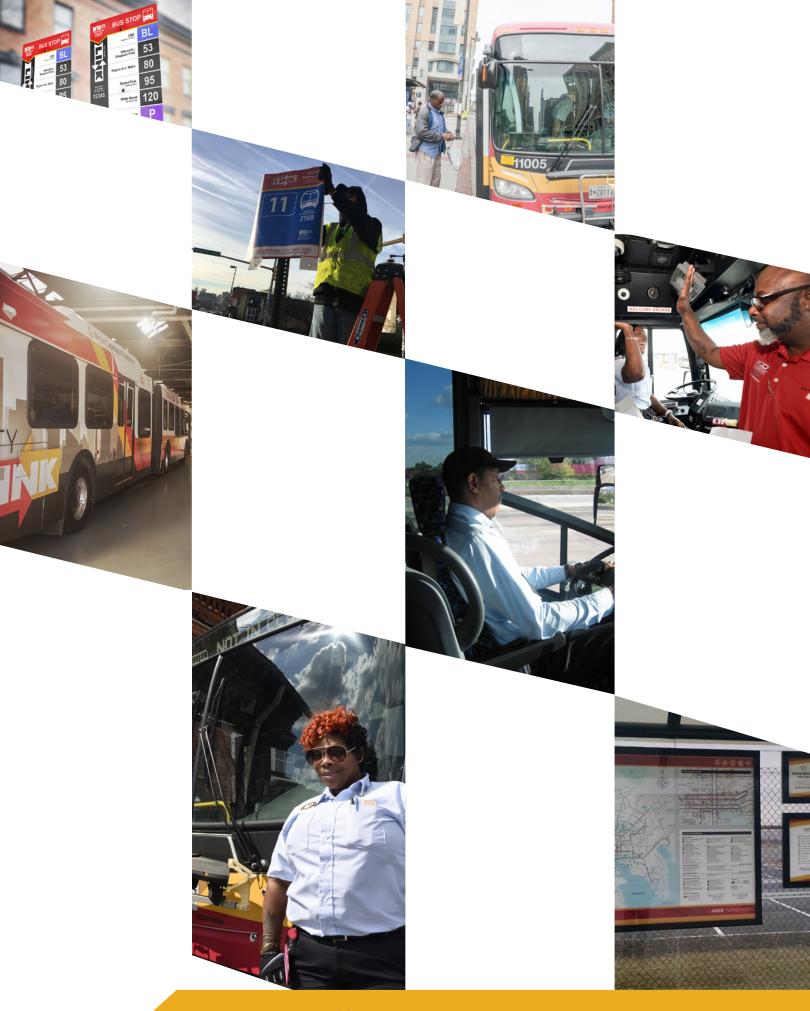
MDOT MTA's Cornerstone Plans translate this vision statement into strategic priorities, policies, programs, and initiatives for each of our transit modes. We are committed to responsibly managing our assets in a manner than supports our operational demands while seeking ways to enhance our customers' experience. Each Cornerstone Plan synthesizes MDOT MTA plans, policies, and reports with performance data, local and national trends, and stakeholder input. MDOT MTA comprehensively analyzes this information to create targeted recommendations for growth and investment in each mode that coordinate with the needs of the transit system overall. This Cornerstone Plan highlights MDOT MTA's long-term plans and priorities for bus service.

Most importantly, the Cornerstone Plans are living documents; these plans and projects may continue to evolve as our team advances in its mission to constantly improve our ability to deliver safe, efficient, and reliable transit with world-class customer service.

Sincerely,

Kevin B. Quinn, Jr.

**MDOT MTA Administrator** 





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# **Purpose of the Plan**

Public transportation serves a critical role in Maryland, connecting residents to jobs and services and driving the state's economy. MDOT MTA is committed to safely, efficiently, and reliably connecting Maryland's residents, businesses, and visitors to life's opportunities through effective planning and responsible management.

#### **MDOT Mission Statement**

The Maryland Department of Transportation is a customer-driven leader that delivers safe, sustainable, intelligent, and exceptional transportation solutions in order to connect our customers to life's opportunities.

The Bus Cornerstone Plan was developed, consistent with the goals of the MDOT Maryland Transportation Plan (MTP). These goals include:

- Ensure a Safe, Secure, and Resilient Transportation System
- Facilitate Economic Opportunity and Reduce Congestion in Maryland through Strategic System Expansion
- Maintain a High Standard and Modernize Maryland's Multimodal Transportation System
- Improve the Quality and Efficiency of the Transportation System to Enhance the Customer Experience
- Ensure Environmental Protection and Sensitivity
- Promote Fiscal Responsibility
- Provide Better Transportation Choices and Connections

The Cornerstone Plan is part of MDOT MTA's continuing commitment to achieve its goals through effective planning and management. This plan includes strategic priorities that support the four cornerstones of MDOT MTA service. Specific initiatives are also identified that provide recommended paths forward to implementation.

The Bus Cornerstone Plan (the Plan) provides the framework around which MDOT MTA will invest in Local and Commuter Bus service to deliver safe, efficient, and reliable transportation with world-class customer service. Derived from MDOT MTA's vision statement, these four cornerstones provide focus for the outcomes MDOT MTA seeks to achieve through its initiatives and investments. Looking ahead over the next 25 years, the Plan identifies strategic priorities and key investments for MDOT MTA to efficiently maintain Bus service, while leveraging many opportunities to introduce new technologies and amenities to improve the service.

MDOT MTA is a Transportation Business Unit (TBU) of the Maryland Department of Transportation (MDOT). As the 12th largest multimodal transit system in the United States, MDOT MTA operates:

- Local Buses (CityLink, LocalLink, and Express BusLink)
- Commuter Buses
- Light RailLink
- Metro SubwayLink
- Maryland Area Regional Commuter (MARC) Train service
- MobilityLink (a comprehensive paratransit system)

Additionally, MDOT MTA manages the taxi access service within the MDOT MTA MobilityLink service area and directs funding and statewide assistance to Locally Operated Transit Systems (LOTS) in each of Maryland's 23 counties, Baltimore City, Annapolis, and Ocean City.



#### Safety

Provide a safe and secure environment for every customer and employee. Ensure the transportation system is resilient to natural and man-made hazards.



Preserve existing assets and maximize the efficient use of resources and infrastructure.



#### Reliability

Deliver a reliable, frequent, convenient, and easy to use transit service for customers.



#### World Class Customer Service

Improve communication and responsiveness with MDOT MTA customers and stakeholders in an effective and professional manner.





MDOT MTA uses an iterative planning process to drive and monitor results. By continuing to develop this feedback loop, MDOT MTA will maintain a standard of excellence to serve its customers.

#### **ITE**RATIVE PLANNING PROCESS

#### **IDENTIFY**

issues and needs and frame from a customer pespective. Identify key parties who have a stake in the issue.

#### **MONITOR**

key performance indicators and analyze trends. Investigate cause and effect relationships of key trends.

IMPLEMENT
selected alternative
on schedule and
within budget.
Ensure that all
potential projects

threats are identified

and accounted for.

#### **ENGAGE**

key stakeholders and general public. Maximize participation in planning process and clearly define project. **EVALUATE**alternative
scenarios and
project options,
including no build
scenario. Evaluate
capacity to
implement
project.



# Overview of the Bus System

#### **History**

While streets, routes, and ownership have changed since the 19th century, prior to 2017, many current MDOT MTA bus routes followed the original streetcar lines operated by the Baltimore Transit Company and its parent companies between the 1890s and the 1960s. Between the 1940s and the 1960s, the original streetcar routes were converted to bus operations and consolidated in response to changing transit needs and trends. Additional routes and extensions were later added to serve newly developed communities and to feed into Metro SubwayLink and Light RailLink stations.

Between 2015 and 2017, MDOT MTA overhauled and rebranded the transit system under BaltimoreLink. Prior to this network redesign, MDOT MTA's bus system had many routes that were antiquated, did not serve current job centers, and were too long to deliver reliable service. Under BaltimoreLink, MDOT MTA's bus system delivers more efficient and reliable service by creating a network of high-frequency routes (CityLink) with stronger connections between all MDOT MTA modes.

Complimenting the core bus system, MDOT MTA's Commuter Bus program connects suburban commuters with downtown destinations where there are large concentrations of jobs. Launched in the mid-1980s as two separate programs serving Baltimore City and Washington, D.C., the Commuter Bus program uses private contractors to operate long-distance, workbased trips primarily from suburban park-and-ride lots into the central business districts (CBDs) of both cities, where they connect with local bus and rail systems. Service is scheduled Monday through Friday during morning and afternoon peak periods.

The initial Washington, D.C., routes originated in Charles County, but quickly expanded to Calvert and St. Mary's Counties during the late 1980s. Additional routes were established in the 1990s from Howard, Queen Anne's, and Anne Arundel Counties. Demand for – and service on – the Washington, D.C., commuter routes significantly increased during the 1990s, helped greatly by Federal transit subsidies for employees.

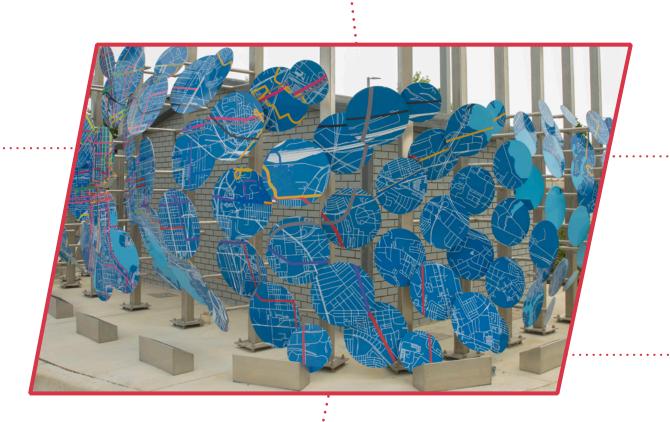
In recent years, the program has begun serving outlying suburbs further from the metropolitan areas of the state. In addition, some routes operate between suburban activity centers rather than going to either Washington, D.C., or Baltimore, and one route operates seven days per week on an hourly schedule.



#### **Service**

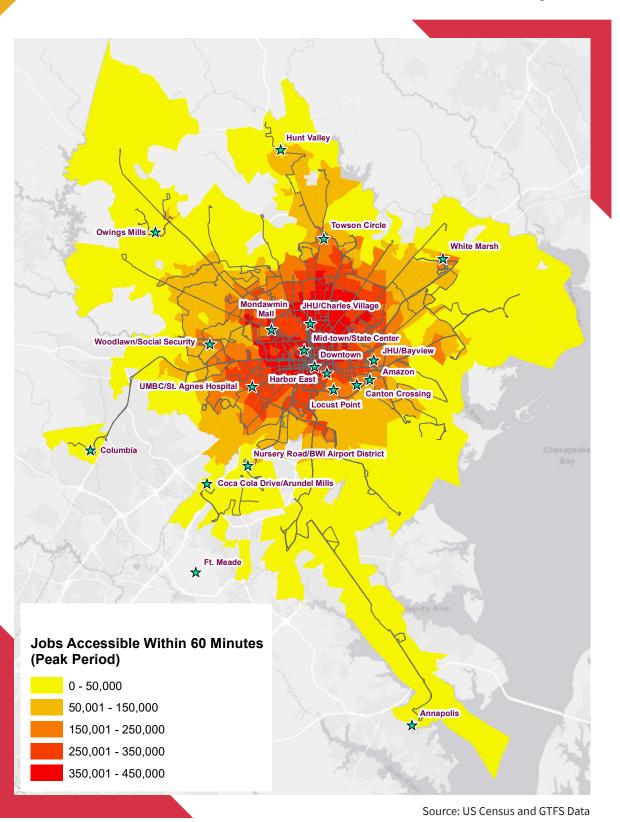
MDOT MTA is the largest public transportation provider in the State of Maryland and the twelfth largest in the nation. The agency provides several transit options across the Baltimore region, including bus service in the City of Baltimore and its suburbs, Light RailLink and Metro SubwayLink, and other services that connect the Baltimore region with the rest of the state via Commuter Bus service and the Maryland Area Regional Commuter (MARC) rail system.

MDOT MTA's core service area covers 1,795 square miles and serves over 2.2 million people. Over 840,000 jobs are located within a 15 minute walk or transit connection of the core bus system. As shown on the next page, the core bus system provides the access to upwards of 400,000 jobs within a 60-minute commute across much of Baltimore City during peak periods.



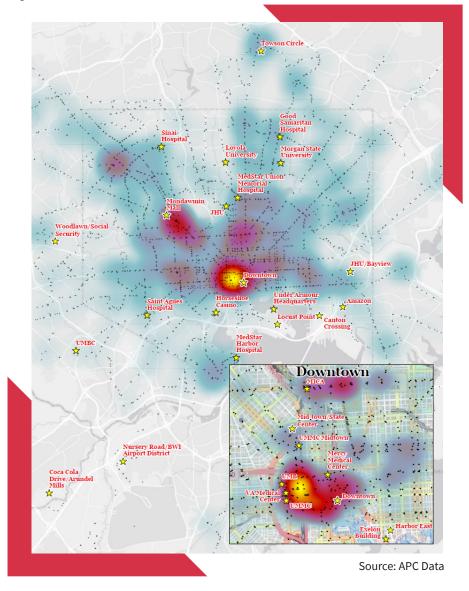


#### Jobs Accessible Within 60 minutes from Each Core Bus Stop



On an average weekday, MDOT MTA customers take approximately 250,000 core bus trips. Most of these trips are taken within the City of Baltimore and Baltimore County. While bus ridership draws from across the core service area, ridership is concentrated in the Downtown area, near Mondawmin and Rogers Avenue Metro SubwayLink Stations, and along major corridors such as North Avenue, Route 40, York Road/Greenmount Avenue, and 33rd Street. Core bus service forms the backbone of MDOT MTA's transit network and provides over 72 million trips a year and was therefore the focus of the BaltimoreLink network redesign.

# Bus Ridership Hot Spots: Average Weekday Boardings by Bus Stop





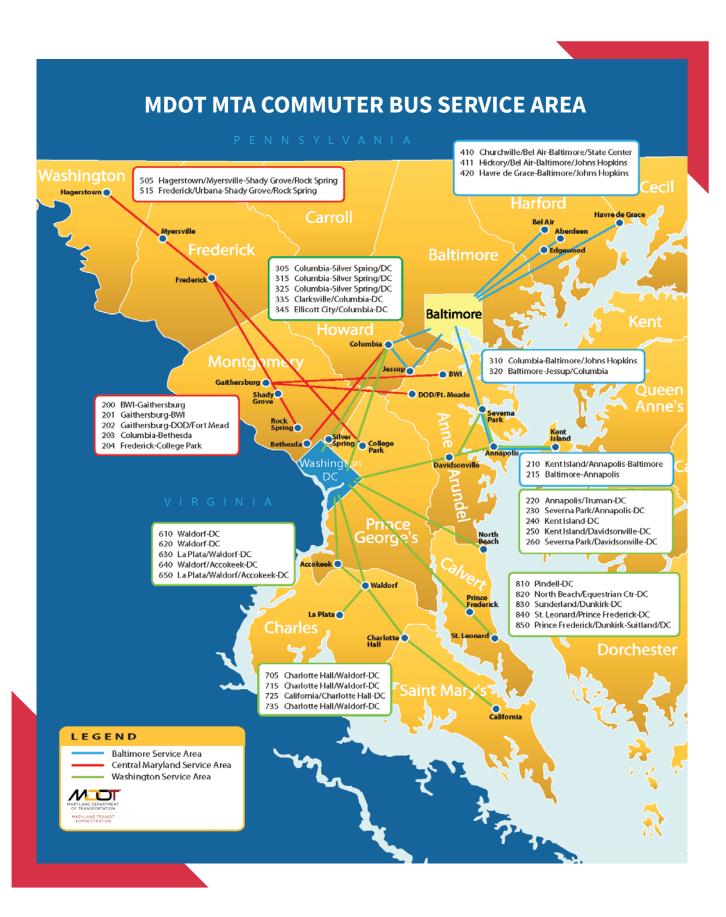
The MDOT MTA Commuter Bus program operates 38 routes, providing over 600 trips per day. Typical Commuter Bus routes provide trips during the morning peak period from a suburban area to a job center, and then from the job center back to the suburban area during the evening peak period. Several routes provide midday and reverse commute service to meet demand. On average, trips have 18 stops. Two new routes, the 210 and 215 between Baltimore and Annapolis, were introduced in 2017 under BaltimoreLink. The Commuter Bus program is split into three main service areas: Baltimore, Central Maryland, and Washington, D.C.

#### **MDOT MTA Commuter Bus Service Area Summary**

Service Area	Number of Routes	Total Daily Trips
Baltimore	9	95
Central Maryland	6	102
Washington	23	445
Total	38	642

Transit ridership fell in 31 of 35 major metropolitan areas in the United States in 2017. Factors such as low fuel costs, increased teleworking, higher car ownership and the rise of alternative transit means are believed to be causing this trend. Following this trend, ridership on MDOT MTA's core bus system fell by nearly 23 percent in the month after BaltimoreLink was launched in 2017, but it has since bounced back. Monthly ridership has been increasing since January 2018 and was down less than 1 percent in May 2018 compared to same period previous year.

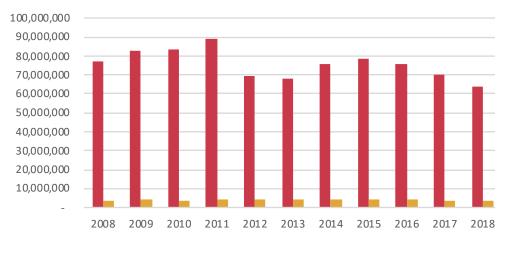
Commuter Bus had over 3.8 million trips in FY 2018, compared to just over 3.5 million in FY 2008, a 1 percent average annual growth over that period. Since FY 2008, ridership in the Central Maryland service area increased the most (11 percent). This growth corresponds with the expansion of service from one route in FY 2008 to the six routes that currently serve the area. Factors such as level of service, economic conditions, the cost of alternative transportation modes, accessibility, and land use patterns may be among the factors that impact ridership.





#### **Annual Ridership for Bus**





Source: National Transit Database, FY 2018 and MTA Operating Data, unlinked passenger trips

■ Core Bus ■ Commuter Bus

The table below shows the number of miles per year that buses are operated in revenue service. Revenue miles increased substantially in 2017 and 2018 after being relatively flat for several years.

#### **Annual Vehicle Revenue Miles for Bus**

#### Vehicle Revenue Miles 25,000,000 20,000,000 15,000,000 10,000,000 5,000,000 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 ■ Core Bus ■ Commuter Bus

Whereas MDOT MTA operates core bus service directly, MDOT MTA's primary role on the Commuter Bus Program is contract oversight and Program management, including procurement of the services. For the Commuter Bus Program, MDOT MTA uses a service contract method by which private operators provide a turn-key service for a route or a group of routes. Each contractor assumes responsibility for vehicle procurement, personnel, deadhead mileage, and vehicle maintenance, liability and any other associated risks. Customer relations for the Commuter Bus Program are managed by MDOT MTA staff. There are the seven contractors retained to operate Commuter Buses within the MDOT MTA Program.



Partnered with *Transit*, a mobile app that provides real-time transit information, simple trip planning, and step-bystep navigation.

Launched *CharmPass*, a fare payment app that enables passengers to buy and store fares right on their phones.

Refined service to increase efficiency.

# BaltimoreLink **Accomplishments**

Implemented the *Rate Your Ride* campaign
that achieved a reduction
in customer complaints.

Improved on-time performance.

Won an award for Operations Excellence from the American Association of State Highway and Transportation Officials (AASHTO).

Reduced the number of preventable accidents.

#### **BaltimoreLink Accomplishments**

#### The Pre-BaltimoreLink Network

For many years, the bus system moved hundreds of thousands of people every weekday but had not adjusted to shifting employment centers or worsening traffic conditions; consequently, it had become unreliable and inefficient.

The network's most frequent bus routes radiated from Downtown Baltimore in nearly every direction. Crosstown service operated less frequently, demanding that riders sometimes travel downtown and transfer to another radial route that would take them back out to their desired destination.

#### **Planning and Designing BaltimoreLink**

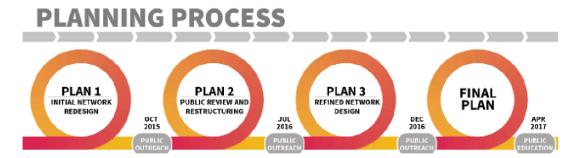
To build a better bus system, MDOT MTA designed routes through inclusive service planning, improved infrastructure, and better-supported operations. MDOT MTA assessed impacts and merits during the planning process through technical impact analyses, public involvement, and internal stakeholder engagement.

This system redesign was a collaborative effort of MDOT MTA that produced three draft service plans based on the following goals:

- Improve service quality and reliability;
- Maximize access to high-frequency transit;
- Strengthen connections between MDOT MTA's bus and rail routes;
- Align the network with existing and emerging job centers; and
- Involve riders, employees, communities, and elected officials in the planning process.

The redesign included establishing alignments, frequencies, and spans for every route in the new BaltimoreLink system. The final system design was approved and implemented in June 2017.

Public outreach and education were a major component of BaltimoreLink and shaped service planning decisions from initial planning to implementation. Bus operator inreach was similarly robust and raised important service planning and operational issues that could then proactively be mitigated through design. MDOT MTA analyzed data from existing routes to build realistic run times and schedules for the new BaltimoreLink routes segments that aligned with the new system. The new BaltimoreLink service was ultimately designed through this intensive iterative process, graphically represented in the diagram below.





#### **Systemwide Upgrades**

Robust data analysis guided by realistic operational parameters, such as the number of available operators and vehicles, informed the BaltimoreLink system redesign. As a result, the new system provides service that is more efficient and reliable. Under BaltimoreLink, MDOT MTA purchased 172 new buses (22 percent of the existing fleet), which allowed MDOT MTA to retire old and unreliable buses, increase the number of available buses, and consequently improve system reliability.

Infrastructure upgrades, such as transit signal priority (TSP), dedicated lanes, new signage, and transit hubs, complement the redesigned system and provide customers with a better journey, beginning to end.

Under BaltimoreLink, MDOT MTA created a new bus transfer facility at the West Baltimore MARC Train station with customer amenities, such as shelters, benches, new lighting fixtures, wayfinding signs, and real-time arrival display boards. A new bus loop with multiple bus bays facilitates safer, more efficient transfers for customers



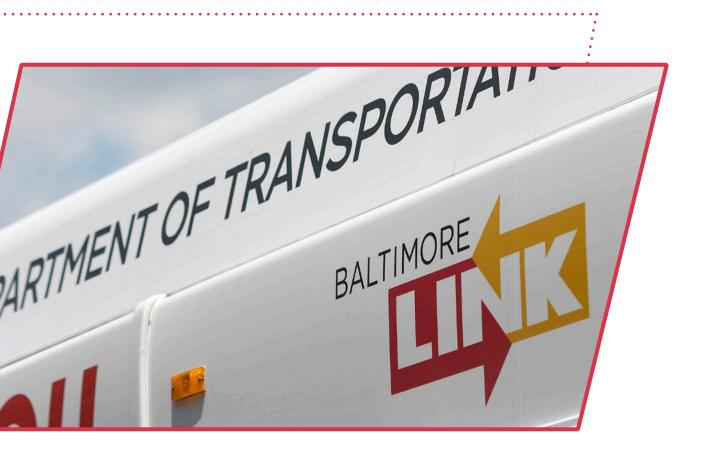


#### **Continual Improvement**

At its core, BaltimoreLink was designed to be more reliable, efficient, and to effectively transport the public to jobs, services, and to life's opportunities. Through a process of continual improvement, MDOT MTA will adjust routes, refine runtimes, and respond to changes in job centers and other transportation drivers. Further, MDOT MTA constantly explores technological advancements to design and deliver reliable service and timely information.

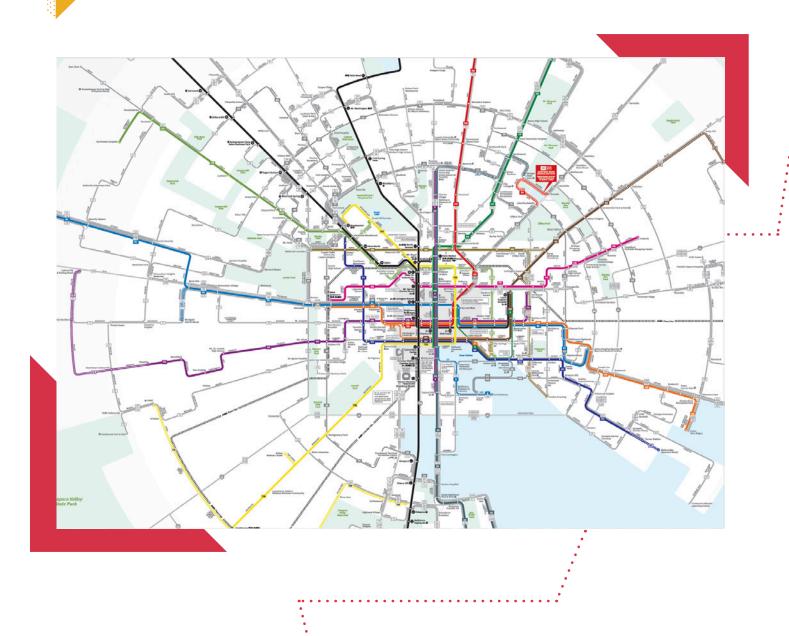
MDOT MTA's public outreach and operator inreach programs will continue to be key components in the planning process. Our bus operators are often the most effective and efficient ambassadors to educate the public, ensuring that our planning efforts integrate their insight and input.

Future infrastructure improvements and investments, such as dedicated bus lanes and transit signal priority (TSP), will further improve the system over time. MDOT MTA initially identified 25 streets in Downtown Baltimore with CityLink or frequent LocalLink bus service that could benefit from dedicated bus lanes, from which a select number were implemented as pilots. Due to the success of the pilot, MDOT MTA is working with Baltimore City to expand the number of dedicated bus lanes through North Avenue Rising. This project will add an additional 7 miles of dedicated lanes in the City.



MDOT MTA's Commuter Bus group has recently completed retrofitting all the Coaches with GPS based vehicle trackers. This will not only enable real time data feed for commuters, but also allow MDOT MTA to track on-time performance and contract adherence.

#### **BaltimoreLink System Map**



# **Strategic Priorities**

Looking ahead, MDOT MTA has established five strategic priorities for Bus that support the four cornerstones of the agency's vision. These priorities provide focus for future decisions and investments. The priorities are:

- 1. Safety and Security
- 2. Operational Performance
- 3. Asset Management
- 4. Customer Experience
- 5. Practical Design

#### **Safety and Security**

Ensuring the MDOT MTA systems are safe and secure for riders, employees, contractors, and the general public is MDOT MTA's number one priority. Providing a safe and secure Light RailLink system involves a broad range of activities, from timely inspection and maintenance of vehicles, electrical systems, and guideway; to proper training and operating protocols and communication; to effective police enforcement and security equipment.



In 2014, 2015, 2016, and 2017 the MDOT MTA Police Force reported the lowest number of serious crime incidents among the top 12 transit agencies in the country<sup>1</sup>. MDOT MTA will continue to strategically deploy MDOT MTA Police Officers, public safety announcements, ad campaigns (e.g., "See Something, Say Something," and "Keep Your Smartphone Safe"), and technology (e.g., closed-circuits television and emergency blue light telephones) to ensure system safety.

MDOT MTA is committed to increasing its ability to proactively mitigate threats when possible and recovery quickly when events occur. The agency's resiliency strategy prioritizes the safety of customers and employees. MDOT MTA resiliency strategies are critical to protect customers, employees, and physical assets from threats posed by natural and man-made threats such as fires, floods, extreme weather, burglary, theft, vandalism and terrorism.

<sup>1</sup> Lowest number of part 1 crime of the top 12 transit system agencies – APTA Bus Safety & Security Gold Excellence Award MARTA National Study



#### **Operational Performance**

On-time performance of MDOT MTA buses was 68 percent in 2018. MDOT MTA is committed to maintaining strong operations management protocols and investing in reliable equipment to maintain high-quality service. In addition, MDOT MTA will pursue opportunities to increase the speed of bus service to better meet customer needs. Efficient and reliable bus operations involve systems, equipment, and personnel working effectively together.

Bus operations personnel are the front-line staff who identify critical issues that may impact service. In addition to the operations personnel, continuing investments in technology and communications systems will be needed to maintain and improve MDOT MTA's ability to actively monitor and manage daily operations.

#### **Bus operations support includes:**

- Bus Operators
- Dispatch
- Operations Control
- Field Supervision
- Call Center Management
- Maintenance Coordination
- Police Coordination



Every day, staff across the agency collaborate to provide reliable operations, responding to normal fluctuations in traffic conditions and passenger loads, as well as major weather events and incidents that affect bus travel.







#### **Asset Management**

Bus assets include vehicles, stations, facilities, and systems with a total value of approximately \$1.17 billion. MDOT MTA is committed to effectively managing these capital assets and maintaining its system in a State of Good Repair (SGR) to support safe, efficient, and reliable transit service.

Transit Asset Management is a strategic approach to managing the agency's fleet, infrastructure, equipment, and facilities to optimize their performance and useful life, and minimize their whole life cost. MDOT MTA will align its asset and safety management practices and proactively review and communicate safety-related issues.

# Asset Management Asset Management Benefits Reduced Capital and Operating Costs Reduced Safety and Service Risks Increased System-Wide Performance Risk Management Risk Management

Asset Management is a strategic approach to optimizing performance and minimizing lifecycle costs

MDOT MTA will employ data to inform investment decisions and accurately capture capital and operating costs to assess and optimize the total cost of asset ownership. The agency will assess maintenance and capital programs to improve operational performance, reduce asset related risks, and reduce SGR backlog. Through improved management, internal/external asset communication, service reliability, convenience, and accessibility, MDOT MTA will enhance customers' experience.

Asset Management will also help reduce MDOT MTA's impact on the environment and guide the agency to make our transit system more resilient. Lifecycle cost considerations and improved equipment efficiencies will help reduce the financial, social, and environmental costs of the bus system, which supports MDOT MTA's commitment to sustainability.

#### **Improved Customer Experience**

MDOT MTA strives to provide our customers with world-class service at every stage of their trip. MDOT MTA will seek opportunities to upgrade technology and amenities to make it easier, more efficient, and more convenient to use transit to access jobs, education, amenities, and services.

Ensuring that the public can safely, efficiently, and reliably access stations is a key focus for improving customer experience with the core bus system. MDOT MTA is committed to ensuring our service, facilities, and vehicles are accessible to all members of the public, including those with disabilities. Further, we continue to find ways to strengthen the connections to core bus for all those accessing our vehicles and stations, including those who arrive by:

- Wheelchairs and other mobility devices
- Foot
- Bicycle
- Rail or other transit
- Carpool
- Carshare
- Taxi
- Park & Ride

MDOT MTA is committed to developing strong relationships with partners and customers and using their input to deliver better service. MDOT MTA is

committed to the following public engagement objectives to ensure a truly collaborative process with our stakeholders:

- Reach a meaningful cross-section of stakeholders across demographics, interests, and experiences
  of people who are affected by transit, including those who are often under-represented.
- Incorporate customer, community, and stakeholder input and insight into MDOT MTA decisions.
- Provide clear avenues for members of the public to receive information, provide input, and share concerns.
- Explain when and how public input is used.
- Provide interactive experiences across a variety of meeting formats, both in-person and online.







#### **Practical Design**

Practical design guides all MDOT MTA investments, applying the idea that the needs of the system are prioritized over the wants of a specific project. This approach enables MDOT MTA to complete more projects by ensuring that each individual project targets its core priorities and needs. Practical design also provides greater flexibility to address problems and improve the system through innovation.

MDOT MTA will apply Practical Design principles to achieve its mission with constrained resources. Practical design adheres to the following guidelines:

- Every project will make the facility safer after its completion.
- The design solution shall be reached in a collaborative environment.
- The design solution shall match the project need(s).
- Designs shall use the flexibility that exists in current engineering specifications and guidance while ensuring the minimum design thresholds are achieved.
- The goal cannot be to shift investment costs to maintenance. Rather, the goal should be to obtain the best value for the least cost.

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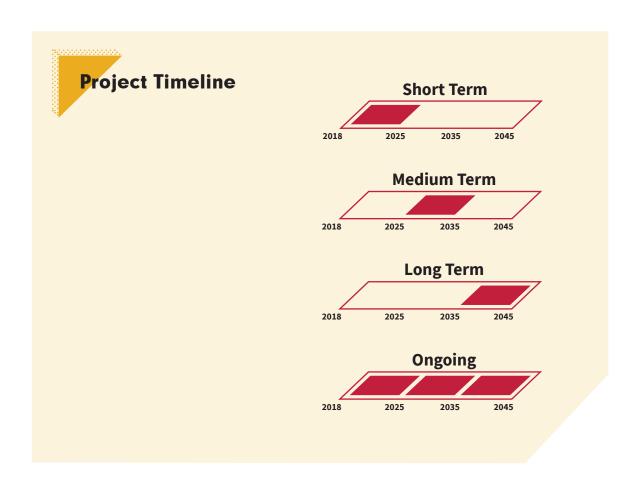


### **Bus Investment Areas**

This section of the Plan categorizes the initiatives needed to provide safe, efficient and reliable core bus service over the next 25 years in 6 investment areas:

- Vehicles
- Bus Stops and Stations
- Systems
- Facilities
- Guideways
- Service

The following sections identify key initiatives in each investment area. These initiatives highlight major investments and customer-facing changes. It is not an exhaustive list, as additional projects are anticipated in each investment area to maintain a state of good repair and to improve customer experience.



Investment Areas	Timeframe	Initiative	
			26
	Short term	Hybrid Battery Replacement	36
Vehicles	Medium term	Revenue Fleet Replacement	
	0	Non-Revenue Fleet Replacement	35
	Ongoing	Bus Mini Overhaul Program	36
	Medium term	Downtown Transfer Facility	40
Bus Stops and		Shelter Expansion	39
Stations		Parking and Accessibility Improvements	39
014110113	Ongoing	Bus Stop Signs	40
		Accessibility Enhancements	41
		Real-Time Signage	42
	Short term	Bus-Unified System Architecture	42
Systems		Transit Signal Priority	43
·	Medium term	Fare Collection	44
	Ongoing	Radio Equipment	44
	Short term	Kirk Division Replacement	46
	Short term	Washington Boulevard Rehabilitation	
Parillala.	Medium term		47
Facilities		Eastern Division Rehabilitation	47
	Long term	Northwest Division Rehabilitation	48
	Ongoing	Maintenance and Support Equipment	48
		North Avenue Rising	50
Guideways	Short term	Dedicated Bus Lanes	
	Ongoing	Transit Priority	51
	Ongoing	Halisit Phonity	52
	Short term	Microtransit	54
Service	Ongoing	Annual Service Plan	55



## **Vehicles**

The MDOT MTA bus fleet includes 770 revenue vehicles, which generally have a lifecycle of 12 to 15 years. Currently, the fleet undergoes regularly scheduled maintenance, and MDOT MTA periodically invests in upgraded vehicle technology that provides safety and customer service improvements. Over 90 percent of the fleet comprises standard 40-foot buses; the remaining buses are 60-foot articulated buses. Most local buses operate regular service seven days a week throughout most hours of the day and evening, with select routes operating twenty four hours a day.

MDOT MTA's Commuter Bus Program operates with a combination of public and private vehicles. There are a limited number of MDOT MTA-owned vehicles that are leased by contractors in this Program, which will not be replaced with new vehicles. Commuter Bus will use 100 percent contracted vehicles after this.

#### **Revenue Fleet Replacement**



MDOT MTA aims to provide customers with a safe and reliable bus fleet that meets peak vehicle requirements for core service with a 20 percent spare ratio, as the Federal Transit Administration (FTA) recommends. To meet this goal, MDOT MTA replaces buses annually and seeks to maintain consistent relatively procurement of approximately 70 buses each year. MDOT MTA seeks to maintain an average fleet age of seven years, as recommended by the FTA. This reduces maintenance costs and ensures reliable service.

#### Non-Revenue Fleet Replacement



Non-revenue vehicles essential to support core bus service include vehicles assigned to field supervision, as well as light trucks and a variety of maintenance/service vehicles, such as forklifts, bucket trucks, and large tow trucks. These vehicles will require periodic replacement when they meet their useful life benchmarks.



MDOT MTA has over 400 diesel electric hybrid buses in its revenue fleet. The rooftop batteries last six to seven years and need to be replaced at the end of their useful life. The battery replacement cost is approximately \$50,000 per battery. In FYs 2016 and 2017, MDOT MTA retrofitted approximately 65 buses with new batteries. Remaining batteries will be replaced between FYs 2018 and 2024.

#### **Hybrid Battery Replacement**



MDOT MTA is implementing a bus mini overhaul program to improve bus reliability. The mini overhaul includes a common set of bus maintenance needs. such as replacement of belts and air valves, and overhauling of high cost items such as engines, compressors, and alternators that were identified from an intensive review of corrective maintenance program. This program is not a full scale overhaul, but it targets common failure points. This structured overhaul helps properly time, group, and centralize the labor, parts delivery, and the budget. The mini overhaul program is not expected to increase MDOT MTA's operating budget for bus maintenance.

#### **Bus Mini Overhaul Program**

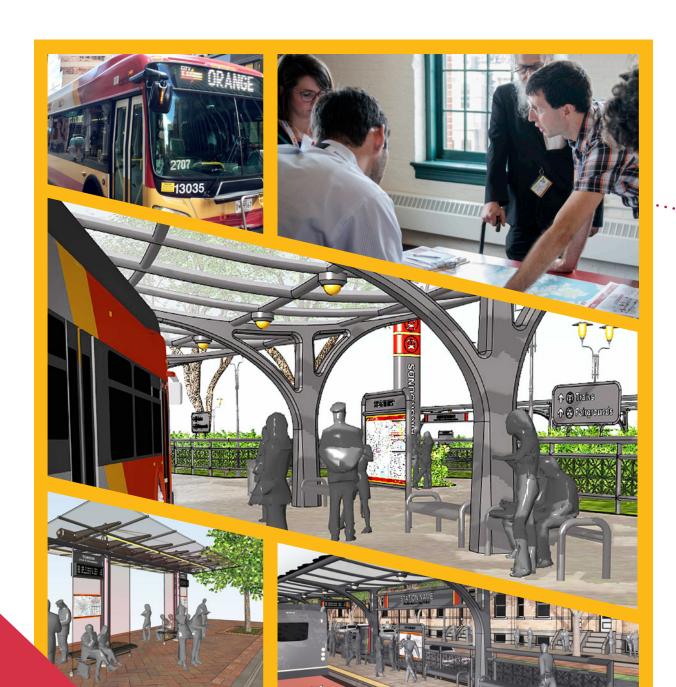






## **Bus Stops and Stations**

Bus stops, ranging from a sign on the street to multi-modal transit hubs with amenities, are a key link in our customers' journey, where riders need to know where to wait, identify which routes serve the stop, and obtain other necessary information. Improving on-street transit stops results in two benefits: first, higher quality stops are more attractive and promote the agency brand; second, these stops can include enhancements that will make them more accessible for riders and support better performance.

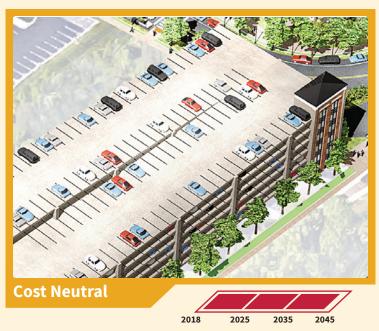


#### **Shelter Expansion**



Bus shelters provide protection from the elements and seating for our customers, including those with mobility challenges. Typically, shelters have clear side-panels for visibility and safety. The core bus system's 434 bus shelters are, on average, 13 years old and have a 40-year expected service life. MDOT MTA plans to increase the number of bus stops with shelters to enhance our customers' comfort. MDOT MTA is currently working to add 200 shelters systemwide. Several shelters in downtown Baltimore will incorporate iconic branding and wayfinding.

# Parking and Accessibility Improvements



MDOT MTA will continue to work with local jurisdictions to find suitable locations for commuter parking options. Local jurisdiction staffs will be consulted as they are more likely to know about potential opportunities for short or long-term commuter parking. Additionally, MDOT MTA will coordinate with local jurisdictions to promote bicycle and pedestrian accessibility to Commuter Bus service. MDOT MTA will continue to add adequate bicycle parking facilities where applicable to encourage alternative modes for accessing Commuter Bus.



# Downtown Transfer Facility

Enhanced amenities at major transfer points continue to be a focus for MDOT MTA. MDOT MTA is currently working to design a downtown bus transfer center. The goals include enhanced canopies, seating, wayfinding, bus and traffic operations, and pedestrian safety and circulation.



#### **Bus Stop Signs**

MDOT MTA provides over 4,400 bus stops, all of which were recently redesigned and renewed for BaltimoreLink. BaltimoreLink's launch unveiled new signage throughout the entire MDOT MTA bus system, with a more legible and informative layout for a better customer experience. For the first time, MDOT MTA bus stop signs display route destinations, frequencies, and real-time tracking information in a single location. Bus stop signage will continually be updated and replaced, due to normal wear and tear, and to reflect service changes.

#### **Accessibility Enhancements**

MDOT MTA is continually working to improve the accessibility of the bus stops. The agency is currently developing an inventory of all bus stops, including ADA features and documenting condition of all bus stops, including sidewalks, curb cuts, concrete bus pads, signage and information boxes. Using this evaluation as well as wheelchair ramp deployment data, MDOT MTA will prioritize and implement accessibility improvements at bus stops throughout the core system.





## **Systems**

Systems supporting bus operations include security and communications systems such as mobile radio systems, scheduling system including Computer Aided Dispatch and Automated Vehicle Locating technologies and farebox and revenue collection systems.

#### **Real-Time Signage**



In 2018, MDOT MTA installed GPS tracking on all MDOT MTA buses and partnered with Swiftly and Transit App to use the GPS data to support a mobile application that provides real-time arrival information, simple trip planning, step-by-step navigation, and more. Customers are now able to receive accurate location and arrival information for every CityLink, LocalLink, and Express BusLink bus in the BaltimoreLink fleet.

MDOT MTA also uses this data to display real-time bus arrival information at select bus shelters and transfer stations. These electronic signs keep the passengers updated with current bus service and arrival/departure status.

#### **Bus-Unified System Architecture**



2018 2025 2035 2045

The Bus-USA project will provide a proven, integrated, state-of-the-art suite of on-board bus systems that are standardized throughout the fleet. The system will also provide accurate, reliable information that supports daily fleet management and control. The Bus-USA project will include communication components (new radio and cellular data communications), a new camera system, a fixed end subsystem (CAD/AVL, CCTV server), and onboard vehicle subsystems (automatic vehicle location, automated voice annunciation, automatic passenger counting, vehicle health monitoring, supervisor mobile data terminal). The project is expected to be completed in 2020.

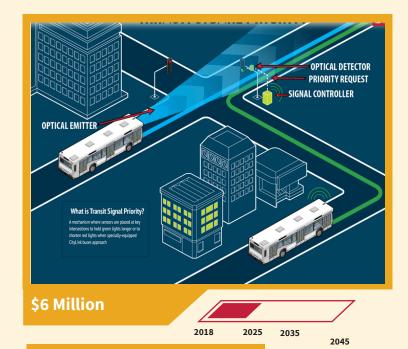
#### **Transit Signal Priority**

Transit signal priority (TSP) is a general term for a set of operational improvements that use technology to reduce dwell time at traffic signals for transit vehicles by holding green lights longer or shortening red lights. TSP systems require four components:

- A detection system aboard transit vehicles
- A priority request generator which can be on the vehicle or at a centralized management location
- A strategy for prioritizing requests
- An overall TSP management system

MDOT MTA has installed TSP equipment on the entire bus fleet and at 36 intersections along Greenmount Avenue/York Road and Loch Raven Boulevard. These corridors have seen travel times reduced by up to 22 percent.

MDOT MTA is working with Baltimore City to implement TSP on additional corridors, including North Avenue, Liberty Heights Avenue, and Belair Road.







#### **Fare Collection**

MDOT MTA will leverage rapidly evolving technology to provide customers new, convenient, and secure options to purchase transit fares. The fareboxes currently in use on the core bus fleet accept cash, magnetic strip tickets, and Charm Cards. MDOT MTA has released the CharmPass app enabling mobile ticketing and free transfers between Bus, Light RailLink, and Metro SubwayLink for up to 90 minutes.

Fare collection system enhancements include improved customer service, an expanded point-of-sale network for purchasing transit fares, and new reduced fare identification cards.



#### **Radio Equipment**

Bus radio equipment enables the operator contact the dispatcher, and provides location data. The average expected life for radio equipment is eight years for handheld equipment and fifteen years for base stations.

Replacing radio equipment, radio towers, and two-way handheld radios and relevant base stations proactively ensures that MDOT MTA personnel can safely and efficiently communicate across the system.

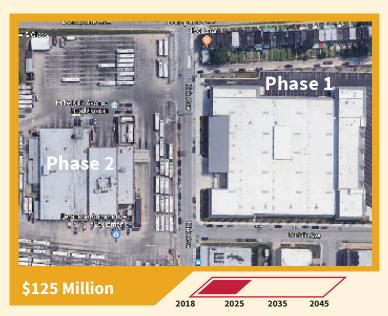




### **Facilities**

Core bus facilities include administrative and maintenance buildings, grounds, and equipment that support operations. MDOT MTA stores and maintains its fleet of transit buses at its four divisions: Bush, Eastern, Kirk, and Northwest. Fueling, cleaning, daily inspections, preventive maintenance, and most unscheduled repairs occur at these four divisions.

#### **Kirk Division Replacement**



New Kirk Division facilities are currently being constructed in two phases. The first phase was completed in 2017 and includes a new 100,000 square foot state-of-the-art maintenance facility on the south side of Kirk Avenue. The new facility is completely enclosed and the lower level of the facility houses repair bays, shops, parts storage, and down/ready bus parking.

The second phase of the project, a new transportation and bus storage building, is now under construction on the original Kirk Division site. The new facility will house parking for approximately 145 buses, fueling, vaulting, and bus wash services. Additionally, the bus transportation functions will be housed in this facility to include dispatch, locker rooms, assembly rooms, and administrative spaces.



#### **Washington Boulevard** Rehabilitation

MDOT MTA's Bush Division is a 27-acre historic property that includes two main structures that were constructed in 1900, a wash house that was built in the 1990s, and a main shop that was completed in 2016. It requires regular upgrades and renovations to support over 250 buses using five different shops and office space for over 150 management personnel. In addition to regular maintenance of the existing structures, MDOT MTA plans to rehabilitate and reconfigure the division to address inefficiencies related to the current configuration.



#### **Eastern Division** Rehabilitation

MDOT MTA's Eastern Division includes two structures and bus parking. The current maintenance building was originally built in the 1930s to house both transportation and maintenance functions, and was last renovated when the new transportation building and wash lanes were constructed in the 1960s. Rehabilitation of the Eastern Division will address challenges associated with the current facility's aging structure and inadequate shop space. The rehabilitation will resolve architectural, structural, mechanical, and electrical issues that impact day to day safety and efficiency. Additional goals include better site circulation, administrative offices, employee parking, storage space, and security.

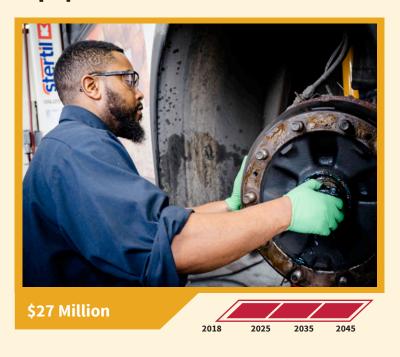


#### **Northwest Division Rehabilitation**



Constructed in 1987, the Northwest Division is the newest operating division, but it will reach the end of its useful life in 2037. The transportation and administration section is attached to the bus storage garage. The garage also houses the service lanes (fuel, vacuum, wash) and the vault pull station. A second structure contains a 16bay maintenance shop that houses all bus maintenance activities including shops, storage, and personnel areas. In addition to maintenance equipment upgrades (bus lifts, new fluid tanks etc.), building renovations, including a roof replacement and some reconfiguration of the building functions to improve efficiency, will be needed over the coming years.

# Maintenance and Support Equipment



Each maintenance division contains various equipment that support the operations, including air handlers, bus washers, oil/water separators, sweepers/scrubbers, machine shops, drills, lifts, presses, HVAC units, etc. Expected useful life for these items varies, but all equipment will need to be replaced within the next 25 years.





## Guideways

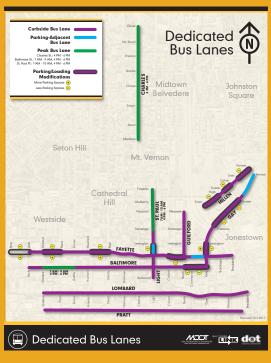
#### **North Avenue Rising**



North Avenue Rising builds on the collaboration successful between MDOT MTA and Baltimore City DOT during BaltimoreLink to implement bus lanes that contributed to increased speed, safety, and reliability of transit service in the downtown area. North Avenue Rising is a suite of transportation investments including dedicated bus lanes, enhanced bus stops, accessibility improvements to the Penn-North Metro SubwayLink Station, improved crosswalks, bike boulevards and lanes, and needed intersection improvements roadway repaving throughout the corridor. The project is intended to leverage multi-modal transportation infrastructure investments to enhance community economic development and stability in a corridor spanning approximately five miles and touching over a dozen neighborhoods.

North Avenue Rising is part of ongoing investment in this critical corridor, with the recently-complete East Baltimore Streetscape and Repaving Project (from Aisquith to Washington Streets) and MDOT MTA's enhanced BaltimoreLink bus stops at Penn-North, Light Rail (MICA-North), and Harford (Courthouse).



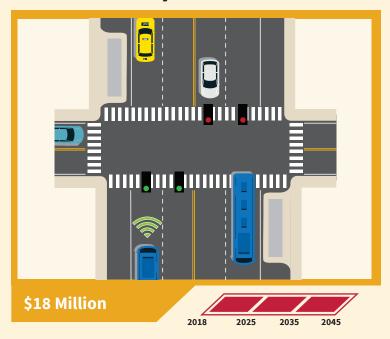


#### **Dedicated Bus Lanes**

As part of the launch of BaltimoreLink, over 5.5 miles of dedicated bus lanes were implemented to facilitate more efficient bus travel through downtown Baltimore (bicyclists are also permitted to use these lanes). These lanes minimize delays associated with auto traffic, particularly during rush hours. These lanes improve bus reliability, on-time performance, and safety. MDOT MTA partnered with Baltimore City Department of Transportation to design and implement these bus lanes. MDOT MTA will continue to evaluate opportunities to implement dedicated bus lanes to improve bus service.



#### **Transit Priority**



Multiple measures along bus corridors can increase transit service reliability and efficiency, including bus bulbs and queue jumps.

Bus bulbs use curb extensions that align the transit stop with the parking lane, creating an in-lane stop that allows buses to stop without making large lateral shifts. Bus bulbs decrease the amount of time lost when merging in and out of traffic and thus improve speed and reliability.

Queue jump lanes combine short dedicated transit lanes near major intersections with priority signal phasing to allow buses to easily enter traffic flow in a priority position. Applied thoughtfully, queue jumps can reduce delay considerably, resulting in runtime savings and increased reliability.

MDOT MTA is currently identifying locations for investment and exploring the scope and feasibility of transit prioritizing treatments.





### Service

In addition to maintaining and improving the bus system's physical assets, MDOT MTA is planning to further improve service. MDOT MTA continually analyzes service and ridership data to evaluate service performance and identify system needs, enhancements, or refinement through the service development process.

For Commuter Bus, MDOT MTA has created general service goals for new start up service to help evaluate the effectiveness and efficiency of the new route. The service goals are as follows.

- Comprehensive evaluation at 12 and 24 months to determine if service modifications are warranted.
- Monthly tracking, monitoring, and reporting on route performance.
- Three-year comprehensive route review and recommendations.

#### **Microtransit**



Microtransit is a form of Demand Responsive Transit. This technology offers flexible routing and/or flexible scheduling of minibus vehicles. Possible pick-up/drop-off stops are usually pre-defined to allow better route optimization.

MDOT MTA, with support from various partners, is developing an Access to Opportunity Business Plan for microtransit that will consider providing flexible, demand-responsive microtransit service to help employees access major employers near BWI Thurgood Marshall Airport and Fort Meade. If successful, this service model may be replicable in other segments of the core service area.

#### **Annual Service Plan**



MDOT MTA evaluates and adjusts service regularly, considering major service changes annually. The Annual Service Plan identifies changes that are designed to achieve specific service goals and objectives, and opportunities for costeffective service expansion. Origin and destination studies inform this plan. It includes study of different service types, evaluates partnership opportunities with local governments, job/education centers, promotes local connectivity, and includes performance monitoring. MDOT MTA includes input from government entities and agencies as well as the public.

MDOT MTA will develop a biennial ridership forecast for each existing route and potential new routes as well as plan for necessary service adjustments within existing service areas. Each year, in cooperation with the Commuter Bus staff, the MDOT MTA Office of Planning and Capital Programming should select the service changes that will be implemented. Once identified, MDOT MTA will need to conduct detailed service planning in coordination with local stakeholders.



### Conclusion

The Bus Cornerstone Plan's strategic priorities and initiatives lay the foundation for MDOT MTA to further its mission to provide safe, efficient, reliable transit with world-class customer service. This comprehensive approach empowers MDOT MTA to prioritize initiatives, synthesize new technologies, apply research and best practices.

MDOT MTA is committed to maintaining assets in a state of good repair and supporting our operations while simultaneously seeking opportunities to enhance customers' experience, whether this is by making our service safer, more efficient, reliable, or enjoyable. The facility improvements, new divisions, fleet's mid-life overhaul, and bus fleet replacement all focus on keeping our assets in a state of good repair, which will ensure the safety and reliability of the bus system for years to come.

In addition to the initiatives, which have well-defined timeframes and scopes, the strategic priorities outline broader goals that may include ongoing programs or policies.

Every day, MDOT MTA strives to improve transit service to better serve Maryland. Our team is constantly monitoring performance, identifying needs, evaluating alternative solutions, engaging stakeholders, implementing solutions, and monitoring outcomes all toward the goal of providing safe, efficient, reliable transit, delivered with world-class customer service.





