



LIGHT RAIL
LINK

CORNERSTONE PLAN



Administrator's Message

Dear Maryland Residents,

The Maryland Department of Transportation Maryland Transit Administration (MDOT MTA) has been providing transit services to the State since its inception as the Metropolitan Transit Authority, almost 50 years ago, in 1969. Today, MDOT MTA operates the 12th largest multimodal transit system in the country with over 300,000 daily riders, five transit modes, and paratransit service, while providing support to locally operated transit systems throughout Maryland. In our Light RailLink operations, MDOT MTA operates 33 stations along 58 miles of track, with over 200 employees committed to managing, maintaining, and operating this system that delivers daily service to an average of 24,000 patrons. MDOT MTA is committed to improving the transit experience for our customers every day. 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, from rail cars to stations, in a manner that 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 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 Light RailLink over the next 25 years.

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

Sincerely,

Kevin B. Quinn
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 Light RailLink 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 Light RailLink Cornerstone Plan (the Plan) provides the framework around which MDOT MTA will invest in Light RailLink 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.

The Plan includes strategic priorities that build upon MDOT MTA's cornerstones and global best practices for transit systems. Initiatives include key investment areas for MDOT MTA to achieve the strategic priorities and cornerstones. The initiatives will inform statewide and regional planning and programming efforts, such as the Baltimore Regional Transportation Board's Constrained Long-Range Plan.

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.



Efficiency

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 strong standard of excellence to serve its customers.

ITERATIVE PLANNING PROCESS

MONITOR

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

IDENTIFY

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



EVALUATE

alternative scenarios and project options, including no build scenario. Evaluate capacity to implement project.

IMPLEMENT

selected alternative on schedule and within budget. Ensure that all potential project threats are identified and accounted for.

ENGAGE

key stakeholders and general public. Maximize participation in planning process and clearly define project.



Overview of Light RailLink

History

MDOT MTA Light Rail service opened in 1992 after several decades of planning and construction. The line was conceived as a rapid transit corridor in the 1968 Baltimore Region Rapid Transit System, Feasibility, and Preliminary Engineering Study. The concept gained momentum in 1974, when officials in Baltimore's northern suburbs pressed the Mass Transit Administration (later renamed the Maryland Transit Administration) to study the feasibility of commuter rail service in their jurisdictions, the results of which suggested Light Rail as the preferred alternative.

The 1980 Phase II Transit Study solidified Light Rail as the mode of choice, as well as the alignment for what would become the Central Light Rail Line (CLRL). The alignment used the former Northern Central Railroad right of way north of downtown, running along the banks of the Jones Falls, Roland Run, and Goodwin Run. South of downtown, the CLRL followed the Baltimore & Annapolis Railroad alignment. Connecting these segments through downtown, the CLRL traveled on Howard Street.

Governor William Donald Schaefer championed the project, believing that the CLRL would play a significant role in Baltimore's transit network, as well as efficiently connect residents and visitors to the Baltimore Oriole's new baseball stadium at Camden Yards. Construction began in 1988 and the CLRL opened in 1992 on the same day as the Baltimore Orioles' first game at Camden Yards. After initially running from Timonium to Cromwell, the Light Rail was extended to Hunt Valley, BWI Thurgood Marshall Airport, and Penn Station in 1997. Double tracking from Cromwell to Timonium was completed in 2005, which facilitated service improvements.

Notably, the initial project was completed without any money from the U.S. federal government, an anomaly for large transit projects.

In 2017, the Light Rail system was rebranded as Light RailLink as part of the BaltimoreLink initiative, a complete overhaul and rebranding of the core transit system operating throughout the greater Baltimore region.



Light RailLink Milestones

1997

In 1997, the system was extended from Timonium to Hunt Valley, and spurs were constructed to serve Penn Station and BWI Thurgood Marshall Airport.

1992

When it opened, Light RailLink only ran from Timonium to Camden Station. The southern portion of the line from Camden Station to Cromwell Station opened later that year.

1998

In 1998, the Hamburg Street station opened as an infill station, but was only used for special events, such as Ravens games.

1999

The federal government awarded MDOT MTA \$120 million to complete double tracking on most of the system. The double tracking facilitated service expansion, since trains would no longer have to wait at interspersed double track sections for oncoming trains to pass.

2005

Double tracking from Cromwell Station to North Avenue was completed in 2004, and double tracking from North Avenue to Timonium was completed in 2005. The Hamburg Street station opened for full-time revenue service.

2011

MDOT MTA completed improvements along Howard Street, including disassembling the arches that support the overhead catenary system, relocating the southbound Lexington Market stop to the block between Lexington Street and Saratoga Street, and installing new shelters at both Lexington Market stops.

2015

MDOT MTA installed LED signage and a public announcement system at all Light RailLink stations. This system allows MDOT MTA to communicate information such as next train arrival estimates, public safety announcements, and general service announcements.

2017

MDOT MTA installed additional audio-visual warning systems on Howard Street to help prevent pedestrians and vehicles from crossing the Light RailLink tracks when a train is approaching.



Service

Light RailLink is one of the six transit modes MDOT MTA operates. While Light RailLink, Metro SubwayLink, and MARC Train are all fixed-rail modes (i.e. trains), they serve different functions, use different types of vehicles, and have different investment needs. Compared to the other rail modes, Light RailLink operates smaller vehicles that can operate in mixed traffic on city streets at lower speeds. Light RailLink's versatile operation is due to use of overhead catenaries, which are the electrical wires that run above the tracks and provide power to the trains by contacting the pantograph attached to the top of the train.

Light RailLink runs between Hunt Valley to the north, through downtown Baltimore, and terminates at Baltimore/Washington International Thurgood Marshall Airport (BWI) or Glen Burnie (Cromwell Station). As it traverses downtown, Light RailLink connects to both Penn Station and Camden Station. The system comprises 33 stations, 58 miles of track, and 53 Light Rail Vehicles (LRV). Over 200 employees are dedicated to managing, maintaining, and operating the Light RailLink system.

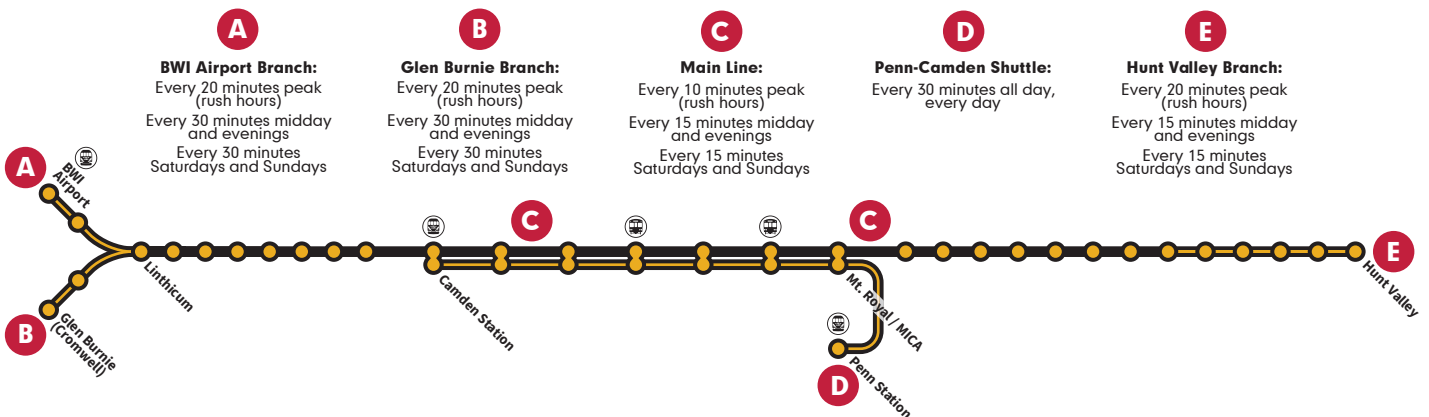
The system includes four overlapping patterns, or variations, of train origin and destination along a common trunk:

- **Hunt Valley to BWI** - Operates with 20 to 30 minute headways.
- **Timonium to Cromwell** - Operates with 20 to 30 minute headways staggered between the Hunt Valley-BWI pattern, which results in 10 to 15 minute service on the trunk between Timonium and Linthicum.
- **Timonium to Hunt Valley** - Off-peak and on weekends, service on the Cromwell pattern continues north of Timonium to Hunt Valley.
- **Penn Station to Camden Station (Penn-Camden Shuttle)** - Typically only uses single-vehicle trains and operates every 30 minutes.

In an average day, approximately 24,000 customers ride Light RailLink. During Orioles games, Ravens games, and other special events, service is provided with trains consisting of three LRVs instead of the typical two to efficiently handle the higher ridership volumes.

Over 550,000 jobs are located within a 30-minute walk or transit ride of Light RailLink stations, with over 290,000 of those within 15 minutes.

Service Frequency Guide:



- 5 a.m. to Midnight Weekdays
- 6 a.m. to Midnight Saturdays
- 11 a.m. to 7 p.m. Sundays

Light RailLink Connections Map

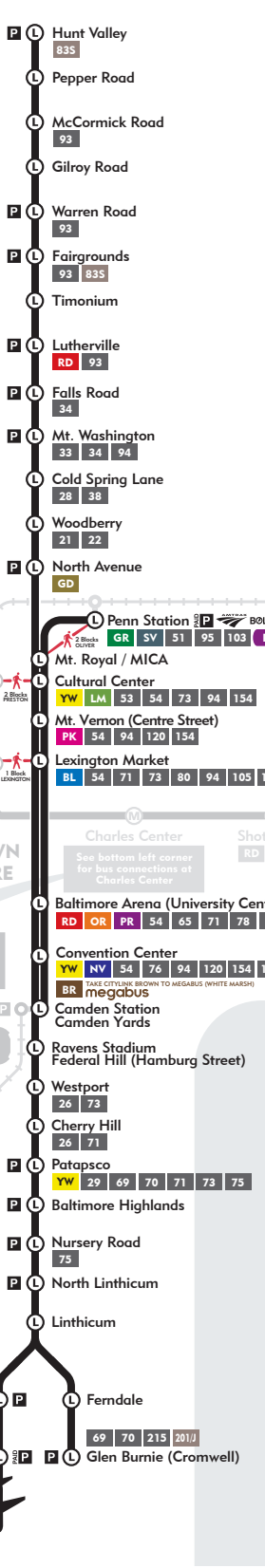
Commuter Bus Connections
in Downtown Baltimore and/or Johns Hopkins Hospital:
210 215 310 320 410 411 420



Charles Center is home to the **MTA TRANSIT STORE** at the corner of Baltimore and St. Paul Streets. You can get CharmCards here!

Bus Connections at Charles Center

RD	OR	GR	PR	SV	51
65	67	71	76	78	95
103	105	120	150	160	164
56	megabus				



Map Legend

RAIL LINES:

- Metro SubwayLink Line/Station**
Owings Mills to Johns Hopkins Hospital
- Light RailLink Line/Station**
BWI Airport or Glen Burnie to Fairgrounds or Hunt Valley
- Light RailLink Shuttle/Station**
Penn Station to Camden Station
- MARC Train Lines/Stations**
Penn Line: Perryville or Penn Station to Washington DC
Camden Line: Camden Station to Washington DC

CONNECTING BUSES:
Note that some connections may require crossing the street and/or walking a block or two.

CityLink Routes
Frequent Daily Service / 24 Hours

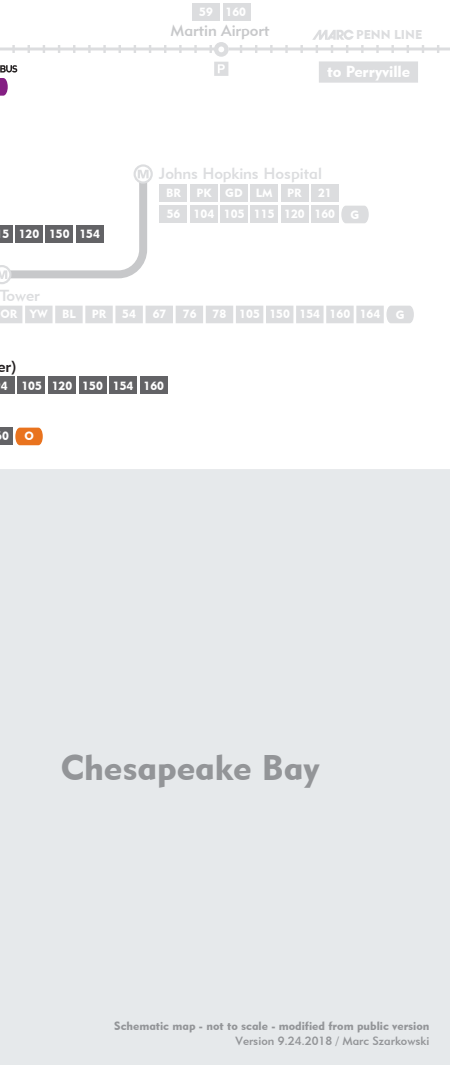
LocalLink Routes
Daily Service

Express BusLink Routes
Weekday Peak Service

Free Charm City Circulator Routes
Frequent Daily Service

External Routes
Operated by Other Transit Agencies

P Park & Rides and Amtrak Stations

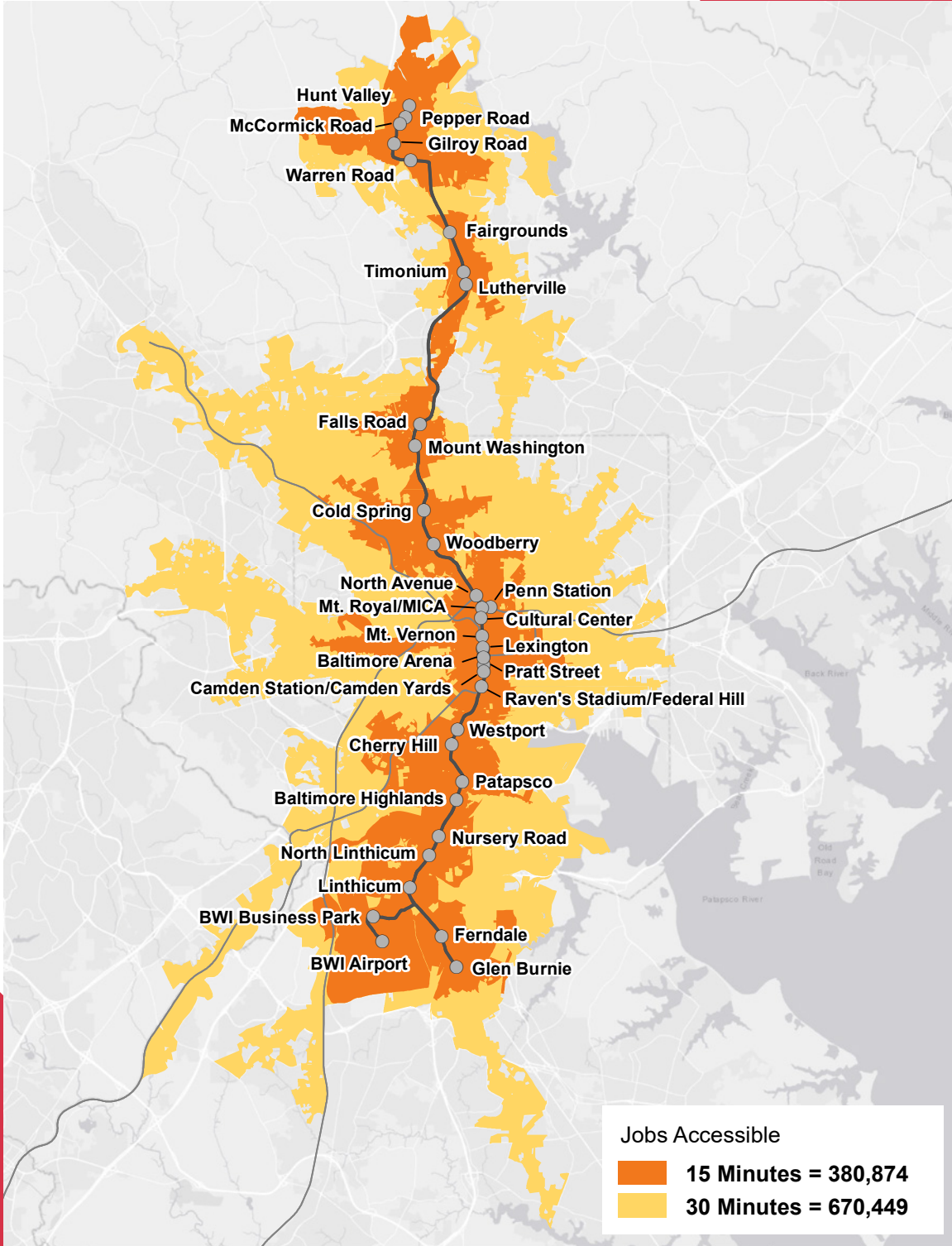


Schematic map - not to scale - modified from public version
Version 9.24.2018 / Marc Szarkowski

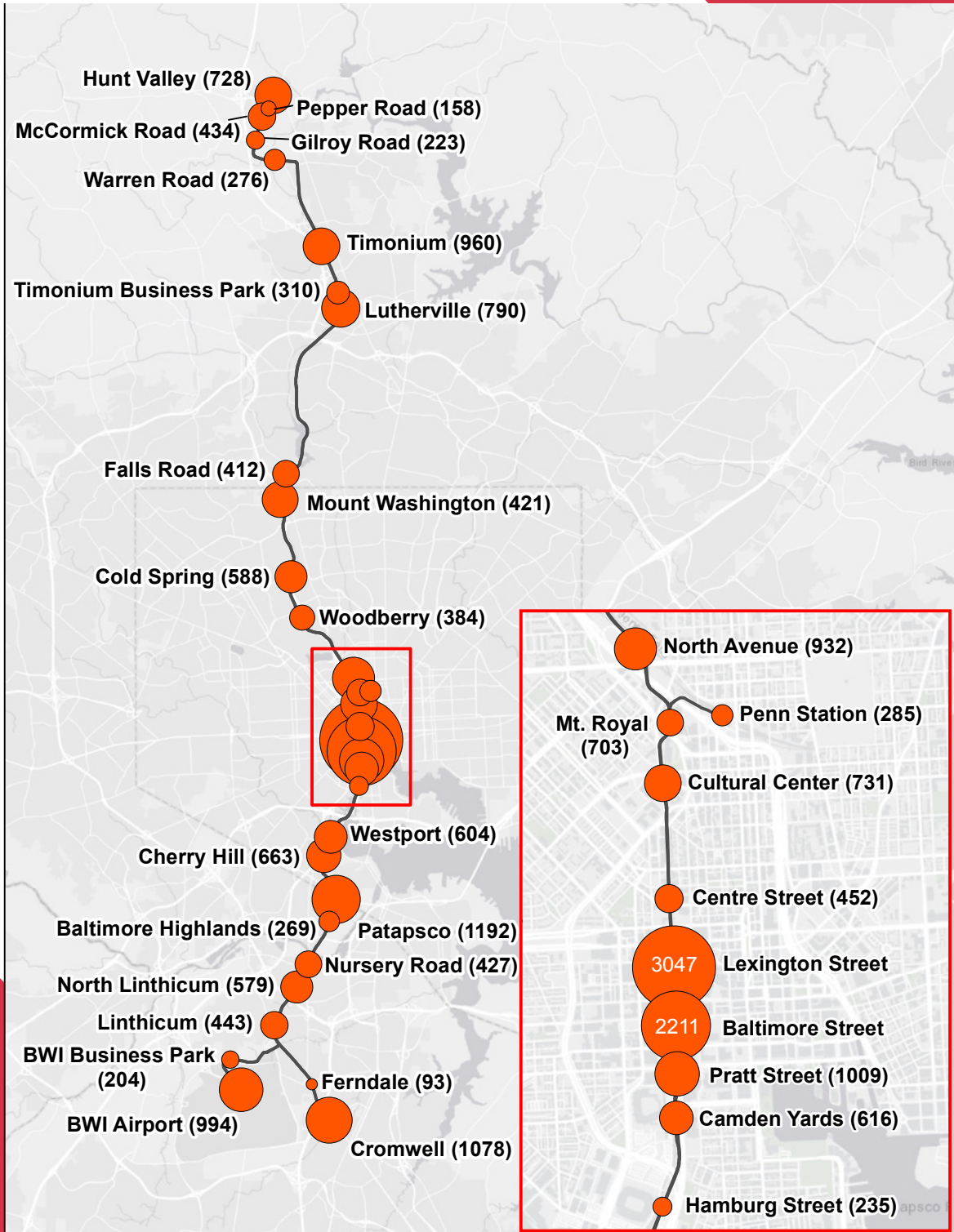
Overview of Light RailLink



Light RailLink Access Map



Light RailLink Average Daily Ridership Map



Average weekday ridership from Fiscal Year 2017



Strategic Priorities

Looking ahead, MDOT MTA has established five strategic priorities for Light RailLink 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 country¹. 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.

¹ 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 Light RailLink was 98 percent in 2016. 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 Light RailLink service to better meet customer needs. Efficient and reliable Light RailLink operations involve systems, equipment, and personnel working effectively together.

Light RailLink's 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. Light RailLink operations average nearly \$60 million per year over the timeframe of the Plan.

Light RailLink operations support includes:

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



Asset Management

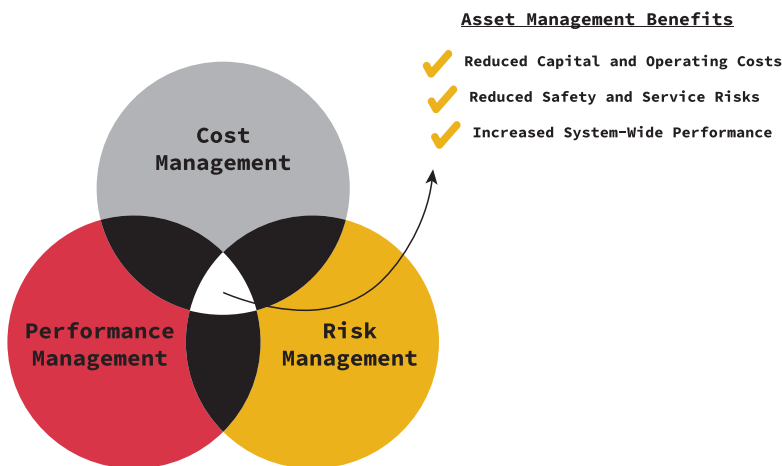
MDOT MTA is committed to effectively managing its capital assets and maintaining its system in a State of Good Repair (SGR) to support safe, efficient, and reliable transit service. Transit Asset Management is a strategic approach to managing the agency’s fleet, infrastructure, equipment, and facilities to optimize their performance, 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.

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

Light RailLink assets include vehicles, stations, guideways, facilities and systems. Maintaining the estimated \$1.5 billion portfolio of Light RailLink assets in a state of good repair will cost approximately \$35 million per year over the timeframe of this Plan.

Asset Management will also help reduce the impact of our activities on the environment and develop ways to make our transit system more resilient. Lifecycle cost considerations and improved efficiencies of equipment in good repair will help reduce the financial, social, and environmental costs of the Light RailLink system, which supports MDOT MTA’s commitment to sustainability.

ASSET MANAGEMENT



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

Improved Customer Experience

MDOT MTA strives to provide our customers with world-class service at every stage of their trip, from beginning to end. MDOT MTA will seek opportunities to upgrade technology and amenities to make it easier, more efficient, and more convenient to access and use transit to access jobs, education, amenities, and services. Key focus areas for enhancing the Light RailLink system include station access and technology improvements.

Ensuring that the public can safely, efficiently, and reliably access stations is a key focus for improving customer experience with the Light RailLink system. MDOT MTA is committed to ensuring our 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 Light RailLink for all those accessing our vehicles and stations, including those who arrive by:

- Wheelchairs and other mobility devices
- Foot
- Bicycle
- Bus 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 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.**





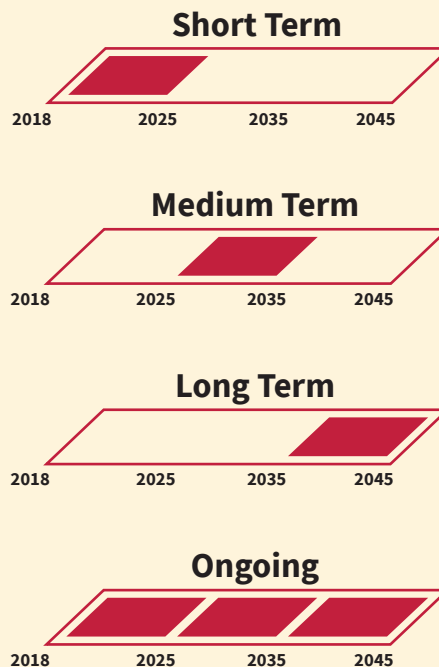
Light RailLink Initiatives

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

- Vehicles
- Stations
- Guideways
- Facilities
- Systems
- Service

The first five categories are consistent with MDOT MTA and the Federal Transit Administration asset types established for Transit Asset Management; the sixth represents operating initiatives related to Light RailLink service that are not captured by the other asset types. Key initiatives in each investment area are identified. These initiatives highlight major investments and customer-facing changes that MDOT MTA anticipates. It is not an exhaustive list, as additional projects are anticipated in each investment area to maintain a state of good repair and improve customer experience.

Project Timeline



Investment Areas	Timeframe	Initiative	Pg. #
Vehicles	Short term	Fleet Mid-Life Overhaul	24
	Long term	Fleet Replacement with Low-Floor Vehicles	25
Stations	Short term	Patapsco Station Pedestrian Access	27
		Station Amenities and Signage Update	27
		Timonium Fairgrounds Transit Oriented Development	28
	Medium term	Cold Spring Lane Transit Oriented Development	28
		Westport Transit Oriented Development	29
		Canopy Replacement	30
Long term	Low Floor Station Retrofits	30	
Guideways	Short term	Howard Street Corridor Improvements	32
	Medium term	Maintenance Yard Track Replacement	35
	Long term	Elevated Structure Repairs and Replacements	33
	Ongoing	Northern Section Track Repair and Replacement	34
		Central Section Track Repair and Replacement	34
		South Section Track Repair and Replacement	34
		Erosion Control and Flood Mitigation	35
Systems	Short term	Mobile Ticketing	36
	Medium term	Ticket Vending Machine Replacement	37
	Long term	Train Control Replacement	37
	Ongoing	Roadway Crossing Systems	38
		Electrification Systems	39
Facilities	Medium term	Cromwell Maintenance Facility Overhaul	41
	Long term	North Avenue Maintenance Facility Overhaul	41
Service	Short term	Sunday Service Hours Extension	42
	Long term	North Avenue Maintenance Facility Overhaul	43



Vehicles

Light RailLink vehicles include 53 revenue vehicles (LRVs) and 55 non-revenue vehicles. Light RailLink revenue vehicles have a lifecycle of 35 to 40 years, and undergo regular inspection and maintenance, as well as periodic overhauls to extend their lifecycle and maintain a SGR. In addition, MDOT MTA periodically invests in upgraded vehicle technology that provide safety and customer service improvements.

Light RailLink's non-revenue vehicles are used to perform catenary system maintenance, clear debris from the tracks, supervise operations, and perform various other specialized tasks. Maintenance and periodic replacement of these vehicles is a necessary component of supporting safe, efficient, and reliable Light RailLink service.

Fleet Mid-Life Overhaul



\$160 Million

2018 2025 2035 2045

MDOT MTA has awarded a \$156 million contract to overhaul the entire LRV fleet. The project will extend the fleet's life by approximately 15 years and will improve safety and reliability, provide a more comfortable and secure ride, and lower maintenance costs. To prevent any service interruption, LRVs are shipped to the contractor one at a time for overhaul and then shipped back and thoroughly inspected before entering back into service. The overhaul process occurs over a period of three years. The first overhauled vehicle went into service in March 2018.

NEXT STEPS

- Monitor Contractor Work
- Inspect Overhauled Vehicles
- Update LRV Maintenance Program

Fleet Replacement with Low-Floor Vehicles



\$440 Million



The original LRV fleet will complete its useful life and fleet replacement will be needed in 15 to 20 years. Light Rail systems throughout the U.S. and the world are increasingly moving toward vehicles and platforms that provide “level boarding,” in which customers can move from the station platform to the main level of the train without steps or grade changes. This design better accommodates individuals with mobility issues, who require walking aids or wheelchairs, or who have strollers, without necessitating “high blocks” or ramps to the wheel-chair accessible door on the Light Rail vehicle. MDOT MTA anticipates transitioning to low-floor LRVs when the fleet replacement is needed. This will require significantly retrofitting stations, modifying maintenance facilities, and amending standard operating practices (see “Low-Floor Station Retrofits” Initiative).



Stations

The Light RailLink system comprises 33 at-grade passenger stations, each of which is simply designed and features a high-block, a platform, a shelter, lighting, and passenger information systems. There are over 3,300 free parking spaces distributed among 13 Light RailLink stations. Planned near-term station investments include replacing shelters, platforms, lighting and other elements that have exceeded their useful life. Additional investments to improve station amenities and access are planned or underway; currently, MDOT MTA is piloting and implementing a variety of new and innovative station access solutions, such as bike share and shared-use vehicles (e.g., Zipcar) at stations.

MDOT MTA will continue to partner with local jurisdictions to encourage transit-oriented development near stations to better leverage transit service. In the long-term, MDOT MTA plans to invest in station redesigns to accommodate level-boarding and new low-floor vehicles.



Patapsco Station Pedestrian Access



\$15 Million



Patapsco Station is the third busiest Light RailLink station and largest bus transfer facility in the southern part of the Baltimore region. While the station is within walking distance of several communities, pedestrian access is inhibited by a major powerline right of way, CSX freight rail tracks, and a six-lane major trucking route on Patapsco Avenue. MDOT MTA is working to improve safe and convenient pedestrian access to the station. MDOT MTA is currently conducting a feasibility study to explore alternative solutions and will work to implement the chosen alternative.

NEXT STEPS

- Complete Feasibility Study
- Develop Alternatives
- Conduct Targeted Public Engagement

Station Amenities and Signage Update



\$12 Million



MDOT MTA is establishing updated uniform architecture for station components, such as shelters, benches, signs, maps, fencing, railings, pylons, and lighting. As these components are replaced due to wear or damage, the updated station elements will make navigating the transit system simple and intuitive, refresh the look of the Light RailLink stations, and reduce maintenance costs. Additional wayfinding pylons will be added to match existing Metro SubwayLink pylons to convey that BaltimoreLink is a single, unified system and help customers locate stations.

NEXT STEPS

- Implement Pilot Project at North Avenue Station
- Develop Station Signage/Wayfinding Plans
- Coordinate with Longer Term Platform and Canopy Replacement Concepts



Timonium Fairgrounds Transit Oriented Development



Cost: Neutral



NEXT STEPS

- Work with stakeholders and agencies to achieve MDOT MTA operational needs
- Facilitate effective design to support and leverage transit

MDOT promotes Transit Oriented Development (TOD) as a tool to support economic development, promote transit ridership, and maximize the efficient use of transportation infrastructure. MDOT MTA is working with Baltimore County and private developers to develop the Park & Ride lot at the Timonium Fairgrounds Light RailLink Station. MDOT MTA envisions a development that features the station as a focal point and promotes transit, walking and biking over driving. MDOT MTA is coordinating with other stakeholders to achieve this vision. As illustrated on the next page, a true TOD project:

- Capitalizes on the development by locating the largest buildings with the most activity closest to the station
- Uses street, open space, and building design that prioritizes pedestrians
- Applies diverse land uses and design elements to create a vibrant place

Cold Spring Lane Transit Oriented Development

Cost: Neutral



NEXT STEPS

- Work with stakeholders and agencies to achieve MDOT MTA operational needs
- Facilitate effective design to support and leverage transit

In 2016, the Baltimore Development Corporation (BDC) acquired a 16-acre site adjacent to the Cold Spring Lane Station for future transit oriented mixed-use development. MDOT MTA will work with the BDC and other stakeholders to promote direct access from any development and the Jones Falls Trail to the Light RailLink station, which is located on the opposite side of the Jones Falls.

Westport Transit Oriented Development

Cost: Neutral

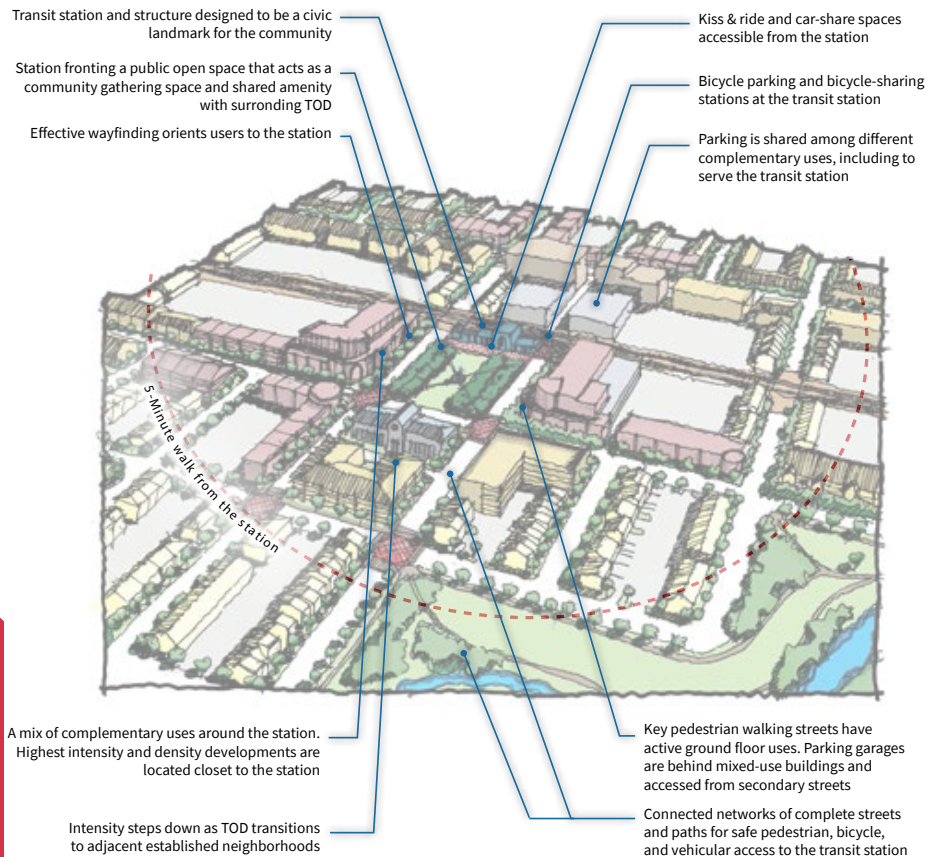


NEXT STEPS

- Work with stakeholders and agencies to achieve MDOT MTA operational needs
- Facilitate effective design to support and leverage transit

Westport Station lies directly west of a large undeveloped privately owned property that has frontage on the Middle Branch of the Patapsco River. This property has been proposed for redevelopment in the past, though no efforts have come to fruition. MDOT MTA will coordinate with stakeholders to encourage any redevelopment of this property to use the station as a focal point and to enhance access between the station and the Middle Branch Trail.

Features of a Successful TOD Project





Canopy Replacement

Platforms

Fencing

Canopies

\$40 Million

2018 2025 2035 2045

Station platforms and canopies will be upgraded to feature standardized, uniform architecture that incorporates a modular design. The updated design will accommodate variations in size, site accessibility, and amenities. Standardized, prefabricated canopies can be linearly lengthened or shortened as needed, platforms can be widened or narrowed as needed, and supporting amenities (signage, benches, etc.) can be predictably repeated and arranged underneath the canopies and omitted in tight-clearance conditions, such as near ADA ramps.

Low Floor Station Retrofits

\$200 Million

2018 2025 2035 2045

As described in the “Low-Floor Vehicles” initiative on page 27, transitioning Light RailLink to a level boarding system will require a major system investment and must be coordinated with the Light RailLink fleet replacement. MDOT MTA plans to retrofit stations to eliminate high-blocks and raise platforms to provide level boarding.





Guideways

The double-tracked Light RailLink mainline and two spurs total 58 miles of track. Along these corridors the system depends on 19 bridges and elevated structures. Despite the installation of culverts and other ancillary structures along the corridor, several segments of the Light RailLink system exist within the floodplain and are subject to periodic track washouts. Guideway assets are inspected regularly and components are upgraded/replaced on an as-needed basis. Guideways account for the largest value of all Light RailLink assets, representing nearly 50 percent of Light RailLink’s \$1.5 billion assets.

Howard Street Corridor Improvements



\$70 Million



NEXT STEPS

- Complete Feasibility Study
- Coordinate with Local Stakeholders
- Pursue Grant Funding

Light RailLink runs along the Howard Street corridor in Baltimore’s Central Business District, roughly bound by Mount Royal Station to the north and Camden Station to the south. This 1.1-mile stretch of mostly embedded track is showing signs of wear and needs to be replaced. MDOT MTA is evaluating the potential to realign portions of the rail when the rail is replaced. Realigning presents several potential benefits, including improving safety by reducing conflict points with automotive, pedestrian, and bicycle traffic. It also presents opportunities to improve the streetscape for pedestrians and support redevelopment plans.

Elevated Structure Repairs and Replacements



\$35 Million



Along the 58 miles of Light RailLink track, there are 19 bridges and elevated structures, some of which predate Light RailLink construction. The largest elevated structure is the viaduct that spans Ridgely's Cove (between Hamburg Street Station and Westport Station). Other notable elevated structures include the bridge over Lake Roland, the bridge over the Jones Falls Expressway (I-83), which provides access to Penn Station, and the bridge over the Patapsco River. MDOT MTA will monitor the condition of all structures and complete maintenance and rehabilitation work to maintain a state of good repair with a goal of minimizing lifecycle costs.



Northern Section Track Repair and Replacement



The northern section of the Light RailLink system runs from North Avenue Station in the south to the northern terminus at Hunt Valley Station. This section spans 30 miles and includes mostly ballasted track, where the rail ties and track are laid atop crushed rock. The northern section also has segments of track, mostly in the Hunt Valley area, that are laid grade-in-street. Included in this initiative is the cost to replace retaining walls adjacent to track, as needed.

\$200 Million



Central Section Track Repair and Replacement

\$150 Million



The central section of the Light RailLink system runs from North Avenue Station in the north to Camden Station in the south. While replacing the embedded section of track on the Howard Street Corridor is a separate short term initiative, additional maintenance and replacement will be needed over the course of this plan. This section spans 5.5 miles and includes mostly track that is embedded in the street.

South Section Track Repair and Replacement

\$135 Million



The southern section of the Light RailLink system runs from Camden Station in the north to the southern endpoints at either BWI or Glen Burnie (Cromwell). This section spans 21 miles and includes mostly ballasted track, where the rail ties and track are laid atop crushed rock.

Erosion Control and Flood Mitigation



Most of the Light RailLink system is built on former freight rail rights-of-way, much of which lies within flood-prone areas near the Jones Falls and Patapsco River. While the flat terrain is conducive to rail use, erosion is becoming a significant threat to safe and reliable operations. Further flooding from storm-surge events pose risks to the electrical and communications equipment in low-lying areas. Mitigating these risks is a significant challenge for Light RailLink.

\$60 Million



Maintenance Yard Track Replacement



In addition to the track on which regular service is provided, MDOT MTA also owns and maintains two maintenance yards that contain several sets of parallel tracks. These tracks are used to store Light RailLink vehicles while they are not in service and move them around to areas where different types of maintenance are done. Keeping these tracks in a state of good repair is critical to ensuring service is safe and reliable.

\$70 Million



NEXT STEPS

- Regular track inspections



Systems

Light RailLink systems include electrification, signals and train control, communications, and revenue collection. In 2015, MDOT MTA finished installing a public address (PA) system to improve communication with customers at stations. Many of these systems have significant useful life remaining. However, in approximately 15 years, most of the mainline catenary power system and several power substations and instrument houses will need to be replaced.

Mobile Ticketing

In the Fall of 2018, MDOT MTA developed a mobile ticketing platform that allows riders to purchase fares on their mobile phones that operators visually verify. The mobile ticketing platform provides riders more purchase options, encouraging pre-payment prior to boarding.

NEXT STEPS

- Monitor Usage of App to Make QA/QC Improvements
- Continue Training Fare Inspectors and Operators on Proper Use



\$ Cost Neutral



Ticket Vending Machine Replacement



MDOT MTA will replace all 89 Ticket Vending Machines (TVMs) at Light RailLink stations. This replacement provides MDOT MTA with the opportunity to provide customers with more purchase options, including CharmCard® and MARC Train passes.

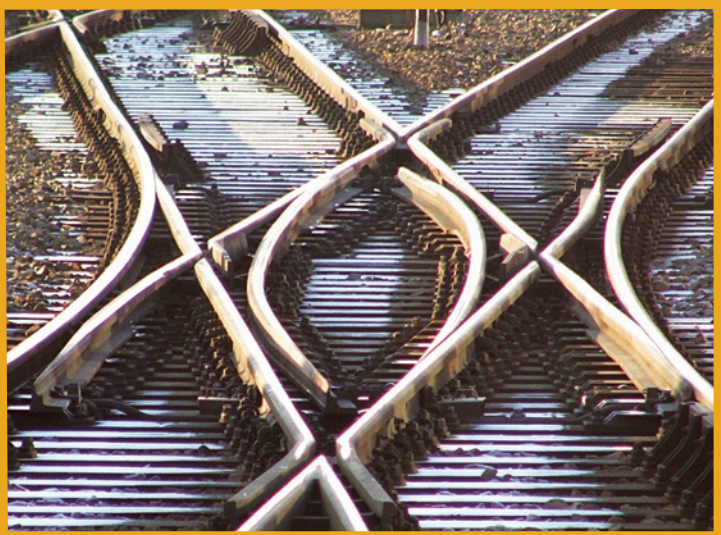
NEXT STEPS

- Coordinate Fare Media Compatibility Systems
- Create Project Scope and Requirements

\$20 Million

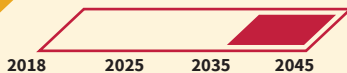


Train Control Replacement



MDOT MTA Light RailLink currently uses five different train control systems to control train movement throughout its network and maintenance yards. Audio frequency track circuit was installed during double-tracking in the CBD in the early 2000s, which provides automated train protection (ATP) capabilities. As the train control systems become technologically dated and need to be replaced, MDOT MTA will modernize and standardize the track circuits and train control system. These upgrades will provide multiple safety protections and reduce maintenance costs and complexity.

\$260 Million



MDOT MTA continues to monitor new and emerging technologies that may play a significant role to continue to enhance safe operations, particularly at these controlled crossings.



Roadway Crossing Systems



\$75 Million



Light RailLink runs entirely on MDOT MTA-owned rails, most of which run “at grade” with automobile traffic, meaning they are not elevated or tunneled. There are 221 at-grade crossings in the system, at which vehicles, pedestrians, and bicyclists can cross the Light RailLink tracks. Some of these crossings are equipped with a control device, which is triggered by an approaching train and prevents automobile, pedestrian, and bicycle traffic from conflicting with Light RailLink vehicles. These systems will need periodic maintenance, and MDOT MTA may install additional equipment as needed, and as technology changes.

NEXT STEPS

- Rehabilitate Beaver Dam North, Beaver Dam South, and Industry Lane grade crossings.
- Upgrade ground-mounted signs, pavement markings, and other traffic control devices systemwide.

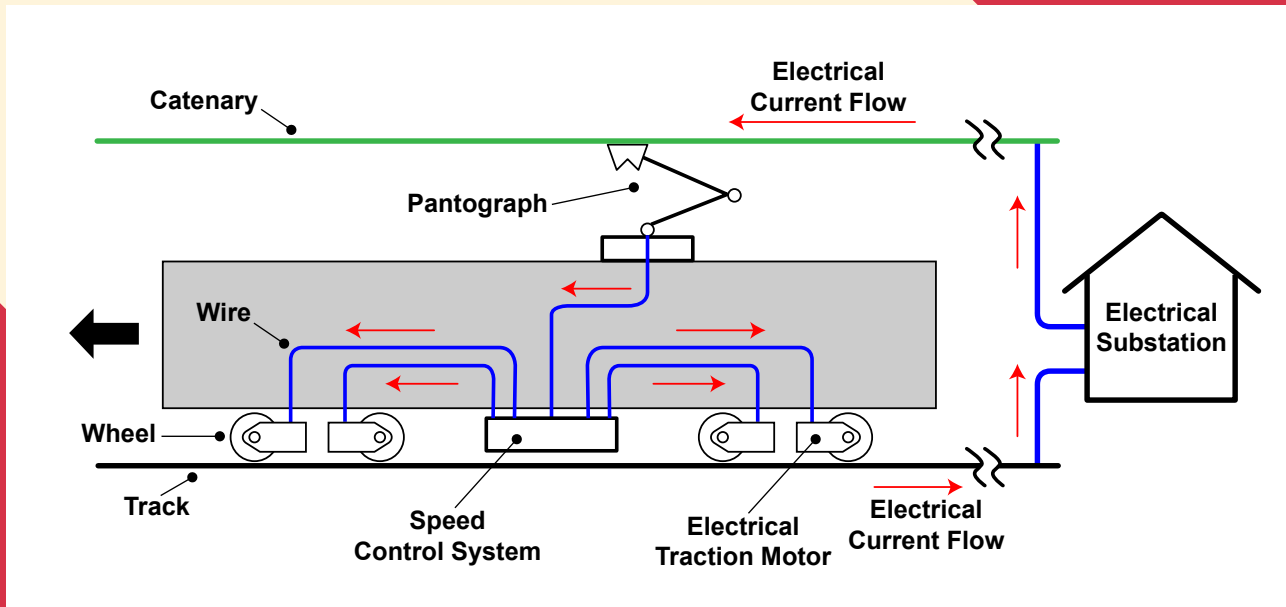
Electrification Systems



\$270 Million



The electrification system is one of the mode's largest assets; it includes the overhead catenary system (OCS), 30 traction power substations, interlockings, 33 central instrument houses, and other wayside equipment. The substations take electric power from the power grid and convert it into the appropriate voltage, current type, and frequency before it then runs through the catenary lines, where it is transferred to Light RailLink trains through the pantograph mechanism. Most of the OCS is expected to need replacement before 2035.



Light RailLink Initiatives



Facilities

Light RailLink facilities include buildings, central control, grounds, and equipment needed to support operations. Light RailLink conducts or coordinates maintenance on all its transit assets out of two major facilities, one located on North Avenue in Baltimore City and one in Cromwell in Anne Arundel County. North Avenue serves as the main location for administration and heavy maintenance, whereas Cromwell serves mainly as an inspection-based facility. Both facilities each have a storage yard for train sets. The North Avenue facility and yard can contain 40 to 44 LRVs, while Cromwell can hold 18 LRVs. Due to the limited capacity, the additional time necessary to shuffle vehicles through the yards can affect on-time scheduled maintenance completion.

Light RailLink is also supported by the Operations Control Center (OCC), which is an agency-wide facility that supports multiple transit modes.



Cromwell Maintenance Facility Overhaul



\$95 Million

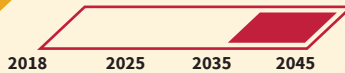


MDOT MTA will need to replace or rehabilitate much of the Cromwell Maintenance Facility's equipment and tracks as they approach the end of their useful life. While Cromwell currently has excess capacity for the existing Light RailLink fleet, the anticipated fleet size increase will demand use of the entire facility.

North Avenue Maintenance Facility Overhaul



\$75 Million



Light RailLink maintenance, operations, and administration activities are predominantly based out of the North Avenue Light RailLink facility. MDOT MTA will develop a program for replacing equipment and facilities to maximize efficiency of Light RailLink maintenance and operations in anticipation of maintenance equipment and building components at this facility approaching the end of their useful life.



Service

In addition to maintaining and improving the physical assets that support Light RailLink, MDOT MTA is planning to increase and improve service. When the required assets are available (such as additional LRVs to support more frequent service), MDOT MTA will seek to invest in additional operating costs to support these service improvements.

Sunday Service Hours Extension

MDOT MTA recognizes the need to increase Sunday hours of operation to match the rest of the week (5 a.m. to 1 a.m.) in order to support workers who rely on Light RailLink. Many of the job centers that Light RailLink serves, including BWI Thurgood Marshall Airport, have seven-day operation. However, MDOT MTA currently uses the time when trains are not in revenue service to perform critical track, systems, and vehicle maintenance. Consequently, MDOT MTA will first need to evaluate whether it is possible to complete critical maintenance activities if the service hours are extended.



\$2 Million/Year



NEXT STEPS

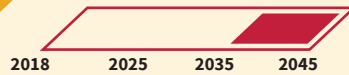
- Develop Revised Maintenance Plan
- Identify Additional Maintenance Resources Needed



Increase Service Frequency

MDOT MTA plans to provide more frequent Light RailLink service by reducing headways 25 percent during peak periods (i.e. from 20 minutes to 15 minutes). Increasing service frequency to this level will require 11 additional LRVs.

\$ Varies





Conclusion

The Light RailLink Cornerstone Plan's strategic priorities and initiatives lay the foundation for Light RailLink to continue furthering its vision to provide safe, efficient, reliable transit with world-class customer service as MDOT MTA manages and enhances the Light RailLink system. This comprehensive approach empowers MDOT MTA to prioritize initiatives using a data-driven approach with which MDOT MTA staff can synthesize new technologies, 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 fleet's mid-life overhaul, ticket vending machine replacement, and train control replacement all focus on keeping our assets in a state of good repair. These initiatives are scheduled to coincide with assets reaching the end of their useful lives, which will ensure the safety and reliability of the Light RailLink system for years to come. However, they simultaneously will improve customer service and customers' experience.

Other Light RailLink initiatives are primarily focused on enhancing the service and making the customer experience safer, more efficient or more enjoyable. Station amenity and access enhancements, Sunday service hour extensions, and mobile ticketing are examples of such initiatives, but also facilitate better operations and support long-term asset management plans.

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 Marylanders. 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.







Glossary

Acronyms

ADA (Americans with Disabilities Act of 1990): Civil rights legislation that prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to participate in the mainstream of American life.

APTA (American Public Transportation Association)

BWI (Baltimore/Washington International Thurgood Marshall Airport)

CBD (Central Business District): the commercial and business center of a city. Baltimore's CBD is roughly associated with the inner harbor area.

CLRL (Central Light Rail Line): Light RailLink's main north-south oriented track, which runs from Hunt Valley to Glen Burnie (Cromwell). There are two spurs, one to Baltimore Penn Station and one to Baltimore/Washington International Thurgood Marshall Airport.

FTA (Federal Transit Administration)

LOTS (Locally Operated Transit Systems): Transit systems operated by local jurisdictions in Maryland. These transit systems receive federal funding and technical support through MDOT MTA.

LRV (Light Rail Vehicle): Single vehicle unit that can be connected to other Light Rail vehicles to form a train. Light rail vehicles can be grouped in one, two or three vehicle consists, or trains.

MARC (Maryland Area Rail Commuter)

MDOT (Maryland Department of Transportation)

MDOT MTA (Maryland Department of Transportation: Maryland Transit Administration)

MDOT SHA (Maryland Department of Transportation: State Highway Administration)

SGR (State of Good Repair): Physical assets owned, operated and maintained by MDOT MTA are evaluated and given condition scores on a 1-5 scale. Assets with a score of at least 2.5 out of 5 are in a state of good repair.

TOD (Transit Oriented Development): A place of relatively higher density that includes a mix of residential, employment, shopping, and civic uses designed to encourage multi-modal access to the station area.

TVM (Ticket Vending Machine): Machines used to purchase fares for use of Light RailLink and other MDOT MTA operated transit modes.

Relevant Terms

Catenary: Overhead wires that transmit electricity to Light Rail Vehicles for propulsion and operation of electronic systems.

CSX: Freight railroad that operates in the Baltimore area. MDOT MTA must coordinate with CSX on certain matters.

Headway: The amount of time between transit trips at a given station. At a given station, if a train comes at 8:00am and the next comes at 8:15am, the headway is 15 minutes.

High Blocks: Ramp and platform at Light RailLink stations that allow people with mobility challenges to board Light RailLink vehicles.

Norfolk Southern: Freight railroad that operates in the Baltimore area. MDOT MTA must coordinate with Norfolk Southern on certain matters.

Pantograph: Device on the roof of the Light Rail Vehicle that makes contact with the catenary wires to transmit electricity.

Pattern: A variation of a transit route.

Platform: Paved area where Light RailLink customers board and alight (exit) trains.

Short Turn: A pattern that involves the transit vehicle turning around before the end of the line.

Transit Asset: A physical asset required to support transit service either directly or indirectly, including vehicles, stations, facilities, guideways, and system assets.



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