

MDOT MTA | CY2022–2031

10-Year Capital Needs Inventory & Prioritization



July 2022



TABLE OF CONTENTS



New MARC Train Riverside Heavy Maintenance Building | January 2021 - November 2022



Light Rail Southern Track Maintenance | April - May 2022



Metro Fleet and Train Control Replacement Program | 2018 to 2023





TABLE OF CONTENTS

Executive Summary	1
1. MDOT MTA's Service and Assets	9
1.1 Service Overview	9
1.2 MDOT MTA's Assets.....	16
2. Methodology	21
2.1 Purpose of the CNI	21
2.2 Methodology Overview.....	23
2.3 Guiding Principles.....	24
2.4 Prioritization.....	25
2.5 Forecasting Needs.....	30
2.6 Forecasting Funding.....	30
3. MDOT MTA's State of Good Repair Investment Needs.....	31
3.1 SGR Backlog Overview	31
3.2 10-Year SGR Needs Estimates	32
4. MDOT MTA's Enhancement Investment Needs	36
4.1 10-Year Enhancement Needs Estimates	36
5. MDOT MTA's 10-Year Total Investment Needs.....	38
5.1 Total 10-Year Needs.....	38
5.2 Prioritized 10-Year Needs.....	39
5.3 Key Findings	43
6. Conclusion	47
Appendix: Detailed Project Tables	49

ACRONYMS



Light Rail North End Signal Power System Replacement
January 2021 - March 2023



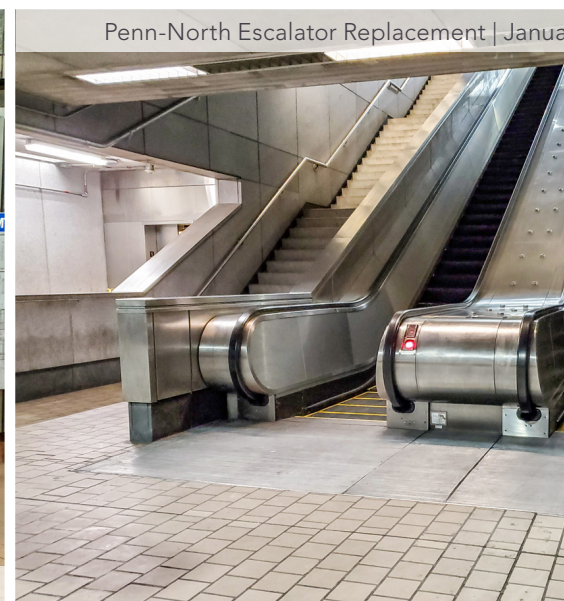
Light Rail Catenary System Rehabilitation | February 2022 - March 2023



Kirk Bus Division Modernization Phase 2 | January 2018 - June 2021



Mondawmin Metro Elevator Replacement | January 2022 - March 2023



Penn-North Escalator Replacement | January 2022 - March 2023

February 2022 - July 2026



January 2022 - March 2022



ACRONYMS

ADA	Americans with Disabilities Act
AVL	Automated Vehicle Locator
BWI	Baltimore/Washington International Thurgood Marshall Airport
CFP	Call for Projects
CNI	Capital Needs Inventory
CTP	Consolidated Transportation Program
ENH	Enhancement Needs
FMIS	Financial Management Information System
FTA	Federal Transit Administration
GPS	Global Positioning System
IVR	Interactive Voice Response
LOTS	Locally Operated Transit Systems
MARC	Maryland Area Regional Commuter
MCDA	Multi-Criteria Decision Analysis
MDOT	Maryland Department of Transportation
MDT	Mobile Data Terminal
MTA	Maryland Transit Administration
NEC	Northeast Corridor
PTASP	Public Transportation Agency Safety Plan
RTA	Regional Transportation Agency of Central Maryland
RTP	Regional Transit Plan
RTIS	Real-Time Information System
SGR	State of Good Repair
SME	Subject Matter Expert
STP	Statewide Transit Plan
TAM	Transit Asset Management
TAMP	Transit Asset Management Plan
TERM	Transit Economic Requirements Model
TICC	Transit Information and Contact Center
TMDL	Total Maximum Daily Load
TSP	Transit Signal Priority
USDOT	U.S. Department of Transportation
VRE	Virginia Railway Express
WMATA	Washington Metropolitan Area Transit Authority
YOE	Year of Expenditure
ZEB	Zero-Emissions Buses

EXECUTIVE SUMMARY

The Maryland Department of Transportation Maryland Transit Administration (MDOT MTA) is the 13th-largest multimodal transit system in the United States, operating and maintaining \$12.6 billion in physical assets to provide transportation services to more than 7 million people within its defined service area. Investing in the state of good repair of these assets and system enhancements is critical for MDOT MTA to deliver safe, efficient, reliable, equitable, and customer-focused services. This Capital Needs Inventory (CNI) outlines the unconstrained investment needs between 2022 and 2031 that will preserve Maryland's significant investment in transit to date and help MDOT MTA meet current and future service demands.

MDOT MTA Modes of Transit Service

- Local Bus (CityLink, LocalLink, and Express BusLink)
- Commuter Bus
- MARC Train
- Metro SubwayLink
- Light RailLink
- MobilityLink

MDOT MTA's CNI captures and quantifies unconstrained capital needs over a 10-year period, in alignment with the agency's transit asset management (TAM) program and annual Call for Projects (CFP) process. The CFP process engages project managers from across MDOT MTA's organization to provide information on future capital investment needs, including how the proposed capital investments support MDOT MTA's strategic goals.

Since the last CNI was published in 2019, MDOT MTA has continued to deliver service through the COVID-19 pandemic to support mobility for essential workers and accessibility to essential services. As recovery funding became available, MDOT MTA captured opportunities to fund the Fast Forward program (see page 41) and the transition to zero-emissions bus (ZEB) vehicles. At the same time, the agency has prioritized investments in state of good repair (SGR) Needs

with the replacement of Camden Station, the modernization of Kirk Bus Garage, the replacement of multiple Metro SubwayLink interlockings, the Light Rail rehabilitation of three interlockings and ten curves, and the purchase of the MARC Riverside Yard facility which has allowed for the construction of a new heavy maintenance building. These significant investments since 2019 have decreased the relative size of the SGR backlog from 16.2 percent to 14.4 percent of MDOT MTA's assets.

Since 2019, MDOT MTA has also continually improved its TAM program which has generated more accurate asset information and more closely aligned capital investments with the agency's strategic goals. Additionally, the Central Maryland Regional Transit Plan (RTP) and MDOT MTA's Strategic Plan: Rebuilding Better, have been adopted and are guiding the capital investment priorities in this CNI. One example of this is the addition of equity as a capital investment criterion in MDOT MTA's capital program.

The State of Maryland has already made significant investments in transit with \$12.6 billion in current transit assets serving Baltimore and surrounding communities. MDOT MTA's services connect communities with Maryland's job centers, schools, healthcare, retail, and cultural centers. The value of MDOT MTA's inventory has grown since 2019 due to three years of inflation, acquisition of new assets, and improvements in capturing asset data.

The largest value of existing assets is in guideway, which includes Metro SubwayLink, Light RailLink, and

10-Year Capital Needs Inventory & Prioritization

Maryland Area Regional Commuter (MARC) Train-owned track, bridges, and tunnels, and the network of dedicated bus lanes in Baltimore that MDOT MTA helps to maintain. This value does not include any third-party-owned assets, such as Amtrak-owned track, for which MDOT MTA does not have capital responsibility. MDOT MTA's guideway values have increased since the 2019 CNI largely due to the inclusion of the dedicated bus lanes and updated replacement costing to reflect modern construction values for Metro SubwayLink's bridges, aerial girders, and tunnels.

The largest asset value by mode is represented by Metro SubwayLink, which includes the fleet of railcars, electrification and train control systems, stations, maintenance facilities, and the guideway elements noted above (see **Figure ES-1**).

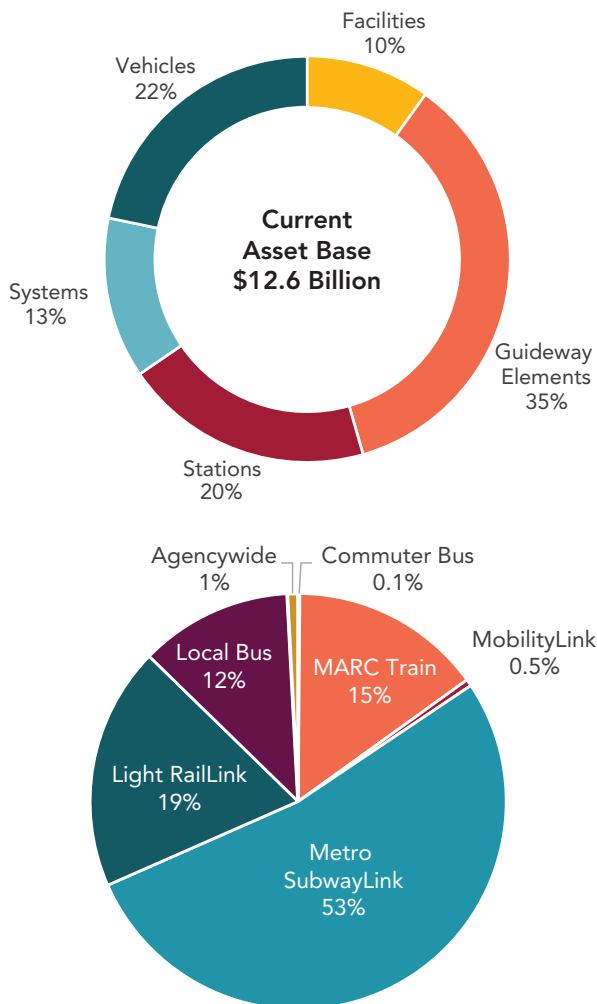


Figure ES-1. Replacement Value of Current Inventory by Asset Category and Mode (\$2021)

In addition, an agencywide category captures technology and operations-related assets that serve multiple modes (e.g., system technology, police, treasury, access control, and operations support).

Existing assets and funding needs related to the Purple Line, Locally Operated Transit Systems (LOTS), freight rail, and new service construction – such as building new RTP corridors– are not included in this analysis.

Total 10-Year Needs

Capital needs include the costs to maintain these existing assets in a SGR, meet existing or new regulatory requirements, invest in transit service enhancements, and modernize or adapt to new technologies or new mobility options. Investments to modernize and enhance current services are guided by the strategies and actions for improving transit documented in the RTP and Strategic Plan.

Routine maintenance activities are considered operating expenses and are not included in the CNI. In addition, construction of major new services—such as the Purple Line and new RTP corridors—are not included. Expansion assets will be included in the inventory once operational and the impact on future SGR Needs is known, though Purple Line asset renewal will not impact MDOT MTA needs while they are covered under contract.

Between 2022 and 2031, MDOT MTA's total capital needs are expected to reach more than \$6.3 billion in year of expenditure (YOE) dollars, including an inflation rate of three percent on all needs. This long-term forecast relies on historic averages to estimate the impact of inflation on costs. However, current rates of inflation are significantly higher and may cause actual future costs to escalate faster if the trend persists. The largest category of total needs over the 10-year period is vehicles at nearly \$2.2 billion (34 percent) for replacement and overhaul of current fleets and expansion of fleets to meet

EXECUTIVE SUMMARY

future customer demand. This value also includes MDOT MTA's plans to transition to cleaner, and more sustainable ZEB vehicles during this time period.

By mode, most of the needs are in support of Metro SubwayLink services, with Local Bus and MARC Train being the next largest in needs.

SGR Needs for MDOT MTA's current asset inventory drive 81 percent of total needs. Enhancement Needs (ENH) to meet system performance goals as well as current and future service demand make up 19 percent of total needs over the 10-year period (see **Figure ES-2**).

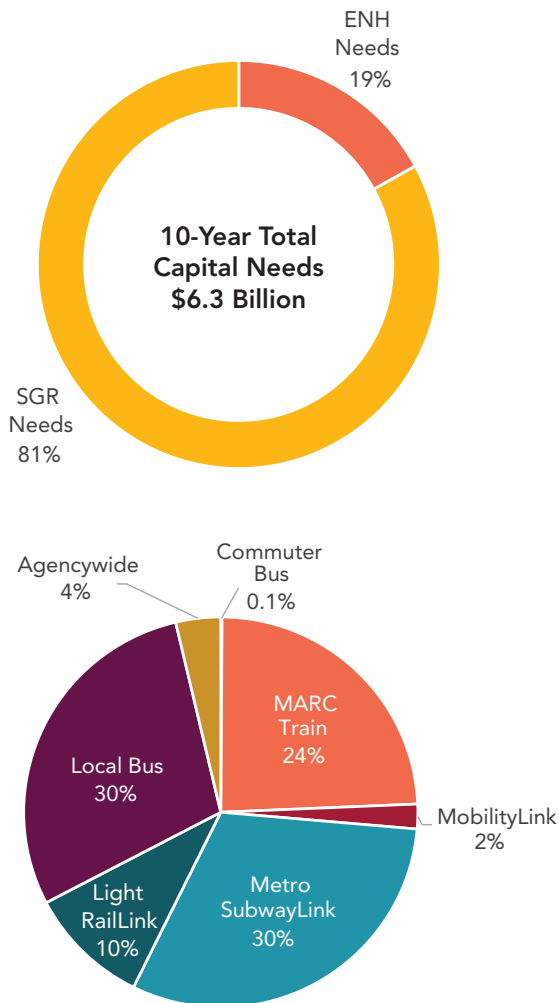


Figure ES-2. Summary of Total 10-Year Capital Needs by Type and Mode, (\$YOE)

State of Good Repair Needs

MDOT MTA's SGR Needs are based on analysis of the current inventory of assets and lifecycle management plans for their replacement, rehabilitation, and annual capital maintenance. The Federal Transit Administration's (FTA) Transit Economic Requirements Model (TERM) Lite aggregates and predicts SGR Needs across all MDOT MTA's transit assets for the next 10 years. As MDOT MTA's TAM program has matured, the asset information for predicting needs has improved and includes more condition data from ongoing inspections.

An estimated \$5.1 billion in SGR Needs have been identified over the next 10 years, including \$1.8 billion in deferred capital maintenance ("SGR backlog"). In this analysis, the entire backlog is shown in the first year, 2022, as the CNI presents unconstrained needs (see **Figure ES-3**). MDOT MTA is not alone in addressing its SGR backlog; many other transit agencies face similar challenges, and the national SGR backlog is estimated at nearly \$120 billion in 2021 dollars per the U.S. Department of Transportation's (USDOT's) 2019 Condition and Performance Report.

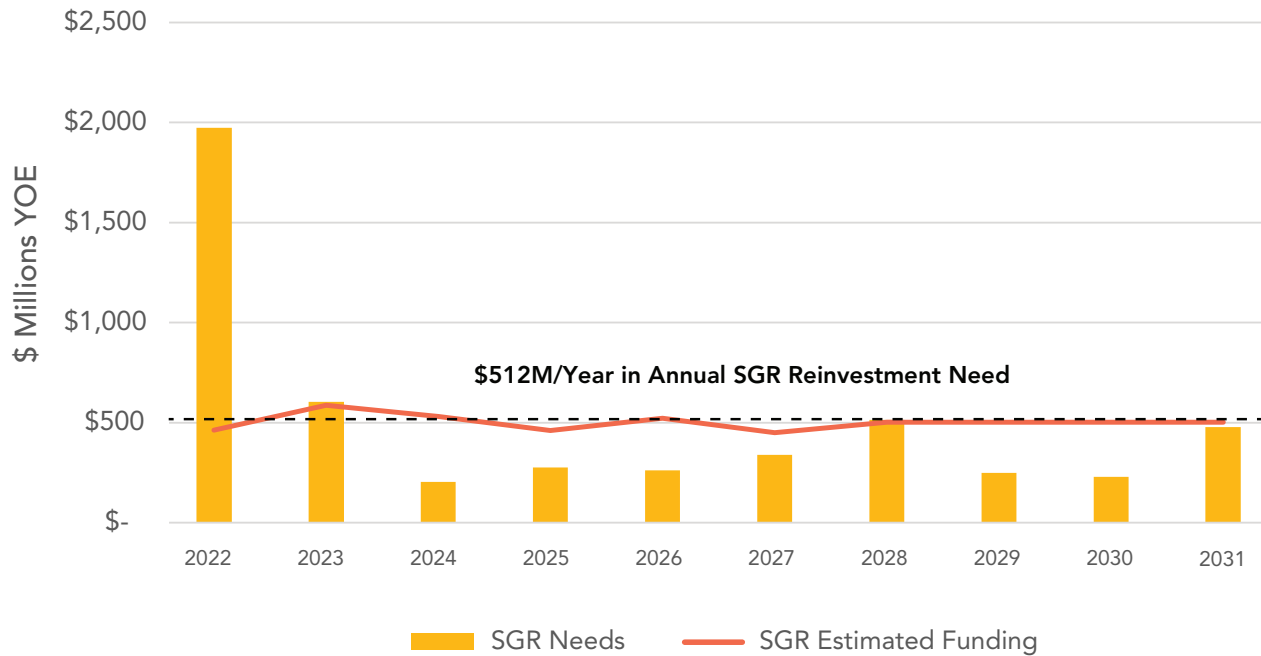
The annual reinvestment needed to maintain and/or bring MDOT MTA assets into SGR averages \$512 million per year for the next 10 years (illustrated with the dotted line on the graph on page 4).

Since 2019, additional funding has become available through federal stimulus and increased state funding of transit, which is expected to significantly close the funding gap for SGR Needs. As shown in **Figure ES-3**, the average annual SGR Needs are close to the estimated annual funding amounts, with a gap of \$110 million over 10 years, or an average gap of \$11 million per year.

This increase in programmed funding has allowed MDOT MTA to address critical backlog items in the Consolidated Transportation Program (CTP) including Metro SubwayLink stations renovations, elevator and escalator replacements, and bus garage modernization. Due to increased transit capital funding and MDOT MTA's aggressive pursuit

10-Year Capital Needs Inventory & Prioritization

of grant funding opportunities and partnerships, the relative size of the SGR backlog has decreased since 2019. This indicates greater overall “health” of the transit system and its interdependent assets. With the current funding estimate, that backlog will continue to decrease over the next 10 years as MDOT MTA prioritizes safety-critical needs and preservation of the existing system (see **Figure ES-4**).



*Note: Analysis does not include MDOT MTA needs or funding associated with the Purple Line, LOTS, or freight rail.

Figure ES-3. 10-Year Forecasted SGR Needs vs. SGR Funding (\$Millions YOY)

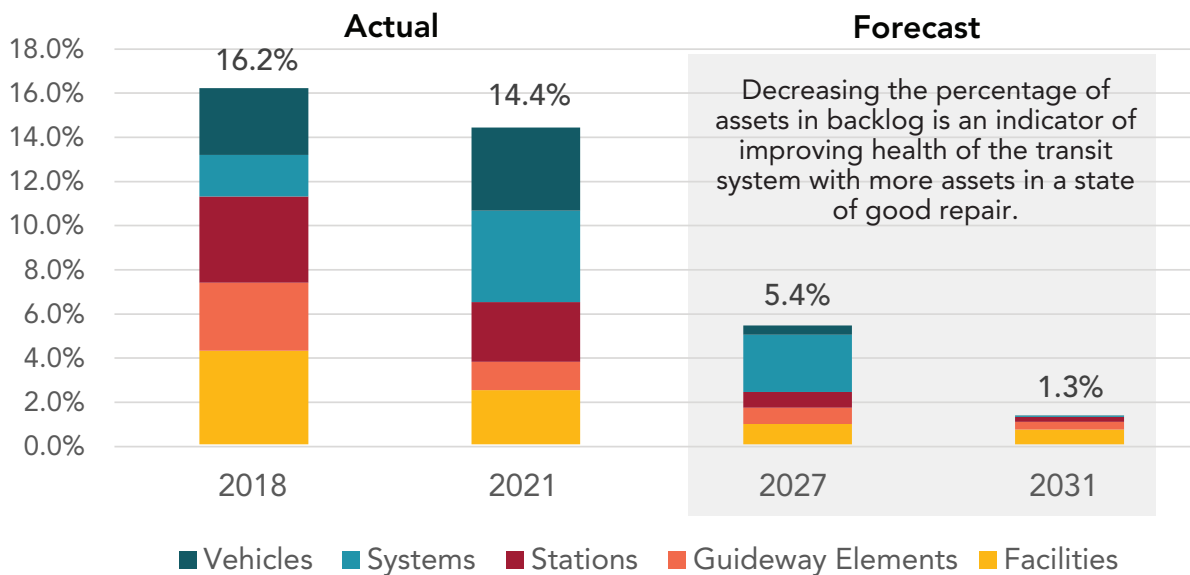


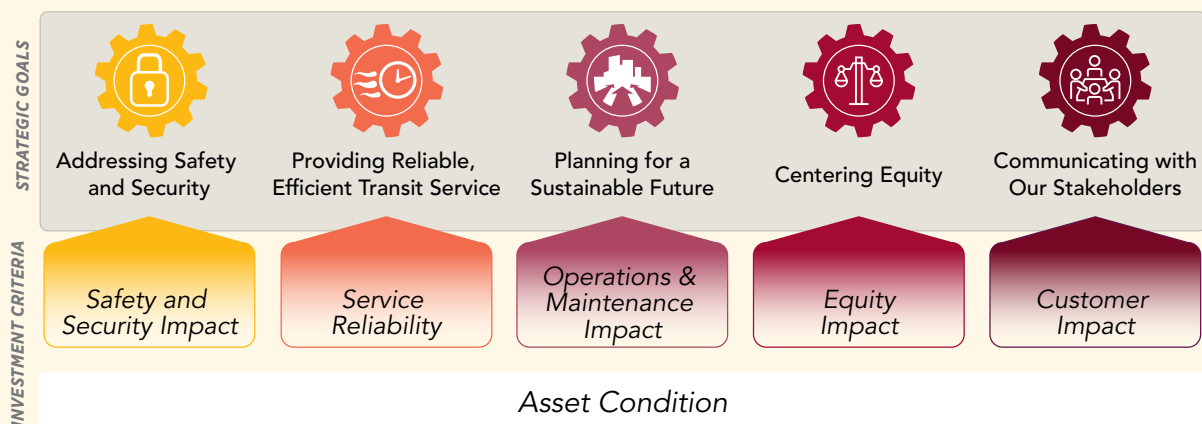
Figure ES-4. Percent of Assets in SGR Backlog from 2018 to 2031

MDOT MTA Prioritization Criteria

MDOT MTA prioritizes capital needs in alignment with the agency's vision, providing a direct link between its strategic actions and its investments to preserve and enhance the system. Each prioritization criteria supports a specific goal.

As MDOT MTA is committed to being a good steward of the region's investment in transit, Asset Condition is considered to be foundational to all of the goals of the agency.

MDOT MTA has always considered Equity in the planning process, and now includes it as a measure for investment to ensure accountability in capital investment decisions.



Enhancement Needs

Enhancement Needs include investments in new assets to provide the highest level of safety, meet forecasted system demand levels, and comply with new mandates. Enhancement Needs also consist of capital investments required to adapt to new technologies and new mobility options to improve customer experience, operational efficiencies, or reliability of transit service.

An estimated \$1.19 billion in Enhancement Needs have been identified over the next 10 years to support MDOT MTA in continuing to deliver its mission. Over the CNL period, the greatest portion of projected Enhancement Needs are attributed to guideway elements (38 percent) primarily associated with the MARC Train Penn Line storage project, which would provide more direct access

to maintenance yards and greater efficiency in storage locations. MARC Train is also the mode with the highest Enhancement Needs as additional expansions are proposed at the Martin State Airport yard and the Brunswick Coach Maintenance Building.

The next-highest Enhancement Needs involve improving facilities and implementing ZEB infrastructure at bus garages (24 percent), (see **Figure ES-5**).

More than half of the identified Enhancement Needs are relatively small projects with individual costs of \$5 million or less. MDOT MTA often seeks funding for these lower-cost Enhancement Needs through discretionary grant opportunities.

10-Year Capital Needs Inventory & Prioritization

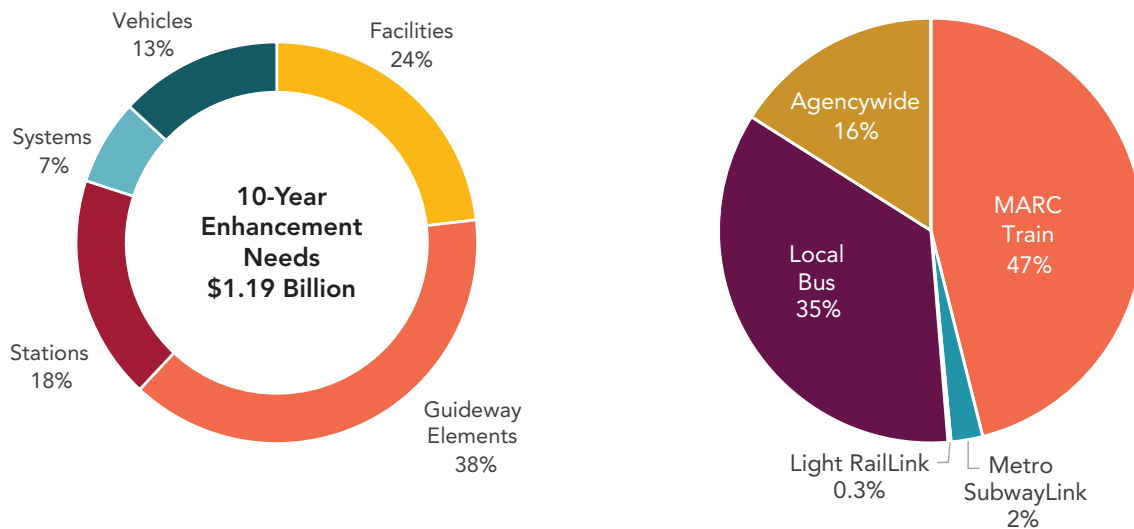


Figure ES-5. Summary of Enhancement Needs (CY2022–2031, \$YOE)

Funded Needs

This CNI is intended to provide, without pre-determined limits to budget or resources, an unconstrained view of the total estimated capital needs MDOT MTA requires to maintain or bring its assets into a state of good repair and meet service Enhancement Needs. Since the 2019 CNI, MDOT MTA has further incorporated asset information and TAM analysis into capital planning and programming processes. This evolution in the capital program has allowed the agency to prioritize and address SGR Needs effectively by

identifying needs early and bundling them together for efficient delivery.

COVID-19 relief funding, competitive grants, and increased funding from the State of Maryland have allowed MDOT MTA to make significant progress against the original \$2 billion funding gap reported in 2019. With the expected increase in formula funding from the recently passed Bipartisan Infrastructure Law, the funding gap is expected to close even further in the next ten years (see **Figure ES-6**). Expected funding can address 98 percent of SGR Needs but still falls short of MDOT MTA's

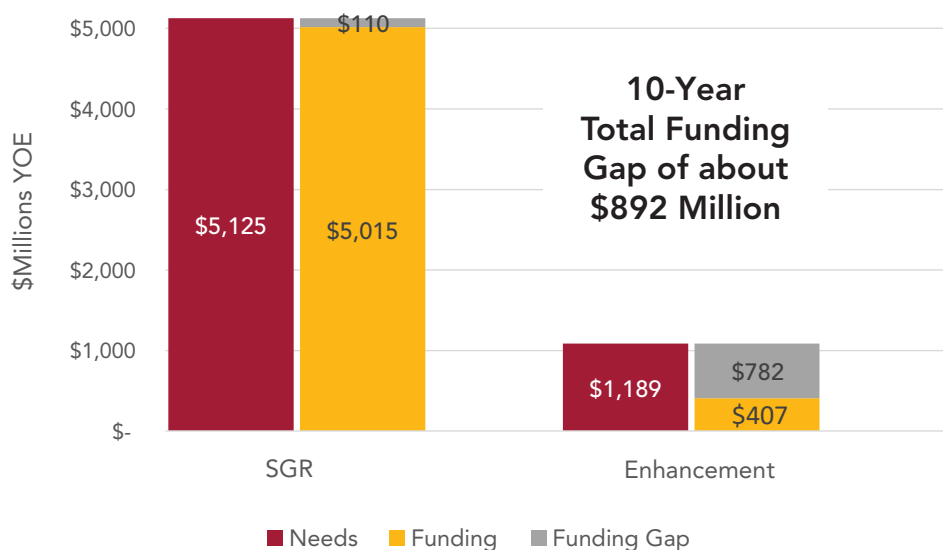


Figure ES-6. 10-Year Total Capital Needs vs. Total Capital Funding Forecast (CY2022–2031, \$Millions YOY)

EXECUTIVE SUMMARY

total needs. It is critically important for the agency to prioritize SGR reinvestments while balancing Enhancement Needs and aggressively pursuing discretionary funding to further close the gap and pursue expansion projects identified in the RTP and Statewide Transit Plan (STP), which are not included in the CNI.

At expected funding levels, MDOT MTA will have an estimated funding gap of about \$892 million, with the majority of the gap identified against Enhancement Needs.

Significant investments have been made in transit in the State of Maryland, with improvements since 2019 in guideway, facilities, stations, and vehicles. The relative size of the SGR backlog has decreased from 16.2 percent to 14.4 percent of MDOT MTA's assets in this time (see **Figure ES-9**). With current funding, the backlog is projected to continue to decrease to 5.4 percent of assets by 2027.

Multiple high-priority items have been addressed including modernized facilities at the Kirk Bus Garage, replacement of local buses and MobilityLink vehicles, and renewed Metro SubwayLink interlockings. MDOT MTA continues to progress the high-priority replacement of Metro SubwayLink railcars and the related signaling system through the current CTP.

Next Steps

MDOT MTA has worked collaboratively with funding partners and the industry to leverage new sources of funding and new technologies to improve the delivery of the capital program. The agency continues to improve the TAM program and CFP process and strengthen the links between them to address the backlog while also funding needed enhancements.

Similarly, MDOT MTA has worked with stakeholders in the region and across the state to develop visions for the future of transit in the RTP and STP. The needs in this CNI will progress these plans and begin to achieve the benefits of improved transit for MDOT MTA's customers and community.

MDOT MTA is committed to asset management excellence and continuously improving safety, reliability, efficiency, equity, and service for its customers. This CNI presents MDOT MTA's unconstrained needs, which will be reviewed every three years, per Chapter 352 requirements from the 2018 legislative session.

WHAT'S CHANGED SINCE 2019?

- Inventory has improved with more accurate data on guideway and systems and inventory value has increased with new facilities, new fleet technology, and cost inflation.

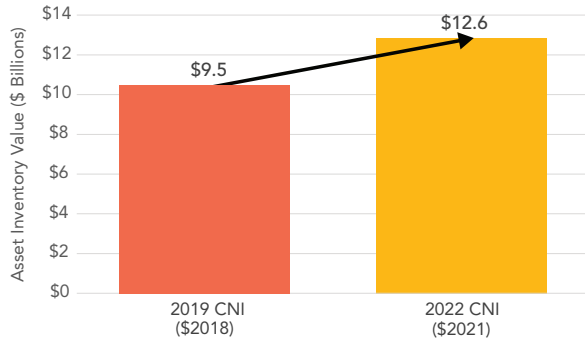


Figure ES-7. Change in Asset Inventory Value, (\$Billions)

- Expected funding has gone up with increases in state and federal investments in transit, including the new Bipartisan Infrastructure Law.

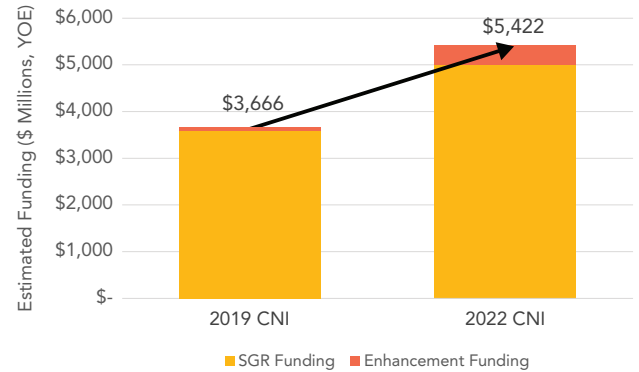


Figure ES-8. Expected Funding 2019 CNI vs. 2022 CNI, (\$Millions YOE)

- Relative size of backlog has decreased as MDOT MTA has invested in high-priority SGR Needs.

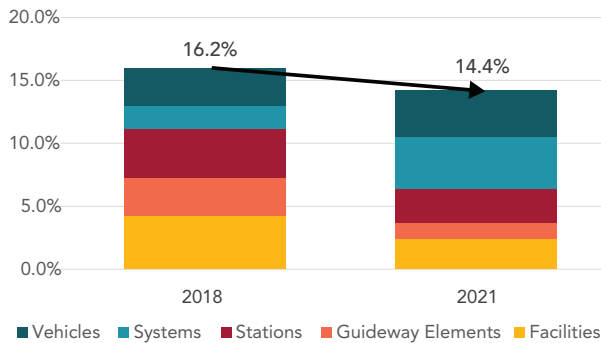


Figure ES-9. Relative Change in Size of Backlog 2018-2021

- Total needs have increased due to inflation, the high cost of ZEB vehicles, the first year of light rail vehicle replacements, and aging rail systems.

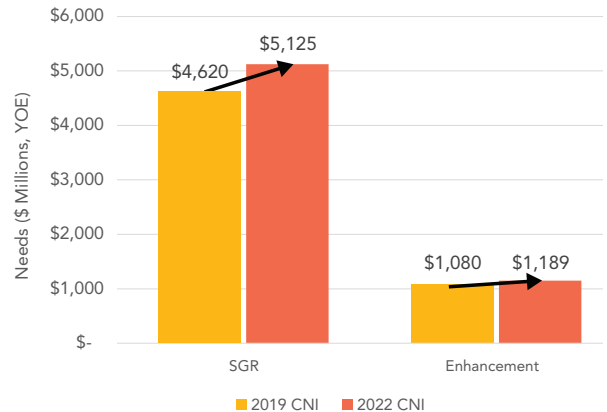


Figure ES-10. SGR and Enhancement Needs 2019 CNI vs. 2022 CNI, (\$Millions YOE)

- Expected funding gap will decrease as more funding is available for transit.

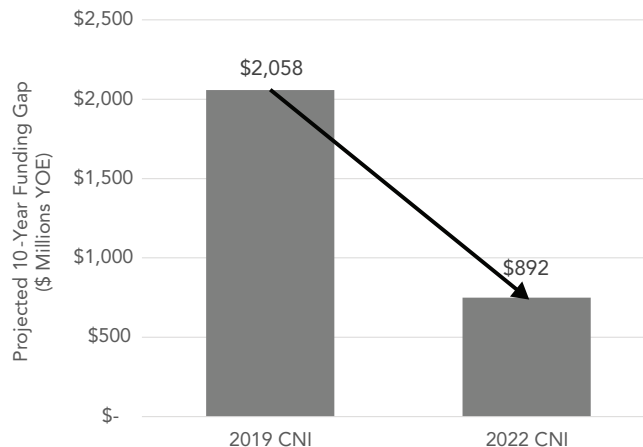


Figure ES-11. Projected 10-Year Funding Gap 2019 CNI vs. 2022 CNI, (\$Millions YOE)

1. MDOT MTA'S SERVICE AND ASSETS

MDOT MTA has served as the primary transit provider throughout the State of Maryland since its inception in 1969 as the Baltimore Metropolitan Transit Authority. MDOT MTA's service area covers 2,560 square miles, serving more than 7 million people according to the latest National Transit Database statistics. This CNI identifies and prioritizes the unconstrained capital investments required over the next 10 years, 2022 to 2031, for MDOT MTA to maintain its existing transit assets in a state of good repair and continue to meet the current and future needs of its customers.

1.1 Service Overview

Since 2019, transit service demand across the country has declined due to the effects of the COVID-19 pandemic. During the peak of the pandemic in 2020, ridership across all MDOT MTA service modes fell to 40 percent of pre-pandemic ridership levels. Average weekday ridership of nearly 320,000 trips in 2019 dropped to approximately 171,000 trips by spring of 2020. Since then, ridership has steadily increased with the strongest recovery on Local Bus services and the slowest recovery on commuter modes that are heavily linked to providing service to federal workers commuting to and from Washington DC (see **Figure 1-1**). MDOT MTA continued to operate Local Bus (CityLink, LocalLink, and Express BusLink), Commuter Bus, Light RailLink, Metro SubwayLink, Maryland Area Regional Commuter (MARC) Train, and Paratransit (MobilityLink) systems to provide the necessary transit service to essential employees and ensure that communities had access to essential goods and services including food and healthcare through the pandemic. MDOT MTA restored full service across all transit modes in September 2021.

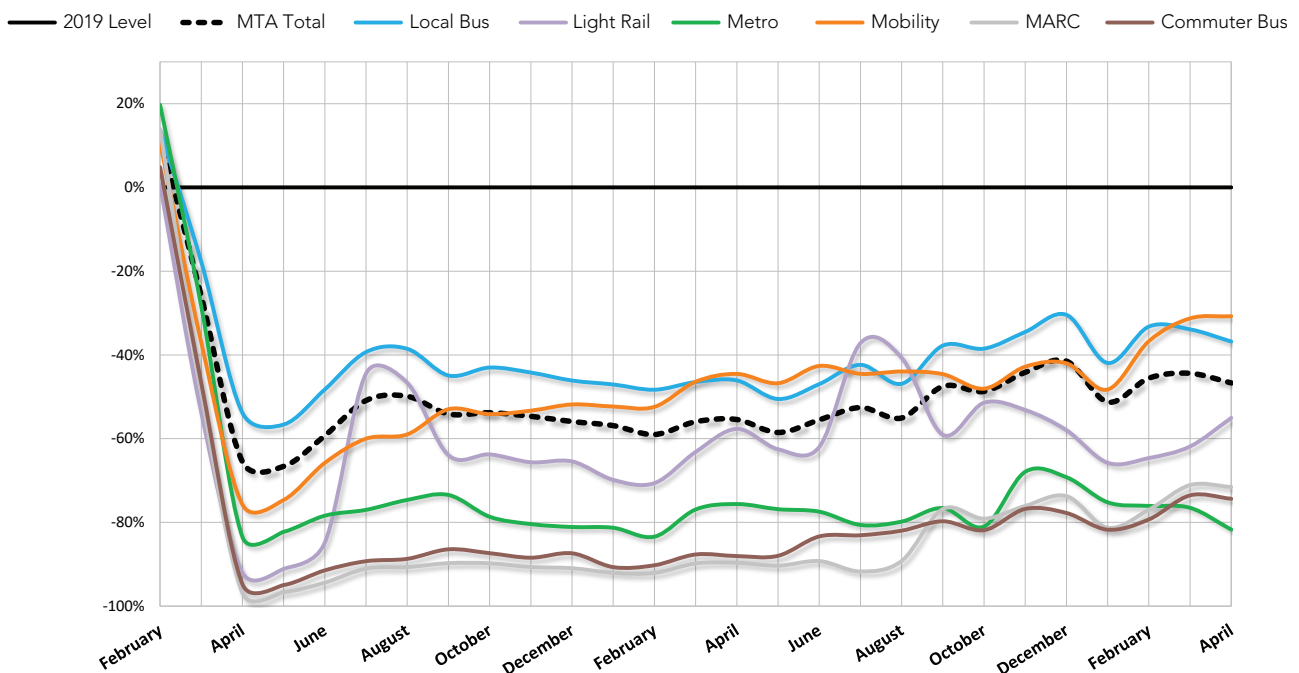


Figure 1-1. MDOT MTA Changes to Ridership Relative to 2019 Average by Mode

10-Year Capital Needs Inventory & Prioritization

MDOT MTA expects the current trends in ridership growth to continue, though recovery to pre-pandemic levels will take time. While recovery continues, the agency is implementing the actions in the Strategic Plan: Rebuilding Better and Central Maryland RTP to meet expected future demand for transit service.

Trip percentage by mode are rounded and may not total to 100%

1.1.1 Local Bus



**CityLink, LocalLink,
Express BusLink**

110,100 Average
Weekday Trips

81% of MDOT MTA
Total Passenger Trips

\$6.08 Operating
Cost per Trip

Local Bus service consists of CityLink, LocalLink, and Express BusLink services. Together, Local Bus service accounts for the largest proportion of MDOT MTA's total system ridership. Although total ridership of the Local Bus service has dropped in comparison to pre-pandemic levels, ridership of Local Bus service was most resilient and continues to outperform the other modes and now represents 82 percent of the total system ridership, compared to 67 percent prior to the pandemic.

1.1.4 Metro SubwayLink



**Owings Mills-
Downtown
Baltimore-John
Hopkins Hospital**

5,500 Average
Weekday Trips

4% of MDOT MTA
Total Passenger Trips

\$12.07 Operating
Cost per Trip

MDOT MTA currently operates a single Metro SubwayLink line, which runs from Owings Mills to Johns Hopkins Hospital, passing through the core of downtown Baltimore. Metro SubwayLink service runs from 5:00 a.m. to midnight every weekday and from 6 a.m. to midnight on weekends and holidays. Headways (length of time between train arrivals) range from eight minutes during weekday AM and PM peak periods to 15 minutes on weekends and holidays. The total scheduled travel time from end to end is approximately 30 minutes.

1.1.5 Light RailLink



**Hunt Valley-
Downtown
Baltimore-BWI/Glen
Burnie**

7,700 Average
Weekday Trips

6% of MDOT MTA
Total Passenger Trips

\$9.90 Operating
Cost per Trip

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). Light RailLink connects to both Penn Station and Camden Station. The system includes four overlapping patterns, or variations, of train origin and destination along a common line:

- Hunt Valley to BWI Airport – operates with higher frequency than other branches
- Timonium to Glen Burnie – operates during peak and off-peak hours to accommodate high ridership
- Hunt Valley to Cromwell – operates during middays and evenings
- Penn Station to Camden Station (Penn-Camden Shuttle) – typically only uses single-vehicle trains

Typically, during special events (e.g., Orioles games, Ravens games, etc.) peak-level service is provided with additional train cars to efficiently manage the higher ridership volumes.

MDOT MTA'S SERVICE AND ASSETS

1.1.2 Commuter Bus



**Region: Baltimore,
Central Maryland,
Washington**

2,300 Average
Weekday Trips

2% of MDOT MTA
Total Passenger Trips

\$21.56 Operating
Cost per Trip

MDOT MTA's Commuter Bus program connects suburban commuters with downtown destinations where there are large concentrations of jobs. The Commuter Bus program uses private contractors to operate long-distance, work-based trips primarily from suburban park-and-ride lots into the central business districts of Baltimore City and Washington, DC, where they also connect with bus and rail systems. In Winter 2022, MDOT MTA's Commuter Bus Program operated 36 routes, providing 465 trips per day. Service is scheduled Monday through Friday during morning and afternoon peak periods.

1.1.3 MARC Train



**Penn Line, Camden
Line, Brunswick Line**

5,400 Average
Weekday Trips

4% of MDOT MTA
Total Passenger Trips

\$24.14 Operating
Cost per Trip

MARC Train delivers daily commuter rail service, providing regional connections to transit systems in two major metropolitan areas—Baltimore and Washington, DC. MARC Train also provides connections to local transit services, including:

- Virginia Railway Express (VRE),
- Washington Metropolitan Area Transit Authority (WMATA),
- Montgomery County's Ride On,
- Prince George's County's The Bus,
- Harford County Transit LINK,
- Frederick County's TransIT,
- Cecil County's Cecil Transit,
- Regional Transit Agency of Central Maryland (RTA),
- Shuttle-UM (University of Maryland), and
- Future Purple Line.

The Penn Line is a segment of the Northeast Corridor (NEC), the busiest passenger railroad corridor in the United States. Stretching from Boston, MA, to Washington, DC, passenger service on the NEC accommodated 760,000 commuters and 40,000 intercity travelers on 2,000 trains each day prior to the COVID-19 pandemic. The Penn Line carries the largest share of MARC Train passengers throughout the system with 82 percent of the total of about 1,240,000 annual passengers in 2021. The Brunswick Line carries 10 percent of all MARC Train passengers and has the second-largest share of average annual passengers throughout the MARC Train system. The Camden Line accounts for seven percent of all MARC Train passengers.

1.1.6 MobilityLink



Shared ride access within ¾ mile of BaltimoreLink stops and other stations

5,400 Average Weekday Trips

4% of MDOT MTA Total Passenger Trip

\$53.30 Operating Cost per Trip

MDOT MTA's MobilityLink paratransit service operates in Baltimore City and Baltimore County, with limited service to parts of Anne Arundel and Howard Counties. MobilityLink offers persons with disabilities who are unable to use fixed route service shared ride access anywhere within ¾ of a mile of MDOT MTA's CityLink, LocalLink, Light RailLink, and Metro SubwayLink stops and stations. MobilityLink covers more than 360 square miles of service area. MobilityLink also provides connections with other paratransit systems, including those offered by Baltimore County CountyRide, the RTA, and Annapolis Transit.

MDOT MTA manages MobilityLink as a contracted service and also manages Call-A-Ride services. MDOT MTA owns the MobilityLink vehicles and staffs the call center for booking trips. The daily scheduling and operations, as well as vehicle maintenance, however, are performed by several service providers under contract with MDOT MTA. All MobilityLink trips are dispatched through a centralized control center. All MDOT MTA vehicles are equipped with Global Positioning System (GPS), automated vehicle locator (AVL), and mobile data terminal (MDT) hardware.

1.1.7 New Services



**Purple Line
Regional Transit Plan (RTP) Corridors
Statewide Transit Plan (STP) Corridors**

MDOT MTA continues to plan, develop, implement, and maintain projects that will expand its existing system and provide customers with new transit options to create a more equitable and sustainable future. Construction of these expansion projects are not included as needs in the CNI because they are not yet operational and the specific assets and their impacts on MDOT MTA funding needs are not yet fully known.

MDOT MTA will continue to refine and update the capital asset inventory as these expansion assets are delivered, to reflect the significant impact they will have on the agency's asset base and lifecycle maintenance needs.

Purple Line

The Purple Line is a 16-mile double-track light rail line with 21 stations that will operate between Bethesda in Montgomery County and New Carrollton in Prince George's County. The line will include direct connections to WMATA's Metrorail in four locations, all three MARC Train lines, and Amtrak. The project includes track, stations, railcars, and two operations and maintenance facilities. These assets will be included in inventory for assessment of SGR nNeds when they become operational, though the capital renewal costs for these assets is included in the public-private partnership contract as the contractor's responsibility in the near-term.

MDOT MTA is excited to complete construction on the Purple Line project, which will provide faster, more reliable transportation between residential and major employment areas. It will enhance access to existing radial Metrorail lines, support economic development consistent with local master plans, and reduce environmental impacts. The Purple Line will serve a corridor that currently lacks a direct east-west rail transit service connection and includes important commercial, institutional, and residential communities. Electrically powered trains will reduce air pollution and greenhouse gas emissions associated with cars and buses.

RTP Corridors

The [RTP](#) adopted in 2020 identified 30 Regional Transit Corridors for new public transportation assets. The Regional Transit Corridors will create a better transit network by providing better, more convenient access to more destinations. These corridors were selected because they:

- Demonstrate transit demand that justifies infrastructure, service, and technology improvements; and
- Have regional significance and often provide connectivity between different jurisdictions.

The Regional Transit Corridors are meant to remain flexible to accommodate the results of future feasibility studies and, therefore, do not define the mode of transit, specific alignment, station locations, or levels of service. Each corridor has or is projected to have sufficient ridership demand to support all-day, frequent transit. Further, these corridors also require additional infrastructure investment to fully support successful transit. These investments may include dedicated right-of-way, signal priority, shelters or stations, and other customer amenities.

Each corridor was determined to be either an early, mid-term, or long-term opportunity based on 16 measures to gauge readiness and potential to improve access to jobs and other opportunities for vulnerable populations.

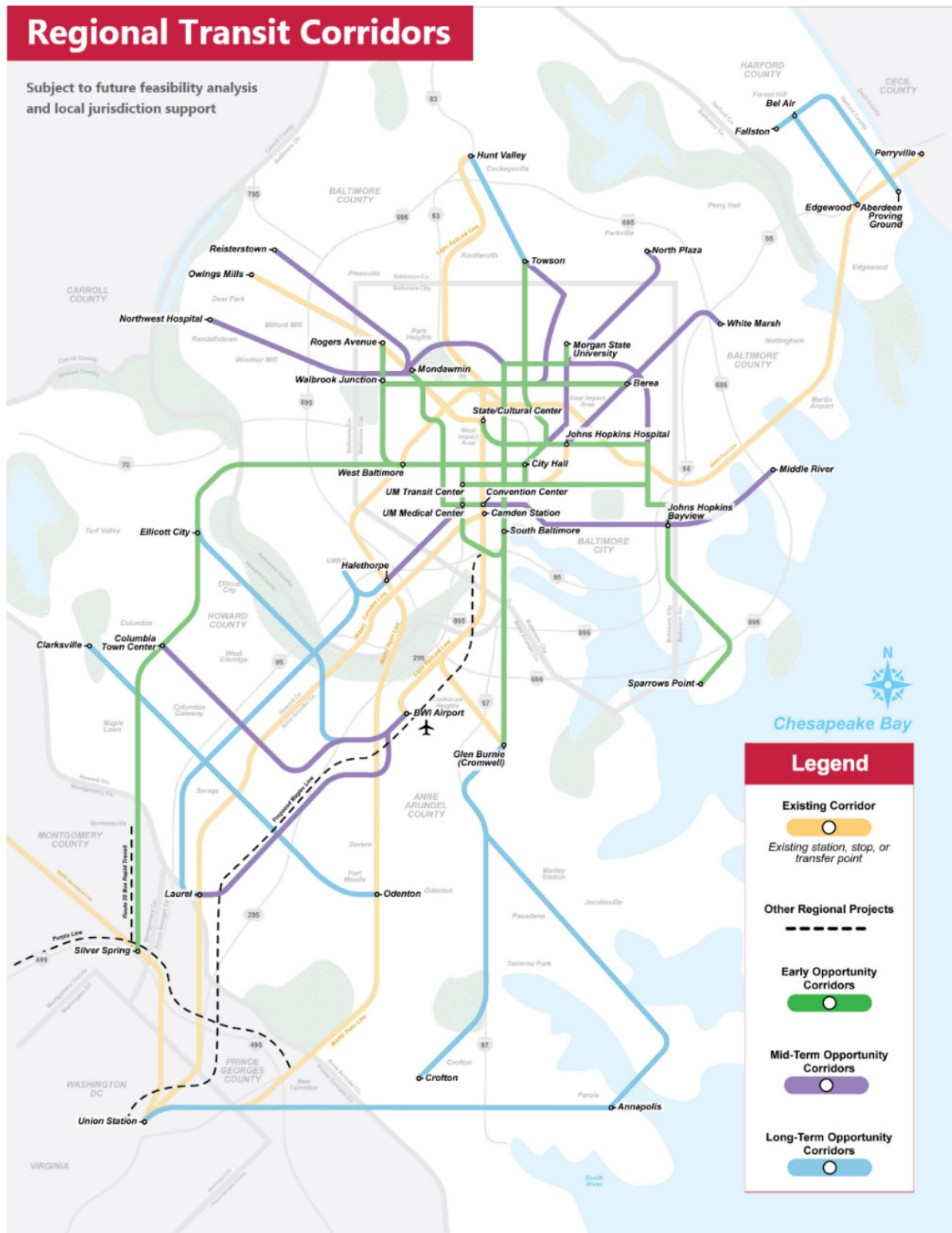


Figure 1-2. Central Maryland Regional Transit Corridors

STP Corridors

The Maryland STP provides a vision for improving public transportation over the next 50 years, with attention to regional context and mobility needs across the state. Among the STP's vision, goals, and strategies is a summary on the key intercity and regional transit connections in Maryland that will help the state meet future travel needs. Summarized at a statewide level, investments along these connections stand to enhance intercity and regional transit across Maryland and support the overall strategic statewide direction, vision, and goals of the STP.

- **Regionally Significant Transit Connections:** Corridors in which local, regional, and commute-oriented transit service could be supported, with moderate or high frequency of service (every 30 minutes or better), more stops and stations, and more connections to destinations of local or regional significance.

- **Intercity Transit Connections:** Corridors in which longer-distance transit service could be supported, with lower frequency, but still regular service, faster travel times, and longer distances between stops and stations.

Development of the STP relied heavily on input from LOTS and jurisdictions across the state of Maryland. Like the RTP corridors, the modes, alignments, and service levels for these corridors remain undefined to allow for feasibility studies and local priorities to direct their development. Many of these projects and the resulting new assets may not be owned or operated by MDOT MTA, as local jurisdictions take the lead. In those cases, the new services will not be included in future CNI updates.

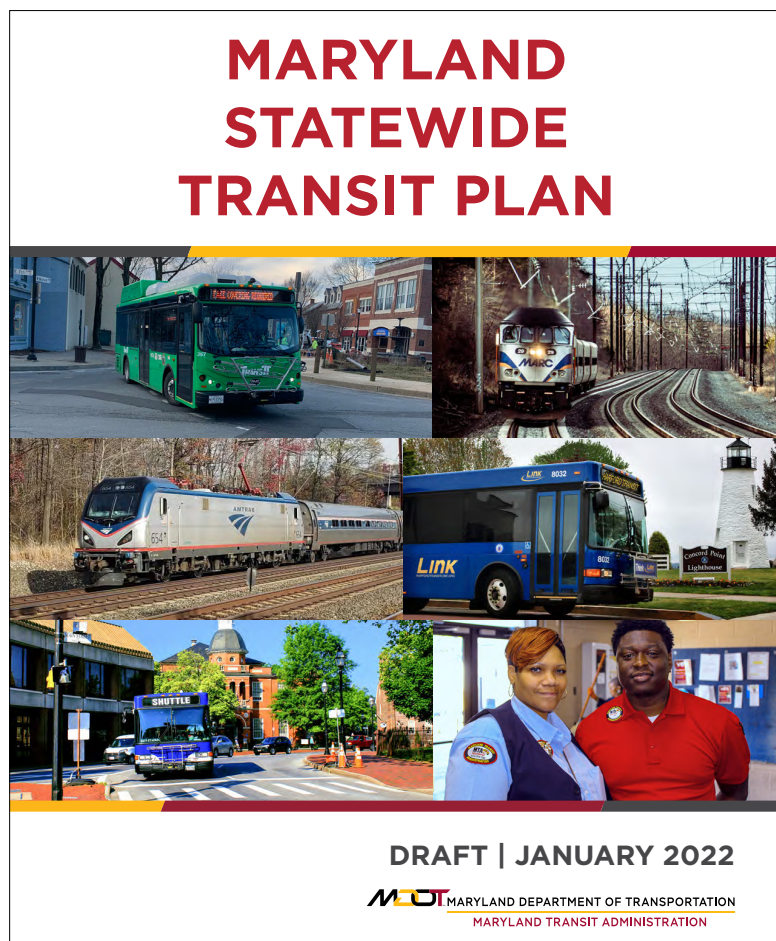


Figure 1-3. Maryland Statewide Transit Plan, 2022

1.2 MDOT MTA's Assets

MDOT MTA is the steward of \$12.6 billion in facilities, guideway, stations, systems, and vehicle assets, representing a significant investment in transit in Maryland. Capital asset information is currently maintained in MDOT MTA's capital asset inventory and forms the basis for understanding the required capital needs to maintain its assets in a state of good repair.

1.2.1 CURRENT ASSET BASE

As a multimodal agency, MDOT MTA is responsible for \$12.6 billion in capital assets that support its transit operations throughout the State of Maryland. MDOT MTA undertakes a review and update of its capital asset inventory annually as part of the agency's TAM planning and capital programming efforts. The capital asset inventory details the age, condition, location, and expected useful life of all MDOT MTA's transit assets.

MDOT MTA's capital asset inventory is currently organized by transit mode (Local Bus, Commuter Bus, MARC Train, Metro SubwayLink, Light RailLink, and MobilityLink) and by the following transit asset categories:

- **Vehicles** – including revenue (bus, railcar, and van) and non-revenue fleets (trucks, steel wheel vehicles, sedans, etc.)
- **Guideway** – including track and structures (e.g., bridges, tunnels, viaducts, fencing, retaining walls, etc.)
- **Systems** – including electrification (traction power and distribution), train control, utilities (drainage, lighting, and ventilation), fare collection, fire and life safety, communications, and security systems
- **Facilities** – including maintenance facilities (e.g., major shops, storage yards) and administrative facilities
- **Stations** – including passenger stations, parking lots and garages, and major transfer centers or hubs

In addition to mode-specific capital assets, agencywide assets also are accounted for in the capital asset inventory; they include those related to police, system technology, treasury, and operations support.

MDOT MTA's current asset base is summarized by asset category and mode in **Figure 1-4**.

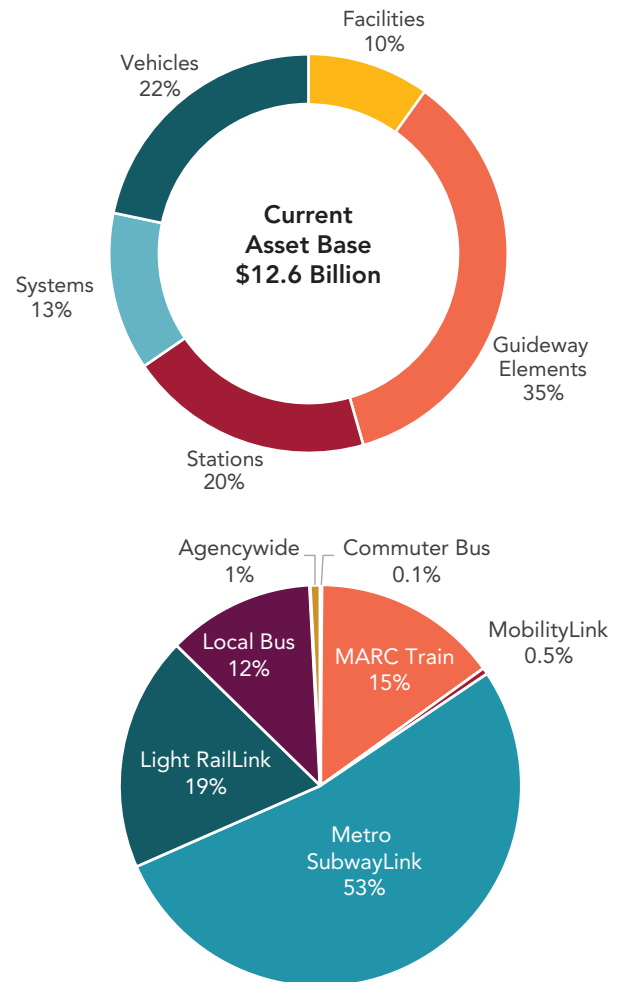


Figure 1-4. Replacement Value of Current Inventory by Asset Category and Mode (\$2021)

All current asset base values are presented in 2021 dollars and represent full replacement costs, which include applicable soft costs such as labor for design, installation, construction inspection, and project management. Assets related to the Purple Line, LOTS, and freight rail are not included in this analysis.

MDOT MTA'S SERVICE AND ASSETS

As **Figure 1-5** illustrates, transit assets are part of larger, interdependent systems, and, therefore, it is important for MDOT MTA to invest in the maintenance of assets that may not be visible to the customer (e.g., traction power substations may not be visible to the customer but are critical to MDOT MTA's ability to provide Light RailLink and Metro SubwayLink services). Accordingly, full investment is often required at a system level to minimize safety risk and/or loss of transit service.

Figure 1-6 and **Figure 1-7** provide a high-level summary of MDOT MTA's current capital asset inventory and estimated replacement values, organized by transit mode. The scope of assets supporting the rail modes (**Figure 1-6**) is much higher in value than the scale of the non-rail modes (**Figure 1-7**).

The capital asset inventory includes assets for which MDOT MTA has direct capital responsibility, meaning the agency owns the asset or has responsibility for capital replacement. Therefore, transit modes with a significant number of third-party-owned assets may reflect low replacement values relative to network size. For example, MARC Train utilizes many third-party assets including track, systems, facilities, and stations covering more than 240 miles of right-of-way, while Commuter Bus utilizes third-party-owned vehicles and park-and-ride lots.

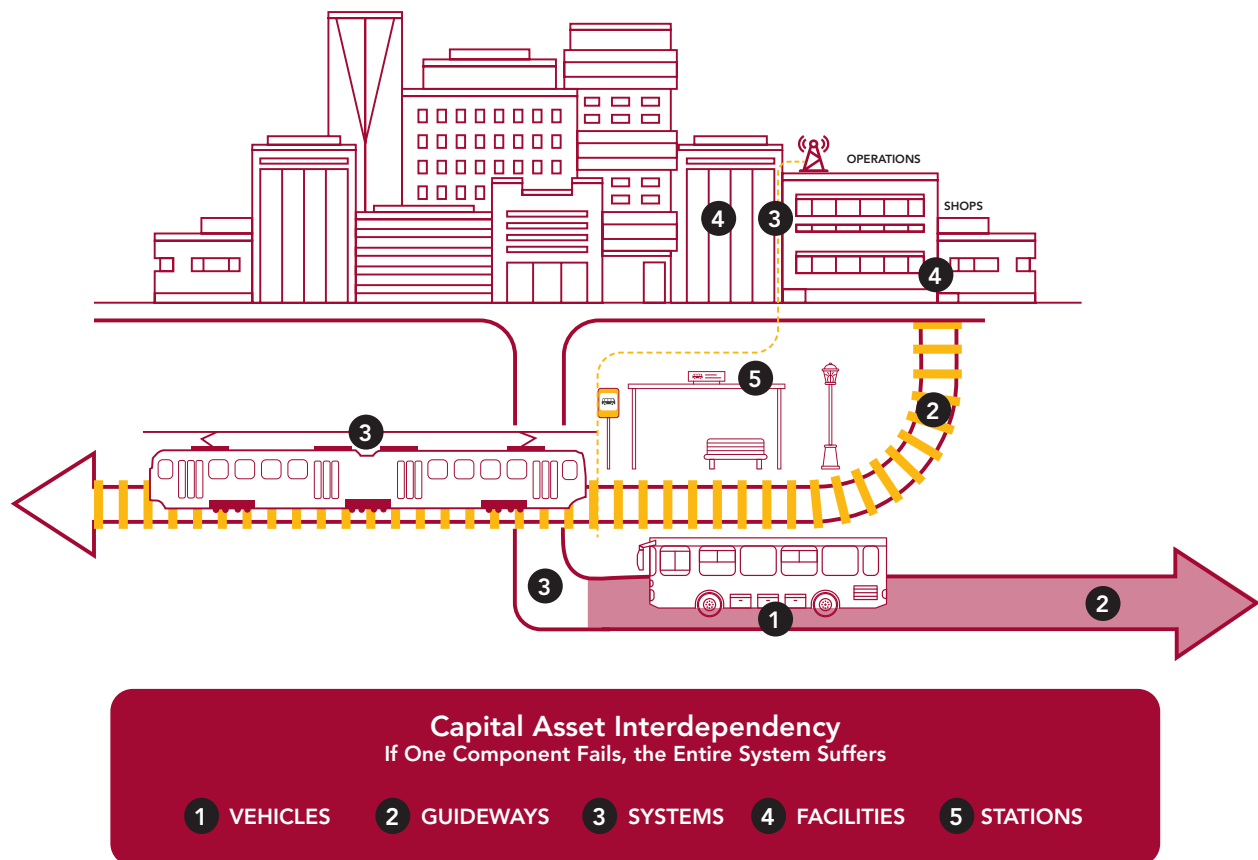


Figure 1-5. MDOT MTA Capital Asset Interdependency

10-Year Capital Needs Inventory & Prioritization

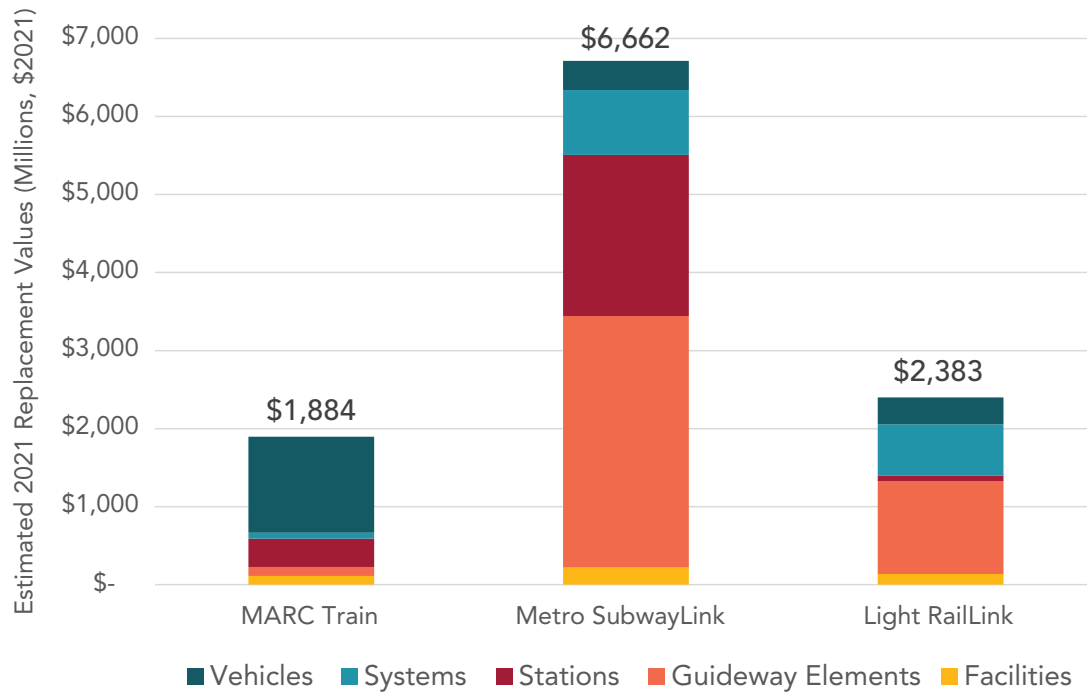


Figure 1-6. Summary of MDOT MTA's Current Capital Asset Inventory (\$Millions 2021) – Rail Modes

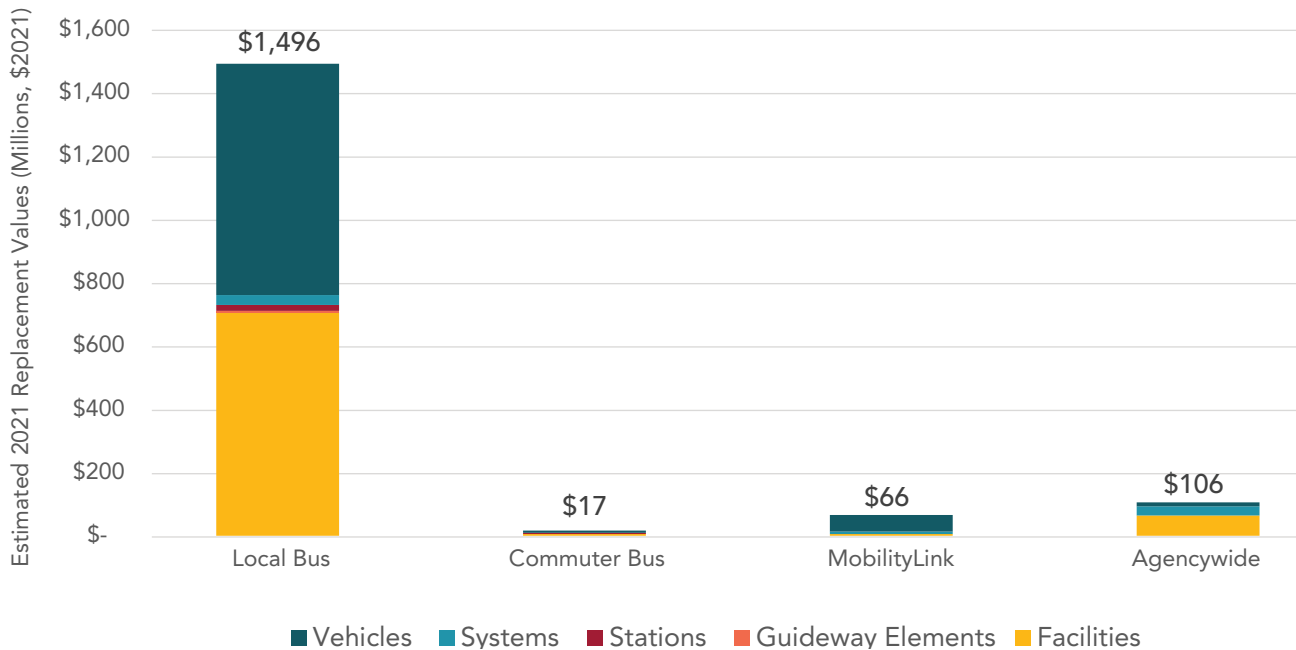


Figure 1-7. Summary of MDOT MTA's Current Capital Asset Inventory (\$Millions 2021) – Non-Rail Modes

1.2.2 CONTINUAL IMPROVEMENT OF TAM PROGRAM DATA

As part of MDOT MTA's ongoing efforts to continually improve and advance the quality of its data and business practices, subject matter experts (SME) from across the agency participate in annual updates to the capital asset inventory. These updates support the ongoing development of the TAM program and alignment with MDOT MTA's capital program development through the CFP process.

The CFP process engages project managers from across MDOT MTA's organization to provide information on future capital investment needs, including details regarding project type, purpose and need, scope, costs, schedule, and existing or new assets involved. CFP proposal submissions also include information relating how the proposed capital investments support MDOT MTA's strategic goals and prioritization measures related to safety,

reliability, efficiency, equity, and customer service. CFP proposal submissions cover both SGR and Enhancement Needs. Since 2019, the CFP process utilized asset inventory data and predicted SGR Needs in the scoping and submission of projects, requiring project managers to identify how and where their projects will improve asset conditions.

Table 1-1 summarizes the improvements made to MDOT MTA's capital asset inventory since 2019 by asset category. Primary data sources include:

- Maximo, an enterprise asset management software solution,
- Financial Management Information System (FMIS), which includes a fixed asset register,
- Condition inspections,
- Department-level asset inventories,
- Industry studies, and
- Input from SMEs and MDOT MTA project managers.

CFP Process Impact

Utilizing asset information to scope and justify capital project submissions through the CFP process has significantly improved the quality of inventory data since the 2019 CNI report.

Table 1-1. Summary of Improvements to Capital Asset Inventory Since 2019

Asset Category	Select Data Improvements Since 2019
Guideway	<ul style="list-style-type: none"> » Metro SubwayLink Aerial Structures and Tunnel Records updated to reflect current inspection records. » Expected life of Light RailLink track updated to better reflect historical inspection records. » Continued refinement of Metro SubwayLink and Light RailLink guideway and track records to reflect rehabilitation and replacement of segments, updated useful lives, and more accurate construction costing of tunnels, bridges, and at-grade structural elements. » Added maintenance costs for Dedicated Bus Lanes in Baltimore to better reflect MDOT MTA's responsibility.
Facilities	<ul style="list-style-type: none"> » Riverside Yard facilities included after acquisition from CSX for MARC Train. » Parking lot and pavement records improved due to MDOT-wide inspection project. » Stormwater management data added to the inventory as initial data was collected. » Captured final construction of new Kirk Bus Division. » Updated inventory based on Eastern Bus pilot study of field inventory and condition inspection.
Systems	<ul style="list-style-type: none"> » Metro SubwayLink third rail heaters and switch heaters added to inventory. » Line Vent and Pump Stations disaggregated from Metro SubwayLink tunnel structures as capital programming practices are being improved across the agency.

Asset Category	Select Data Improvements Since 2019
Stations	<ul style="list-style-type: none"> » Metro SubwayLink Station lighting record added from a new lighting study. » Parking lot and pavement records improved due to MDOT-wide inspection project. » Roof records improved due to MDOT-wide inspection project. » Electrical records at Metro SubwayLink stations were refined to be more comprehensive and reflective of critical components.
Vehicles	<ul style="list-style-type: none"> » Useful life for MARC fleet adjusted to reflect current lifecycle predictions. » Local Bus fleet useful life adjusted to reflect historical maintenance record. » Increase in cost of future replacement buses due to upcoming zero-emissions bus (ZEB) transition.

ZEB Transition

Maryland has set a goal for net-zero statewide greenhouse gas emissions by 2045. MDOT MTA is aggressively pursuing a transition to a ZEB fleet to support air quality and noise benefits across the region and has initiated the process to transition 50 percent of the agency's bus fleet to zero-emission vehicles by 2030. The estimated capital cost of this transition from 2021 to 2041, including fleet purchases and charging/fueling infrastructure, ranges from \$738 million to \$850 million YOE dollars¹. Achieving this goal entails major investments in buses, bus depots, and training for operators and mechanics. As a first step, MDOT MTA is pursuing a pilot project that will bring seven battery electric buses into service in 2023. Cleaner buses reduce diesel emissions and noise near bus maintenance facilities and systemwide (see **Figure 1-8**).

¹ Maryland Zero Emission Bus Transition Act Legislative Report, February 2022.

Three years of improvements in data have resulted in a better understanding of MDOT MTA's asset holdings and lifecycle plans, including improved conditions and useful lives for estimating needs. The total value of MDOT MTA's asset base has increased in real terms as new assets have been acquired or constructed—such as MARC Train's Riverside Yard and the Kirk Bus division, respectively—and additional assets have been

included in the capital asset inventory. Additional structures related to guideway, including tunnel segments and at-grade substructures, have been included and properly valued to reflect modern construction costs. Those improvements have driven a majority of the increase in inventory value since 2019 along with three years of inflation driving up replacement costs.

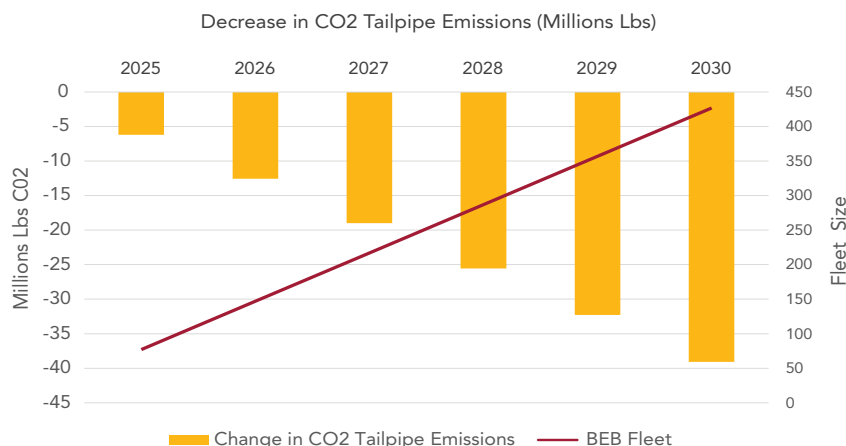


Figure 1-8: Estimated Reduction in Tailpipe Emissions with Increase in ZEB Fleet

2. METHODOLOGY

This CNI is designed to present an unconstrained set of prioritized investment needs over the next 10 years, aligned to MDOT MTA's Strategic Plan and consistent with ongoing TAM analyses. MDOT MTA's CNI methodology is based on its existing capital asset inventory and lifecycle management strategies to help determine timescales and associated costs for replacement or rehabilitation of assets. In addition, the CNI draws upon MDOT MTA's CFP process to align SGR Needs with project plans and identify additional Enhancement Needs to meet the current and future demands of the system and its customers.

2.1 Purpose of the CNI

The purpose of this CNI is to assess MDOT MTA's ongoing unconstrained capital needs over a 10-year period. It presents information from MDOT MTA's ongoing TAM analyses and CFP process and is intended to support improved decision-making regarding the maintenance and improvement needs of MDOT MTA's transit assets over the long term. Capital needs may include, but are not limited to, the costs to maintain assets in a state of good repair; meet existing or new regulatory requirements; invest in transit infrastructure, assets, or service enhancements; and modernize or adapt to new technologies or new mobility options.

2.1.1 CNI REQUIREMENTS

According to Maryland State Law, MDOT MTA must update the CNI at least once every three years and provide a report on the capital funds programmed, appropriated, and expended the prior fiscal year for each of the projects identified in the current CNI.

Table 2-1 outlines all the requirements for preparing the CNI as defined in Maryland State Law, Chapter 352, and the strategy for how compliance is achieved in this document and in the subsequent CNI Annual Report.

10-Year Capital Needs Inventory & Prioritization

Table 2-1. Summary of Capital Needs Inventory Requirements

Chapter 352 Ref.	Requirement	Strategy for Compliance
7-309 (A)	The Administration shall, at least every three years, assess the ongoing, unconstrained capital needs of the Administration.	MDOT MTA established its first 10-Year CNI by July 1, 2019. This document establishes the first three-year update by July 1, 2022.
7-309 (B)	In undertaking the assessment required under subsection (A) of this section, the Administration shall:	
7-309 (B)(1)	Compile and prioritize capital needs without regard to cost.	See Section 3, Prioritization.
7-309 (B)(2)	Identify the backlog of repairs and replacements needed to achieve a state of good repair for all Administration assets, including a separate analysis of these needs over the following 10 years.	See Section 3, State of Good Repair Needs, for forecasts over the next 10-year period. State of Good Repair needs are prioritized under Section 3.4.
7-309 (B)(3)	Identify the needs to be met in order to enhance service and achieve system performance goals.	See Section 3.3, Enhancement Needs, for forecasts over the next 10-year period. Enhancement needs are prioritized under Section 3.4.
7-309 (C)	On or before July 1, 2019, and on or before July 1 every three years thereafter, the Administration shall, in accordance with § 2-1246 of the State Government article, submit the assessment required under subsection (A) of this section to the Senate Budget and Taxation Committee, the House Appropriations Committee, and the House Environment and Transportation Committee.	Please refer to signature page for submission details. Section 2.1 describes the purpose of the CNI and review cycle.
7-309(D)	On or before January 20, 2022, and on or before January 20 each year thereafter, the administration shall, in accordance with § 2-1257 of the state government article, submit an accounting of the capital funds programmed, appropriated, and expended on each of the projects identified in the assessment required under subsection (A) of this section for the prior fiscal year to the Senate Budget and Taxation Committee, the House Appropriations Committee, and the House Environment and Transportation Committee.	<i>Capital Needs Inventory (CNI) Annual Report</i> , January 2022 and future CNI Annual Reports

2.2 Methodology Overview

MDOT MTA's investment needs are organized into two major categories:

- **SGR Needs:** Capital investment associated with the replacement, rehabilitation/repair, or annual capital maintenance of existing transit assets. The FTA defines state of good repair as “the condition in which a capital asset is able to operate at a full level of performance.” A capital asset is in a state of good repair when that asset:
 1. Is able to safely perform its designed function;
 2. Does not pose a known unacceptable safety risk; and/or
 3. Its lifecycle investments have been met or recovered.
- **Enhancement Needs:** Capital investment associated with improving existing services with new technology, increasing functionality, or providing new services. Enhancement Needs may also include investments to upgrade, modernize, or adapt the system to new requirements, technologies, or new mobility options. While enhancement investments are often perceived as new assets, they may also include safety and environmental improvements or actions to protect existing assets. For example, new capital investments were needed to implement positive train control systems and meet the Positive Train Control Enforcement and Implementation Act requirements by December 31, 2018. Enhancement Needs do not include major expansions, such as Purple Line and the RTP or STP corridors.

Maryland's 6-year capital improvement program for transportation projects, the Consolidated Transportation Program, includes many projects that address MDOT MTA's needs. These projects are developed through the CFP process, supported by TAM analyses, and funded under MDOT MTA's budget constraints. For ease of reporting on annual progress against CNI needs (see **Table 2-1**) this updated CNI includes needs that have been defined and scoped into projects that can be found in the CTP as well as unfunded

or longer-term needs that fall outside the 6-year CTP timeframe.

Figure 2-1 depicts how existing TAM and CFP processes have been leveraged to support the CNI. The increased use of asset inventory data in scoping and prioritizing MDOT MTA's projects has vastly improved the agency's understanding of capital needs and created a feedback loop through the TAM program that improves asset data and lifecycle plans on an annual basis. All needs from the TAM and CFP processes are compiled in the Project Investment Prioritization (PIP) database with unconstrained expenditures for the next 10 to 12 years. This database is maintained year-to-year to incorporate new needs as they are identified and maintain or update previously captured needs.

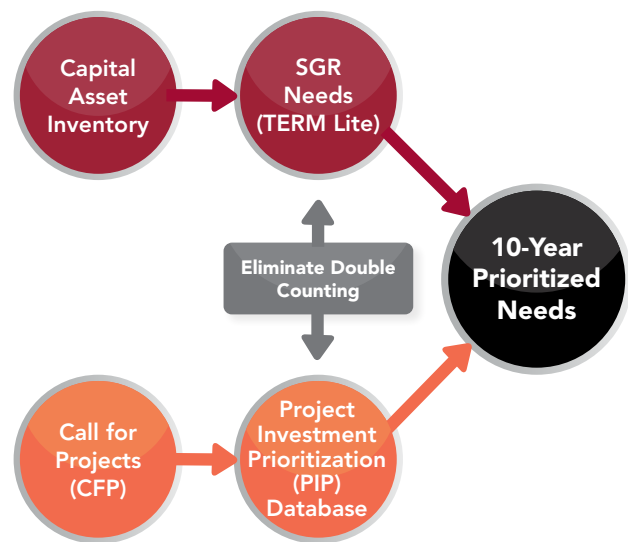


Figure 2-1. Methodology Overview

MDOT MTA's SGR investment needs are based on a comprehensive inventory of existing capital assets. The inventory includes information such as asset type, location, replacement cost, age, condition, and useful life, which help predict or determine the timing and anticipated capital costs of future replacements. In addition, MDOT MTA uses the Federal Transit Administration's (FTA's) Transit Economic Requirements Model (TERM) Lite to apply lifecycle management strategies to the capital asset inventory, which include the frequency and costs of rehabilitation and other capital maintenance activities, as well as predicting

replacement needs based on useful lives and projected asset condition decay.

New capital projects or Enhancement Needs, on the other hand, are identified through MDOT MTA's CFP process. MDOT MTA's project managers leverage a variety of sources to develop enhancement projects for submission to the CFP including:

- Public and customer feedback,
- Cornerstone Plans, which serve as modal long-range plans to meet the four cornerstones of MDOT MTA's vision (safety, efficiency, reliability, and world-class customer service),
- The RTP strategies and transit network improvements,
- The STP strategies and action plan, and
- New legislation or regulatory changes that require enhancements to the current system.

CFP project submissions also cover near-term SGR Needs. To avoid any double-counting, CFP submissions are subtracted from the SGR Needs identified by TERM Lite.

2.3 Guiding Principles

2.3.1 STRATEGIC LINE OF SIGHT

In response to the impact and challenges raised by the pandemic for Maryland and its residents, MDOT MTA developed *Rebuilding Better: Committed to*

an Equitable Transit Future, a strategic plan for the next five years. This strategic plan renews MDOT MTA's focus on equity in everything the agency does. As part of this plan and initiative, MDOT MTA has set commitments that will prioritize its resources and hold the agency accountable in creating a more equitable future. The commitments set by the strategic plan were developed around five strategic actions:

- Centering Equity
- Addressing Safety and Security
- Providing Reliable, Efficient Transit Service
- Communicating with Stakeholders
- Planning for Sustainable Future

MDOT MTA follows best practices by aligning identification and prioritization of needs with these strategic actions, which is referred to as a "line of sight" between goals and investments. In this way, the capital program will support delivery of the strategic plan and the agency's mission and vision.

With the addition of centering equity as a focus point since the 2019 CNI, the current CNI uses the following six criteria to prioritize both its SGR and Enhancement Needs: Safety and Security Impact, Service Reliability, Operating and Maintenance (O&M) Impact, Equity Impact, Customer Impact, and Asset Condition (which is considered foundational to all other criteria). **Figure 2-2** aligns the investment prioritization criteria with MDOT MTA's strategic actions.

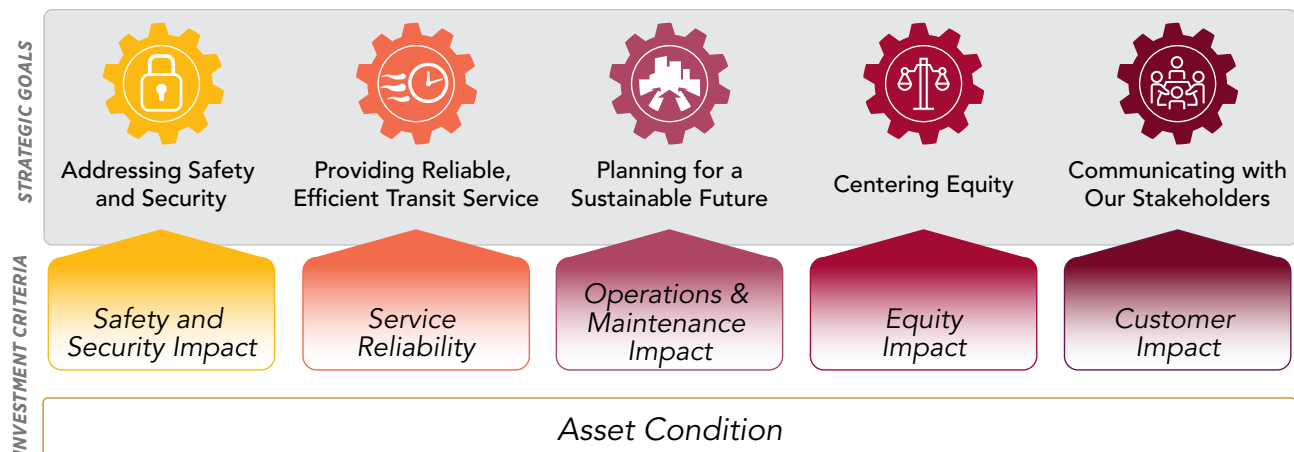


Figure 2-2. Capital Needs Prioritization Criteria Alignment with MDOT MTA's Strategic Goals

2.3.2 TAM PROGRAM

MDOT MTA has been progressively and proactively investing in better methods of prioritizing its capital needs and exploring innovative approaches to address these needs and narrow existing funding gaps. Building upon its existing asset inventory process, MDOT MTA began using TERM Lite, FTA's capital needs decision support tool, to predict and prioritize SGR Needs in 2013.

Over the past three years, MDOT MTA has continued to improve and evolve as an organization to align its asset management practices with industry best practices and TAM guidance. In 2018, the agency utilized the existing capital asset inventory and TERM Lite analysis to fulfill the inventory, condition, decision support tool, and investment prioritization components of the first-generation TAM Plan (TAMP).

Since 2020, MDOT MTA has continued to incorporate data-driven and risk-based decision-making by integrating TAM analysis as part of its capital programming and planning process (see **Figure 2-3**).

Alignment to Federal Transit Asset Management Requirements

The FTA published its final rule on TAM on July 26, 2016, establishing new TAM requirements for recipients and subrecipients of Chapter 53 funds under 49 CFR Parts 625 and 630. Effective October 1, 2016, the final rule requires FTA grantees to:

- Develop and update asset management plans in their entirety for public transportation assets at least once every four years;
- Set annual state of good repair performance targets; and
- Provide new asset inventory module reports to the National Transit Database annually.

49 CFR 625.5 specifies the required elements of the TAMP. **Figure 2-4** outlines the nine federally-required elements of the TAMP and indicates which sections of the CNI support specific TAMP required elements. The second generation TAMP update will be complete by October 2022. The development

and regular update of this CNI will support MDOT MTA's continuing asset management efforts and ability to maintain the existing system in a state of good repair.

2.4 Prioritization

While MDOT MTA continues to classify capital investments as either the SGR or Enhancement Needs, the prioritization approach for all needs now utilizes a common set of criteria shown above in **Figure 2-2**. This advancement since 2019 recognizes that MDOT MTA's capital program is guided by the same vision and mission regardless of what type of investment is being proposed.

While the criteria for prioritization are the same across the SGR and Enhancement Needs, the underlying metrics used to rank each criterion differ slightly depending on the category of need. For example, an SGR Need will directly address existing asset conditions through replacement or rehabilitation, but an Enhancement Need will only indirectly affect existing assets, if at all. As such, the measurement of asset condition for SGR Needs is more direct and specific, whereas the asset condition measure for an Enhancement Need is based on the type of impact the enhancement will have on existing assets (e.g., indirectly improving conditions, slowing degradation, or no impact at all). This case also applies to scores for the Safety and Security criterion. Improvements to existing assets (i.e., SGR Needs) will have a direct impact on reducing the probability of asset failure and decreasing safety risks, and the level of decreased risk is based on the asset type being improved. Whereas the level of impact of an Enhancement Need is dependent on if and how the project is intended to improve Safety and Security outcomes.

To calculate the overall prioritization score for both SGR and Enhancement Needs, the CNI uses a multi-criteria decision analysis (MCDA) approach. Prioritization scores are measured and ranked for each individual criterion and then aggregated into an overall priority score using a weighted average (see **Figure 2-5**). Since the 2019 CNI report, MDOT MTA has increased to six prioritization criteria with

10-Year Capital Needs Inventory & Prioritization

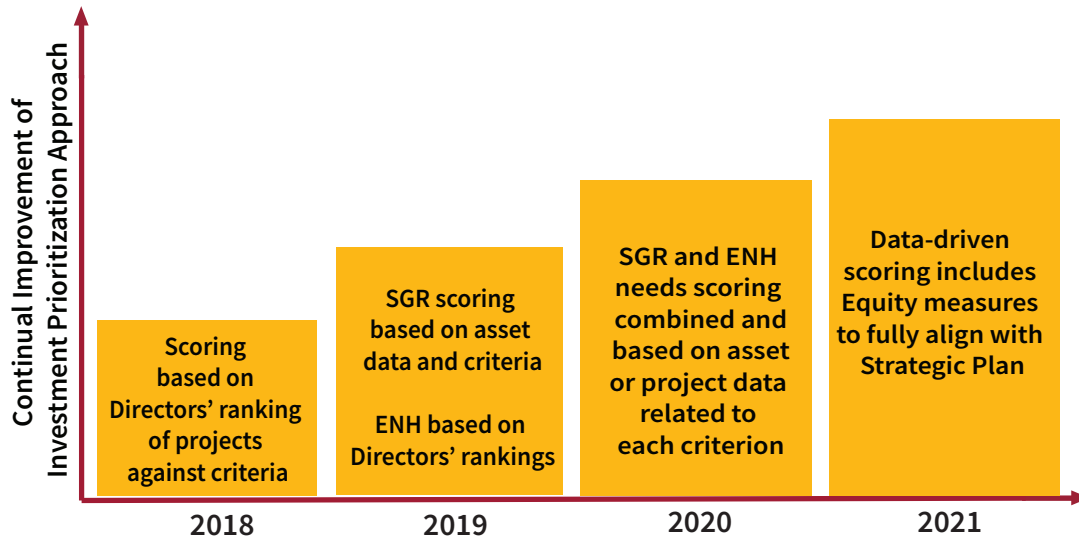


Figure 2-3. Advancement of MDOT MTA's Investment Prioritization Approach

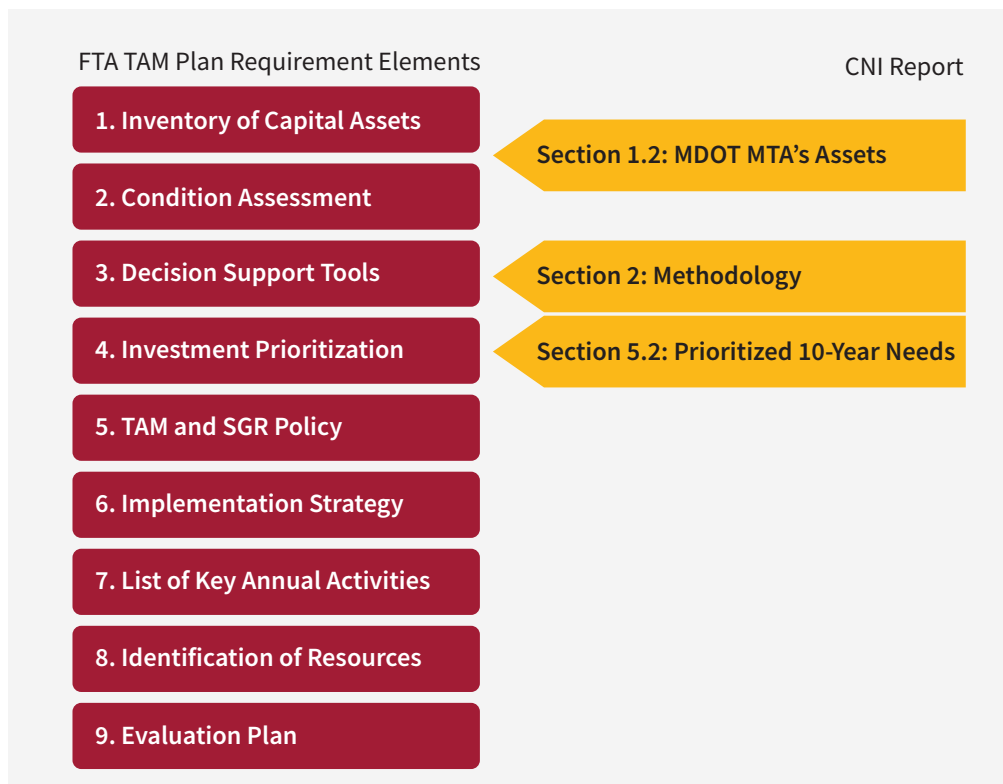


Figure 2-4. Alignment of CNI with TAM Requirements

METHODOLOGY

the inclusion of Equity. When combined the highest baseline score for a need is 100 points.

In addition to the six criteria, there are other considerations that factor into the scoring that allow MDOT MTA to make funding decisions on an annual basis. These factors include regulatory considerations that require compliance, such as changes to codes or standards or new legislation, and current funding status. External compliance needs and fully funded needs are given 100 points each in addition to the baseline score, increasing the highest possible score to 300 points. The purpose of these additional factors is to provide MDOT MTA with clear direction for funding decisions and visibility of interdependencies in the capital program.

The criteria weights are assigned based on MDOT MTA's current priority of its strategic goals and the weight corresponding to each criterion is consistent across SGR and Enhancement Needs.

The **Asset Condition** criterion reflects MDOT MTA's commitment to maintaining assets in a state of good repair. Asset condition scores are assessed based on FTA's five-point condition rating system. There are two methods for capturing current conditions: inspection records or age-based

TERM Lite

MDOT MTA calculates the prioritization scores of its SGR Needs using TERM Lite. TERM Lite enables assessment of the agency's SGR backlog, level of annual reinvestment to attain SGR or other investment objectives, impact of variations in funding on future asset conditions and reinvestment needs, and investment priorities by mode and asset type.

comparison to useful life (i.e., how much remaining useful life an asset has). Future conditions are estimated based on FTA's age-based asset decay curves for all assets, allowing for prioritization to be reflective of conditions over the next 10 years. For the Asset Condition criterion, the priority scores are reflected as the inverse of the asset condition rating, where assets with lower condition ratings receive higher priority scores. For example, a revenue vehicle with a Poor rating will receive a

Asset Condition	Safety & Security	Service Reliability	O&M Impact	Equity Impact	Customer Impact
Score: Declining condition yields higher priority score	Score: Reduced risk of injuries, fatalities, and/or property damage	Score: Reduced risk of service failures, disruptions or delays	Score: Impact on reducing operating and maintenance costs	Score: Based on service equity score and project characteristics	Score: Based on number of riders served by a location, asset type, and improvement type

Weighted Average Total Investment Score:
(Converted to 100-Point Scale; High Score = High Priority)

Fully Funded & Compliance Status add 100 points each

Figure 2-5. Prioritization – Multi-Criteria Decision Analysis Approach

10-Year Capital Needs Inventory & Prioritization

priority score of five in the MCDA approach, so that the vehicle with Poor rating results in a higher priority score for investment than a vehicle with a Good rating (see **Figure 2-6**). As condition scoring is dynamic as assets age over the 10-year analysis period, the “Maximum 10-Year” score is reported in the CNI.

The **Safety and Security** criterion uses hazard risk categories to assess safety and security risk by asset type. MDOT MTA’s Public Transportation Agency Safety Plan (PTASP) hazard management approach forms the basis of assessing the probability and severity of asset failures, where severity of occurrence (catastrophic, critical, marginal, negligible) and probability of occurrence (frequent, probable, occasional, remote, unlikely) have been translated to a one-to-five priority scale. For Enhancement Needs, the scoring is based on what type of hazard will be addressed.

For all needs, the **Service Reliability** criterion relates the function that an asset provides to the delivery of on-time transit services. Assets with direct impact on service delays, such as vehicles and train control systems, are given the highest priority. Assets that have an indirect impact on on-time performance, such as maintenance equipment,

are rated the next highest. Other assets are then rated by MDOT MTA’s SMEs based on their impacts to service quality.

The sustainability criterion assessing **Operations and Maintenance Impact** is based on three levels of impact to operations and maintenance cost or revenue. These impact ranges are defined as: major impact (\$1 million or more annually), moderate impact (less than \$1 million but greater than \$100,000 annually), and minor or no impact (less than \$100,000 annually). A major impact is given a priority score of five, whereas moderate impacts are scored as three, and minor impacts scored as one. For SGR Needs, each asset type is given one of these scores based on SME input, whereas Enhancement Needs are scored holistically based on the combined impact of the project.

The **Equity Impact** criterion was developed to represent MDOT MTA’s broad definition of delivering an equitable future. The criterion combines multiple methods of measuring equity based on best practices research for implementing equity considerations in capital programming (see **Figure 2-7**).

Specifically, MDOT MTA included measures to reflect locations, access to destinations, and

Condition Rating	FTA Rating	Priority Score	Description
Excellent	5	1	New asset
Good	4	2	Minimal signs of wear
Adequate	3	3	Asset had reached its mid-life
Marginal	2	4	Asset reaching or just past its useful life
Poor	1	5	Asset past its useful life/in need of immediate repair or replacement

Figure 2-6. TERM Lite Condition Rating and Priority Score

METHODOLOGY

user benefits by adapting the equity evaluation methodology that the agency uses to propose and assess service changes and monitor demographic shifts. This methodology prioritizes MDOT MTA's services based on the demographics of residents with access to the service and current ridership, along with the types of destinations served (i.e., jobs, education, and essential services). Similar to the Customer Impact score, the equity evaluation methodology is discounted if the need is for an asset type that does not directly support customer experience on the system.

Additional equity measures also were captured from project managers to reinforce MDOT MTA's focus on building partnerships with diverse communities, building capacity in those communities, and improving access to services for all residents. These measures elevate scoring for projects that:

- Directly serve vulnerable communities,
- Engage local communities in project development,
- Utilize Disadvantaged Business Enterprises (DBEs) or Minority-owned Business Enterprises (MBEs), and

- Mitigate negative impacts of current transit facilities or services (e.g., aggregation of noise pollution or run-off).

The location, access to destinations, and user benefits score and the list of additional factors provided by project managers above are combined into a single Equity Impact score for each need. The equity impact score was developed to help create a better balance between SGR and Enhancement Needs that serve vulnerable communities and reinforces consideration of equity in MDOT MTA's project planning and across MDOT MTA stakeholders.

The **Customer Impact** criterion focuses on both the level of impact a project can have on a passenger, and the magnitude of passengers affected. To determine ridership impact, needs are mapped to a location and mode to calculate the ridership being served. As not all asset types support customers in the same fashion, a scale of zero to 100 percent is used to indicate how directly an asset type contributes to customer experience. In other words, an asset that serves a larger proportion of riders more directly would receive higher priority than



Figure 2-7. MDOT MTA's Equity Impact Measures for Prioritization (Adapted from Equity-oriented Criteria for Project Prioritization in Regional Transportation Planning, Krapp, et al.)

an asset that serves a smaller proportion of riders indirectly. For example, revenue vehicles, guideway, train control, and power are rated at 100 percent, while office computers and non-revenue vehicles are rated at 1 percent. Project managers also submit on the type of customer impact related to needs, such as improving customer information or comfort, which further adjusts the scoring.

2.5 Forecasting Needs

SGR Needs are forecast based on the lifecycle of existing transit assets, from planning and design through decommissioning. Three types of reinvestment needs are calculated based on the capital asset inventory.

- The replacement value and useful life determine the **replacement** need.
- The timing and cost of **rehabilitation** and other renewals is incorporated from MDOT MTA's lifecycle strategies.
- **Annual capital maintenance** needs are applied to ensure large infrastructure assets, such as tunnels and bridges, are maintained in SGR.



Figure 2-8. Conceptual Asset Lifecycle Diagram

As MDOT MTA's TAM program has matured the capital asset inventory has improved along with increased inspections and analysis of asset conditions. Facilities, stations, pavement, and structures are all inspected regularly to support improved decision-making. These inspection results are leveraged to advance lifecycle management plans and provide more accurate needs estimates.

The CFP process is now more closely linked to this asset information, with project managers submitting needs based on inspection results and aligned to lifecycle management plans. The CFP process engages project managers from across MDOT MTA's organization to provide information on future capital investment needs, including details regarding project type, purpose and need, scope, costs, schedule, and existing or new assets involved. CFP proposal submissions also include information relating how the proposed capital investments support MDOT MTA's vision of safety, reliability, efficiency, and customer service.

As noted earlier, Enhancement Needs are forecast based on MDOT MTA's current plans for responding to customer needs and increased demand. The CNI is aligned to the strategies and actions in the Cornerstone Plans, the RTP, and the Strategic Plan. Major expansion corridors are not included here because they are not yet operational and the specific assets and their impacts on MDOT MTA funding needs are not yet known.

All needs in the CNI are inflated to YOE dollars using three percent annual cost inflation.

2.6 Forecasting Funding

Total capital funding from 2022 to 2031 is forecasted to be nearly \$5.4 billion—\$3 billion of which is committed funding in the FY22-FY27 CTP. Funding estimates are based on:

1. The current CTP excluding Purple Line, LOTS, and freight funding
2. Additional formula funding available under the Bipartisan Infrastructure Law
3. Assuming consistent funding levels through 2031

3. MDOT MTA'S STATE OF GOOD REPAIR INVESTMENT NEEDS

The foundation of MDOT MTA's SGR Needs is a comprehensive capital asset inventory of existing assets. Each record in this inventory documents asset or component type, age, expected useful life, replacement value, and other attributes required to assess the asset's reinvestment needs. Over the next 10 years, an estimated \$5.1 billion in SGR Needs have been identified to support, achieve, or maintain a state of good repair.

3.1 SGR Backlog Overview

SGR is defined by FTA as the condition at which a capital asset can operate at a "full level of performance"—that is, the asset can perform its designed function, does not pose unacceptable safety risk to users, and/or has all reinvestment needs met. SGR backlog is the cumulative dollar value of deferred capital reinvestment and replacement needs, including for those assets that may have surpassed their expected useful life. In other words, the SGR backlog represents the total amount of capital funding it will take at any given time to bring an agency's assets back into an SGR.

MDOT MTA's current SGR backlog is estimated at \$1.8 billion. This backlog includes \$477 million in vehicles, \$163 million in guideway assets, \$526 million in systems assets, \$311 million in facilities, and \$343 million in stations assets (see **Figure 3-1**).

Many of the needs identified in MDOT MTA's SGR backlog are funded to some extent and MDOT MTA prioritizes safety-critical projects to ensure safe operation of the system (e.g., track and signaling reinvestment needs would be considered higher priority than paint booth replacement). The next section describes the SGR Needs identified over the 10-year CNI period.

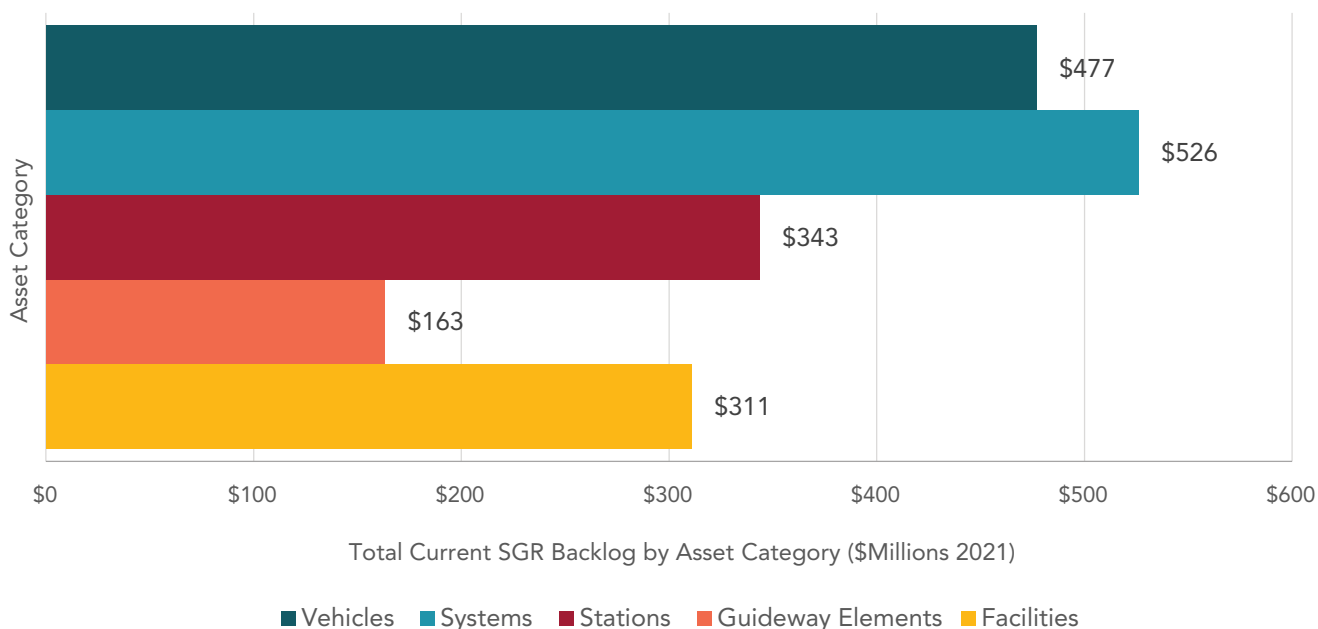


Figure 3-1. Total Current SGR Backlog by Asset Category (\$Millions 2021)

3.2 10-Year SGR Needs Estimates

SGR Needs identified over the next 10 years are estimated to require capital reinvestments of approximately \$5.1 billion in YOE. The rehabilitation and/or replacement of the assets described in this section are required to sustain the safety and full performance of the MDOT MTA transit system.

Vehicles drive the greatest reinvestment needs at \$2 billion, followed by systems at \$1.2 billion, guideway elements at \$705 million, stations at \$698 million, and facilities at \$550 million. The 10-year total SGR percentage needs are distributed by asset type in **Figure 3-2**.

By mode, Metro SubwayLink drives the greatest reinvestment needs at \$1.9 billion, followed by Local Bus at approximately \$1.5 billion, MARC Train at \$962 million, Light RailLink at \$620 million, MobilityLink at \$127 million, and Agencywide assets at \$40 million with negligible reinvestment in Commuter Bus due to most assets for that service being owned and maintained by third parties. The percentage breakdown is seen in **Figure 3-3**.

The 10-year reinvestments required to bring all MDOT MTA's assets into SGR are projected with no constraints in terms of funding, capacity to deliver reinvestments, or responsiveness of supply chains.

Figure 3-4 and **Figure 3-5** illustrate the total SGR

Needs over the 10-year period by asset category and mode, respectively. The annual reinvestment need to address the SGR backlog and ongoing replacement and rehabilitation averages \$512.5 million per year.

Many of the SGR Needs in this CNI are associated with the complete replacement of a given asset. However, some assets such as underground Metro SubwayLink stations and historically significant buildings (Washington Boulevard complex and some MARC Train stations) cannot be fully replaced; rather, they must be perpetually rehabilitated by replacing major components. In some circumstances, such as with MARC Train locomotives and coaches, the asset can be overhauled (keeping the railcar body and chassis but replacing major vehicle subsystems). Accordingly, asset replacements, rehabilitations, and overhauls were determined, as appropriate, in the forecast of SGR Needs:

- Vehicles:** Bus reinvestments are projected to be the costliest revenue vehicle replacement and repair needs over the 10-year period, estimated to cost about \$1.1 billion (about \$450 million of which is currently funded through 2027). The cost of bus replacements is higher than past estimates due to the higher cost of ZEB vehicles (\$1.2 million per ZEB compared to \$580,000 per diesel bus in 2022 dollars) and the planned transition starting during the CNI timeframe.

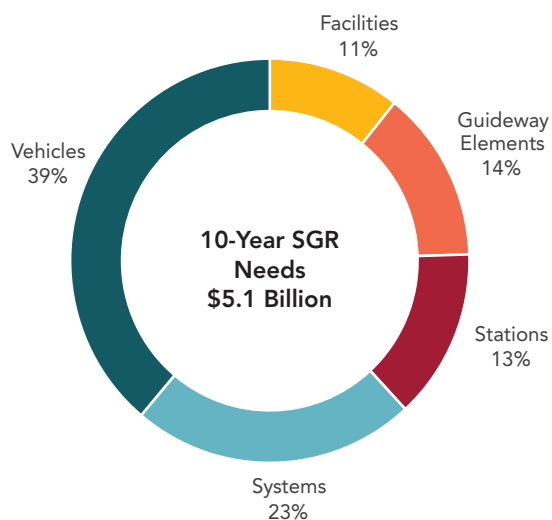


Figure 3-2. 10-Year SGR Needs by Asset Category (CY2022–2031, \$YOE)

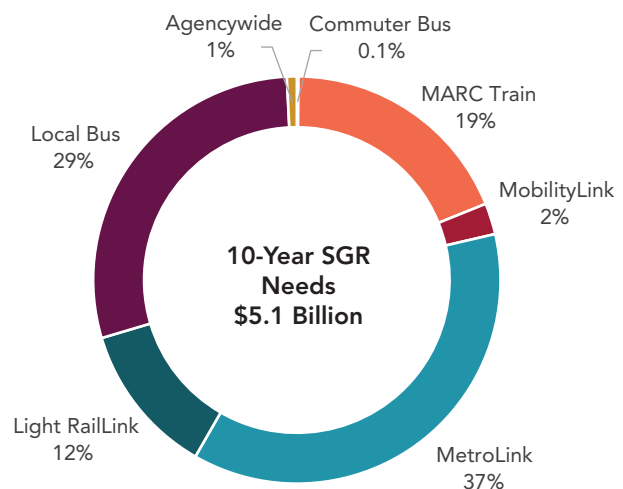


Figure 3-3. 10-Year SGR Needs by Mode (CY2022–2031, \$YOE)

MDOT MTA'S STATE OF GOOD REPAIR INVESTMENT NEEDS

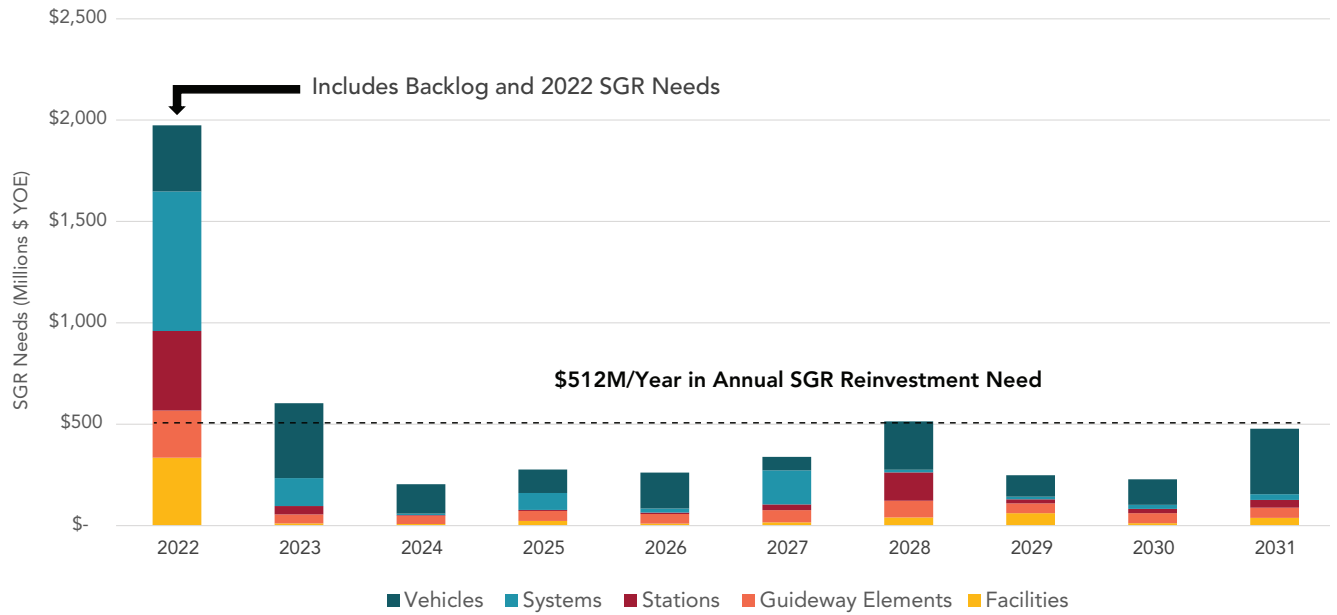


Figure 3-4. Summary of 10-Year SGR Needs by Asset Category (\$Millions YOY)

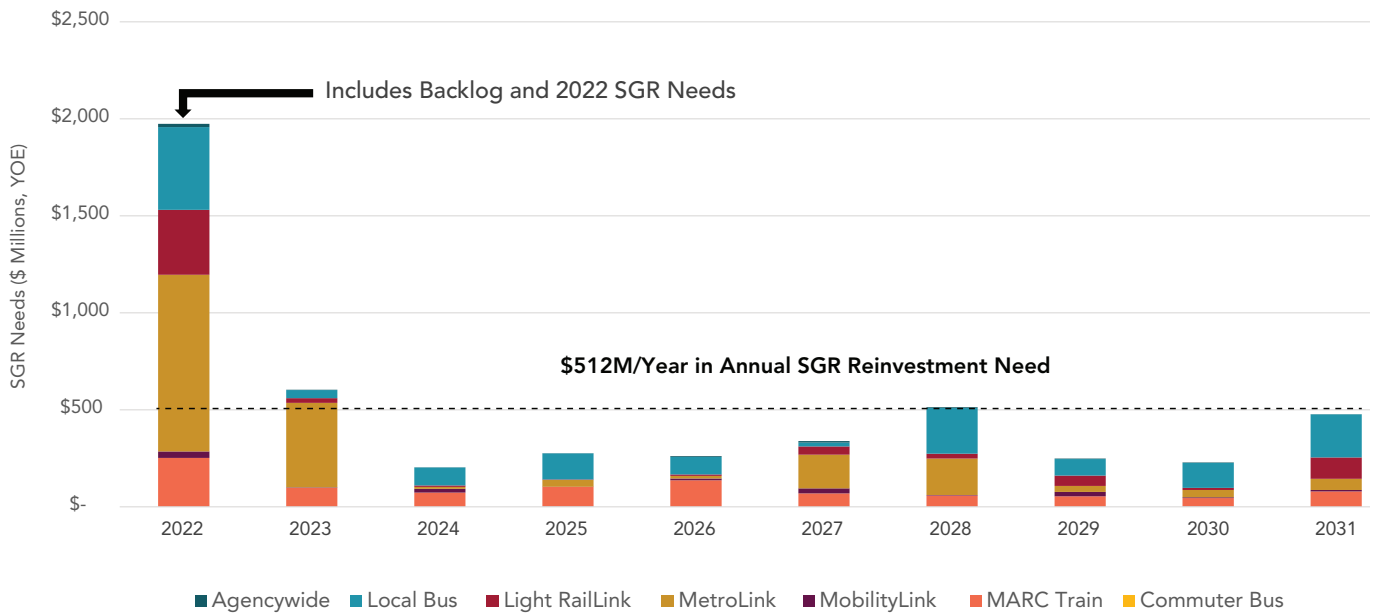


Figure 3-5. Summary of 10-Year SGR Needs by Mode (\$Millions YOY)

The second-highest-costing vehicle replacement and repair needs are for Metro SubwayLink revenue vehicles estimated at \$332 million, which includes necessary truck overhauls to keep the current fleet functioning. Metro SubwayLink vehicle replacement is currently fully funded as part of the joint vehicle replacement and train control upgrade program. The third-largest category of vehicle needs is for MARC Train locomotive and passenger car overhauls and replacements, at \$315 million, a vast majority of which are fully or partially funded. This value also includes the first year of Light Rail Vehicles replacements, which will begin delivery in 2031 and continue for multiple years thereafter.

- **Systems:** The second largest category of SGR Needs is systems. The combined 23 percent share of SGR Needs between 2022 and 2031 includes electrification distribution, train control, underground utilities (such as drainage and ventilation in Metro SubwayLink’s tunnels), closed-circuit television (CCTV) systems, and fare collection systems. Metro SubwayLink’s train control system upgrade is funded, along with modernizing the fare collection system. However, only a small portion of MetroSubway Link’s \$299 million electrification system, including traction power substation (TPSS) equipment, third rail, and power cabling, is currently funded. Similarly, Light RailLink’s catenary system is anticipated to require investment in rehabilitation and replacements at about \$62 million over 10 years. Light RailLink’s interlockings and train control system also will require investment under this category as they reach their useful lives, at an estimate of \$118 million. Portions of Light RailLink’s catenary and interlocking needs are funded in the current CTP.
- **Guideway:** The third-largest driver of SGR Needs at 14 percent, guideway needs include reinvestments in track and rail structures, as well as maintenance of dedicated bus lanes in Baltimore. The greatest SGR Needs are anticipated to be driven by MARC Train, mostly due to ongoing capital contributions required to maintain the CSX and Amtrak right-of-way on an annual basis. Smaller needs are related to and maintaining the Frederick spur and yard track in a state of good repair. In total, MARC Train’s guideway needs are \$404 million. Metro

Frederick Douglass Tunnel Project

MDOT MTA is collaborating with Amtrak to replace the 148-year-old Frederick Douglass Tunnel (formerly known as the Baltimore and Potomac, B&P, Tunnel) in Baltimore.

Improvements to the Frederick Douglass Tunnel will result in improved and more reliable rail service, address a longstanding bottleneck along the MARC Penn Line and Amtrak Northeast Corridor, and allow for more and faster trains between Maryland and major cities such as Washington, DC, Philadelphia, and New York.

While this is an SGR Need where MDOT MTA shares partial capital responsibility, there is no defined cost sharing agreement to date. Therefore, this SGR Need is not included in the 2022 CNI.

SubwayLink is the second-largest need in this category annual due to capital maintenance of tunnel and bridge structures, aerial girder replacements, and ongoing track replacement needs (\$166 million). The Light RailLink system also requires a variety of grade crossing replacements, many of which are fully funded, and ongoing track maintenance totaling \$134 million.

- **Stations:** The top drivers of these SGR Needs consist of station access and other SGR Needs at Metro SubwayLink stations, with \$185 million for elevator and escalator renewal and \$236 million for rehabilitation of station components such as lighting, electrical systems, roofs, and customer service booths, and \$45 million for platform replacements. Many of these needs are fully or partially funded in the current CTP. MARC Train stations make up the next-largest need in this category, with multiple stations requiring platform replacements and parking lots requiring

MDOT MTA'S STATE OF GOOD REPAIR INVESTMENT NEEDS

repaving (\$125 million). Light RailLink platforms will also require renewal starting at the final years of the CNI analysis, to coincide with the replacement of the light rail vehicle fleet. Finally, bus shelters and signage fall into this category for SGR Needs, and while the existing shelters are only estimated to require \$9 million to maintain in a state of good repair, they are critical to customers using the system.

- **Facilities:** It should be noted that although facilities SGR Needs make up only 11 percent of the 10-year SGR Needs, facilities have had the greatest funding gap when considering current levels of committed funding across all asset categories. A few key facilities needs are fully funded, including the MARC Train Heavy Maintenance Facility at Riverside Yard (\$62 million) and multiple renovations at Bush Bus Division buildings. However, the largest single need for upgrading the Eastern Bus Division is only partially funded to date.

Like most of the legacy transit agencies around the United States, a large part of MDOT MTA's SGR Needs is associated with the rail modes; this is due to the inherent nature of rail being a more cost-intensive mode to operate. In contrast to rail, MobilityLink has fewer SGR Needs due to the relatively low cost of paratransit vehicles. The smaller portion of needs identified for MobilityLink, however, should not be overlooked as the fleet provides a critical service to the elderly and persons with disabilities in accordance with the Americans with Disabilities Act (ADA).

4. MDOT MTA'S ENHANCEMENT INVESTMENT NEEDS

MDOT MTA annually solicits information from modal departments on new capital investments needed to meet industry standards, satisfy forecasted system demand and service levels, improve system safety and security, as well as other enhancements required to adapt to new technologies and new mobility options. Cornerstone Plans, the RTP, and the Strategic Plan also provide the basis for Enhancement Needs. An estimated \$1.19 billion in Enhancement Needs have been identified over the next ten years to support MDOT MTA in continuing to deliver its mission, enhance service, and achieve system performance goals.

4.1 10-Year Enhancement Needs Estimates

Since 2019, multiple Enhancement Needs have been addressed in part or in full, including North Avenue Rising, the purchase of Riverside Yard from CSX, expansion of the CCTV system, and expansion of bus shelters as part of the BaltimoreLink implementation. Multiple total maximum daily load (TMDL) projects also have progressed, though those needs have been recategorized as SGR Needs as current projects address the repair and rehabilitation of existing stormwater management assets.

Enhancement Needs identified over the next ten years require an estimated capital investment of \$1.19 billion (in YOE dollars, assuming a three percent inflation rate).

The four most expensive Enhancement Needs identified to occur in the next ten years are:

- MARC Train – Penn Line Storage project (\$248.5 million)
- MARC Train – New Expansion Locomotive Procurement (\$154.5 million)
- Local Bus – Zero Emission Bus Charging Infrastructure for Kirk and Northwest Bus Divisions (\$145.9 million)
- MARC Train – Martin State Airport High-Level Platforms and Station (\$75 million)

Figure 4-1 summarizes the total enhancement needs by asset category between 2022 and 2031. About 38 percent of the Enhancement Needs between 2022 and 2031 are related to Guideway Elements with about \$457 million in investment needs. Facilities have the next-highest Enhancement Needs at 24 percent (about \$284 million), followed by Enhancement Needs for Stations at 18 percent (about \$213 million), Vehicles at 13 percent (about \$154 million), and Systems at seven percent (about \$81 million).

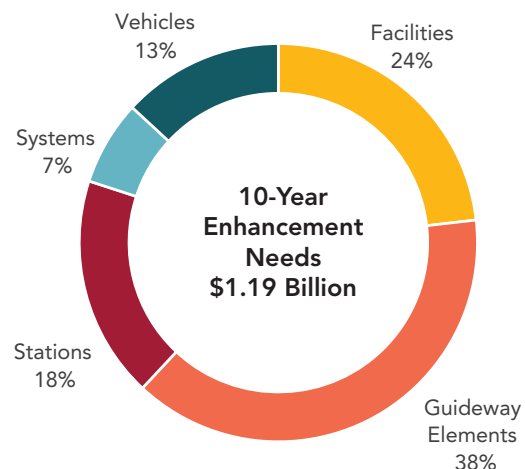


Figure 4-1. Summary of 10-Year Enhancement Needs by Asset Category (CY2022–2031, \$YOE)

MDOT MTA'S ENHANCEMENT INVESTMENT NEEDS

Evaluating Enhancement Needs by mode, the largest portion of the identified Enhancement Needs are for MARC Train at 47 percent (about \$554 million), followed by Local Bus at 35 percent (about \$415 million), agencywide at 16 percent (about \$188 million), and Metro SubwayLink at two percent (about \$28 million) from 2022 to 2031 (see **Figure 4-2**). This is consistent with the 2019 analysis where the Enhancement Needs identified with the highest associated costs were all related to MARC Train.

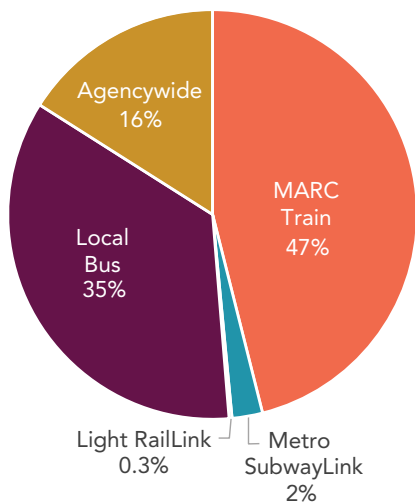


Figure 4-2. Summary of 10-Year Enhancement Needs by Asset Category (CY2022–2031, \$YOE)

5. MDOT MTA'S 10-YEAR TOTAL INVESTMENT NEEDS

MDOT MTA's combined unconstrained SGR and Enhancement Needs total an estimated \$6.3 billion from 2019 to 2028. With a current SGR backlog of \$1.8 billion in deferred capital investments. Over the 10-year CNI period, the average annual capital needs identified total an estimated \$630 million for both SGR and enhancements.

5.1 Total 10-Year Needs

Between 2022 and 2031, MDOT MTA's total capital needs are estimated at \$6.3 billion.

SGR Needs for MDOT MTA's current asset inventory drive 81 percent of total needs, while identified Enhancement Needs to meet system performance goals as well as current and future service demand make up 19 percent of total needs over the ten-year period (see **Figure 5-1**). MDOT MTA capital funding is currently allocated to about 96 percent SGR Needs and four percent Enhancement Needs in the FY22-27 CTP, which indicates that the funding gap will be larger for Enhancement Needs.

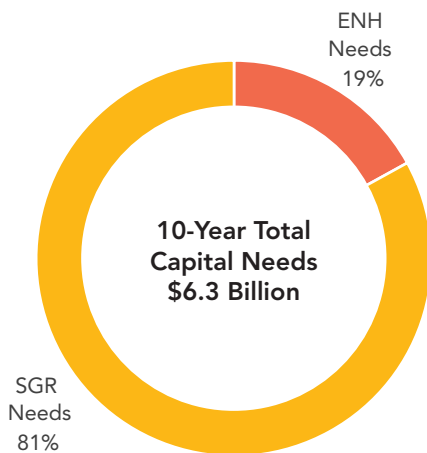


Figure 5-1. Summary of Total 10-Year Capital Needs by Type (CY2022–2031, \$YOE)

Figure 5-2 illustrates the distribution of total capital needs by asset category. At about \$2.2 billion, the capital needs for vehicles account for the largest portion (about 34 percent) of MDOT MTA's needs with Systems—largely driven by end-of-life rail systems—being the next-largest category.

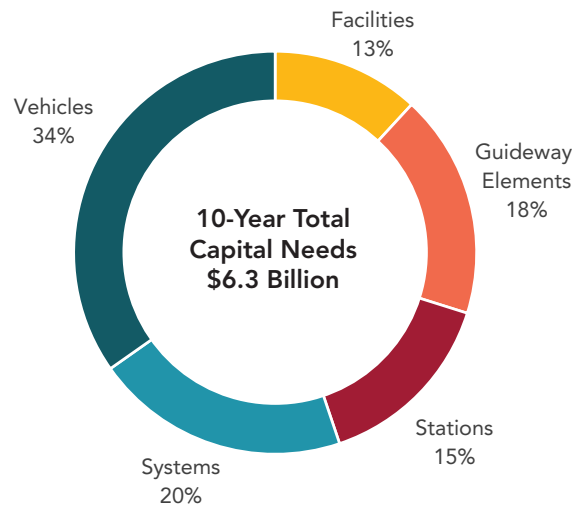


Figure 5-2. 10-Year Total Capital Needs by Asset Category (CY2022–2031, \$YOE)

MDOT MTA'S ENHANCEMENT INVESTMENT NEEDS

Evaluating MDOT MTA's capital needs by mode, about 64 percent of the needs are associated with the rail modes (see **Figure 5-3**). In the event of a rail system failure, MDOT MTA supplements the rail service with bus service. These "bus bridges" compete with surrounding automobile traffic, operate at a fraction of the speed of rail, and are overcrowded at peak commuting times. Maintaining MDOT MTA's rail modes are a key piece of the overall transit system operations to relieve stress on the roadways and bus system.

Metro SubwayLink and Local Bus carry the greatest proportion of total needs at about 30 percent (about \$1.9 billion), followed by MARC Train needs at about 24 percent (about \$1.5 billion).

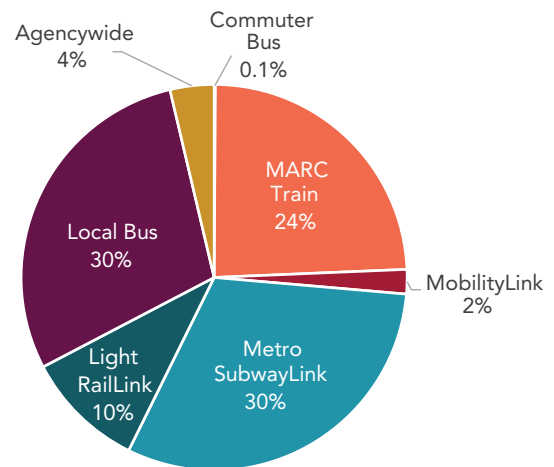


Figure 5-3. 10-Year Total Capital Needs by Asset Category (\$YOE)

5.2 Prioritized 10-Year Needs

5.2.1 PRIORITIZED SGR NEEDS

SGR Needs are either submitted by project managers through the CFP or grouped by location and function as part of the TERM Lite analysis over the 10-year period. These needs are given a priority score using the six prioritization criteria and MCDA methodology, which includes fully funded projects and compliance-related projects receiving an additional 100 points respectively. The highest-value line-item SGR Needs are summarized in **Table 5-1**, with those that have some level of committed funding noted with an asterisk (*). The total costs shown are only from 2022 to 2031 and do not include previously expended project costs. A complete list of needs is provided in **Appendix B**.

Table 5-1. Grouped and Prioritized SGR Needs (CY2022–2031) – 40 Highest Value Needs sorted by Priority Score

Project Name (* projects that are either partially or fully funded are denoted with asterisk)	10-Year Total Cost (\$000s YOY)	Priority Score
Light RailLink Howard Street Rail*	\$50,316	177.80
Local Bus Revenue Vehicles*	\$398,630	169.30
Metro SubwayLink Revenue Vehicle and Train Control Program*	\$323,669	167.81
MARC Train Locomotives*	\$125,500	166.41
Light RailLink Restraining Rail Curves*	\$62,500	164.62
Metro SubwayLink Section B Interlocking Reconstruction*	\$31,994	161.17
MobilityLink Revenue Vehicles*	\$115,741	159.75
Agencywide Elevator Rehabilitations*	\$152,527	159.38
Local Bus Eastern Bus Facility Replacement*	\$426,936	156.85
MARC Train MP36PH-3C Locomotive Overhaul*	\$67,872	156.64

10-Year Capital Needs Inventory & Prioritization

Project Name <i>(*) projects that are either partially or fully funded are denoted with asterisk</i>	10-Year Total Cost (\$000s YOY)	Priority Score
Agencywide Fare Collection System Replacement*	\$42,162	155.08
Metro SubwayLink Long-term Electrical and Lighting Replacements*	\$92,203	154.53
MARC Train Riverside Heavy Maintenance Building*	\$46,875	146.91
MARC Train Capital Contributions*	\$373,346	100.00
Light RailLink Train Control	\$58,584	83.30
MARC Train Revenue Vehicles (MARC IIA & GP40)*	\$140,332	71.45
Light RailLink First Year of Vehicle Replacements	\$56,222	65.57
Light RailLink Revenue Vehicle Overhauls*	\$51,481	65.57
Metro SubwayLink Long-term Trackwork FY28-FY31	\$96,836	64.74
MARC Train Bi-level Railcars Overhauls and Replacement*	\$41,150	64.18
Metro SubwayLink TC&C Equipment	\$122,459	63.71
Light RailLink Long-term Catenary System Replacement *	\$40,465	61.85
Agencywide Escalator Rehabilitations*	\$177,876	56.84
Light RailLink Wayside Communications and Train Control Replacement*	\$39,835	55.95
Agencywide In-station Revenue Collection Equipment Replacements	\$46,267	55.08
Metro SubwayLink Station Platform Structure*	\$30,513	53.92
Metro SubwayLink SCADA Replacement	\$40,874	53.82
Metro SubwayLink TPSS Building Components	\$152,284	53.54
Metro SubwayLink Third Rail and Cabling	\$113,232	53.54
MARC Train Penn Line Station Platform Replacement*	\$40,000	53.06
MARC Train IV Railcar Overhaul*	\$58,800	52.28
Metro SubwayLink Station Buildings	\$67,036	49.54
Agencywide Non-Revenue Vehicles	\$48,831	48.94
Agencywide Maintenance Equipment	\$86,095	47.40
Agencywide IT Hardware	\$31,647	47.31
Light RailLink TPSS Major Rehabilitation*	\$67,863	47.27
MARC Train Station Platforms FY28-FY31	\$68,846	46.43
Agencywide Ongoing Facility Renewal	\$39,450	46.33
Agencywide IT Server Preservation*	\$51,735	45.78
MARC Train Switch Machine Repairs	\$68,978	42.53

5.2.2 PRIORITIZED ENHANCEMENT NEEDS

Generally, enhancement projects received a lower priority score than SGR projects because SGR projects are required for continued safe and reliable operation of transit service. While these enhancement projects received lower priority scores, some of these investments aimed at improving the customer experience or sustainability can still be partially or fully funded through competitive discretionary grant awards.

The highest-scoring Enhancement Needs are either already fully funded or address a compliance need. These include:

- North Avenue Rising,
- MARC Train Martin State Airport Yard Improvements,
- Local Bus Zero Emission Bus Charging Infrastructure for Kirk and Northwest Bus Divisions, and
- Local Bus RAISE Transit Priority Project, and
- Local Bus BaltimoreLink bus shelter expansions.

Other high-scoring Enhancement Needs include North Avenue Rising, which is a collaborative effort to support economic revitalization in communities along North Avenue through sidewalk improvements, dedicated bus lanes, transit signal priority, enhanced bus stops, roadway repaving, and station renovations. Multiple transfer hubs identified in the RTP also score highly as Enhancement Needs that meet future customer demands.

Table 5-2 lists the highest-value enhancement projects in priority order, again with fully funded and compliance-related projects receiving an additional 100 points each. Identified enhancement projects with some level of committed funding are noted with an asterisk (*). Martin State Airport Yard Improvements, for example, is fully funded in the FY22–FY27 CTP. The total costs shown are only from 2022 to 2031 and do not include previously expended project costs. A complete list of needs is provided in **Appendix B**.

Fast Forward Investments

Federal funding relief in 2021 helped launch the \$43 million Fast Forward program, which will improve transit reliability, system safety, and customer experience through investments in dedicated bus lanes, transit signal prioritization, new and enhanced transit hubs, more bus shelters, ADA and pedestrian safety improvements near bus stops, and improved wayfinding.

Equity Impact

The addition of Equity scoring to the CNI is critical to MDOT MTA's vision and mission. It has:

- Created a better balance between SGR and enhancement projects serving vulnerable communities, including promoting
 - Transit Priority Initiative Projects
 - East/West Corridor Design;
- Given credit to projects engaging local communities and DBE/MBE firms;
- Elevated projects focused on mitigation of negative transit impacts; and
- Reinforced consideration of equity in MDOT MTA's project planning and across MDOT MTA stakeholders.

10-Year Capital Needs Inventory & Prioritization

Table 5-2. Prioritized Enhancement Needs (CY2022–2031) – 40 Highest Value Projects sorted by Priority Score

Project Name <i>(*) projects that are either partially or fully funded are denoted with asterisk</i>	10-Year Total Cost (\$000s YOY)	Priority Score
MARC Train Martins Yard Power Switch*	\$6,475	140.35
Local Bus Yard Management System*	\$4,075	137.19
MARC Train Martin State Airport Yard Improvements*	\$11,048	136.47
North Avenue Rising*	\$3,444	133.77
Local Bus BaltimoreLink Transitways*	\$2,523	129.86
Local Bus RAISE Transit Priority Project*	\$50,000	129.50
Local Bus Zero Emission Bus Charging Infrastructure for Kirk and Northwest Bus Divisions*	\$145,840	128.42
Beyond the Bus Stop *	\$4,485	128.12
Metro SubwayLink, Signage and Wayfinding Updates	\$8,331	126.44
Agencywide Planning *	\$48,608	126.24
Local Bus BaltimoreLink Bus Shelters*	\$3,393	123.67
Agencywide Tracking Non-Revenue Vehicles System	\$22,525	55.20
Metro SubwayLink Portal Storage Upgrade	\$6,550	50.16
East Baltimore Transit Hub	\$7,563	41.80
Towson Transit Hub*	\$3,789	40.93
MARC Train Penn Line Storage *	\$248,453	40.30
RFID Automated Track Inspection	\$7,201	40.16
Agencywide Patapsco Avenue Pedestrian and Bicycle Bridge*	\$20,153	38.34
MARC Train Brunswick Coach Maintenance Building Acquisition	\$30,734	35.87
MARC Train Brunswick Coach Maintenance Building Expansion	\$27,484	35.87
MARC Martin State Airport Station High-Level Platforms and Station*	\$75,000	33.74
Local Bus Fast Forward Campaign *	\$44,832	33.12
Energy Storage Systems	\$12,918	32.91
HOPE Hub - Fayette/Caroline	\$3,149	32.80
Bus Hub at Baltimore Arena*	\$2,450	32.10
Light RailLink Operator Simulator*	\$2,174	31.98
Agencywide Transit Hub Charles Center	\$20,645	30.24
Agencywide Point of Presence WLAN	\$6,899	30.00
TPI - Belair/Gay Corridor*	\$3,134	29.09
MARC Train New Expansion Locomotive Procurement*	\$154,449	29.08
Agencywide Retro-commissioning Program	\$3,204	28.66
TPI – Garrison Corridor*	\$3,134	28.37

MDOT MTA'S ENHANCEMENT INVESTMENT NEEDS

Project Name (* projects that are either partially or fully funded are denoted with asterisk)	10-Year Total Cost (\$000s YOY)	Priority Score
Agencywide Sub-metering Program	\$4,241	26.68
Metro SubwayLink Owings Mills Station Sound Barrier	\$2,738	26.66
Agencywide Blue Light Phones for Passenger Safety	\$2,694	26.28
Priority Corridor planning and design*	\$80,510	26.24
Local Bus Stop Improvements	\$23,388	23.67
Critical Parking Lots CCTV Buildout	\$8,492	23.38
Real-Time Information System (RTIS) Expansion*	\$5,604	23.24
Police Facility Improvements	\$19,894	21.20

5.3 Key Findings

5.3.1 PROGRESS FROM THE 2019 CNI

Since 2019, many SGR and Enhancement Needs have been met including replacing and modernizing stations and maintenance facilities and adding numerous new assets to benefit riders, such as additional shelters and real-time information technology. Key completed investments include:

Project	Description
MARC BWI Rail Station Improvements	MDOT MTA renovated the MARC BWI Rail station in 2019 to include more seating, customer-friendly ticketing options, and updated restrooms.
MARC Camden Station Replacement	MDOT MTA opened a brand-new passenger facility in September 2019 at the Camden Yards MARC station in downtown Baltimore. It provides service to both MARC Train and Light RailLink passengers.
North Avenue Rising	North Avenue Rising is a collaboration between federal, state, and city partners to support economic revitalization in communities along North Avenue through sidewalk improvements, dedicated bus lanes, transit signal priority (TSP), enhanced bus stops, roadway repaving, and Penn-North Metro SubwayLink station renovations. Construction of the overwhelming majority of these improvements was completed in 2021. A limited amount of additional work will be completed before the end of June 2022, largely focused on improving pedestrian safety and accessibility.
Replacement and Modernization of Kirk Bus Garage	MDOT MTA completed construction of the new Kirk Bus Division maintenance and support facilities in 2021 that will allow the agency to maintain and operate the bus service with increased reliability and efficiency.
MARC Train Riverside Yard Acquisition and Build-out	Riverside Maintenance yard was purchased from CSX in 2020, which gives MDOT MTA the ability to independently operate its own maintenance yard for MARC vehicles, allowing for increased flexibility and efficiency. Construction of a new heavy maintenance facility at the yard is now underway.
Metro SubwayLink Track and Interlocking Replacements	In the past several years, various track segments of the Metro SubwayLink system have been replaced as part of ongoing maintenance efforts to maintain a safe and reliable experience for customers. These replacements include the renewal of interlockings (arrangement of signals that help prevent conflicting movements through special trackwork like turnouts and crossovers that allow trains to cross over between the two mainline tracks) at Charles Center and State Center in 2020.

10-Year Capital Needs Inventory & Prioritization

Project	Description
Light Rail CBD Three Interlockings and 10 Curves	This project completed in 2021 included the rehabilitation of three interlockings on the Light Rail system as part of ongoing maintenance efforts: the North Avenue north and south interlockings and the Mount Royal interlocking. Due to higher wear on tight curves, the project also rehabilitated 10 restraining rail curves between North Avenue and Camden yards.
Bus Unified Systems Architecture (USA)	Bus USA was substantially completed in 2021, including vehicle retrofits with new hardware. Bus USA is a new software platform for bus operations that modernizes operating procedures and allows MDOT MTA to operate much more efficiently and effectively, providing more reliable bus service to customers.
Automatic Vehicle Locator (AVL) Improvements	In the past few years, MDOT MTA has implemented many AVL improvements to give customers real-time information on the location of their vehicles, which in turn gives the customers an enhanced transit experience.
BaltimoreLink Improvements	The BaltimoreLink program initiated many changes throughout MDOT MTA's Local Bus system, including updated signage, new bus branding, and enhanced route designs. These changes have continued since the launch of BaltimoreLink to provide customers new shelters and a high-quality transit experience.

5.3.2 10-YEAR NEEDS (2022 TO 2031)

- **Total Capital Needs:** MDOT MTA identified an estimated \$6.3 billion in combined SGR and Enhancement Needs over the next 10 years.
 - Most of these needs, 81 percent, are reinvestments to maintain assets in an SGR and 19 percent are driven by Enhancement Needs over the 10-year period.
 - The largest category of total capital needs has been identified for vehicles (34 percent); systems comprise the next-largest category of total capital needs (20 percent); and guideway elements follows (18 percent).
- **SGR Needs:** MDOT MTA identified an estimated \$5.1 billion in SGR Needs over the next 10 years with a large portion of SGR Needs in 2022 due to the current \$1.8 billion SGR backlog.
 - Most SGR Needs are driven by vehicles reaching the end of their useful lives and planned fleet rehabilitations or overhauls over the 10-year period, resulting in 39 percent, or \$2 billion, in identified SGR Needs between 2022 and 2031. The value of bus replacements and repair is the largest fleet need, in part due to the transition to higher-cost, cleaner, and more sustainable ZEBs.
- The second-largest category of need is in Systems, which includes rehabilitation and replacement of critical rail systems for electrification and train control, upgrades to the end-of-life fare collection system, and replacements of a variety of communications system components.
- **Enhancement Needs:** MDOT MTA identified an estimated \$1.19 billion in Enhancement Needs over the next 10 years.
 - The most expensive enhancement project is the MARC Train – Penn Line Storage project, estimated to cost \$248.5 million in YOY dollars over the 10-year period, including inflation. This project allows MARC to bring its locomotives more efficiently from both Penn and Camden lines to MARC's Riverside Maintenance Facility and eliminates deadhead travel by storing trainsets overnight closer to revenue service. Future phases could include upgrades allowing revenue service between the Penn Line and Camden Station.
 - Many other enhancement projects will directly improve customer experience and accessibility to services, including multiple transit hubs, improved wayfinding, real-time information, bus stop improvements, and more reliable transit priority corridors.

5.3.3 10-YEAR FUNDS AND FUNDING GAPS (2022 TO 2031)

- **Total Capital Funds:** To address the \$6.3 billion in total capital needs, \$5.4 billion in total funding is forecasted, leaving an estimated funding gap of about \$892 million over the next 10 years (see **Figure 5-4**). Over the past three years, the funding gap has decreased significantly, from just over \$2 billion in 2019 to the current \$892 million. MDOT MTA is leveraging new funding opportunities to address critical safety needs and improve the reliability and efficiency of the system.
- **SGR Funds:** Of the identified \$5.1 billion in SGR Needs, it is estimated that about \$5.0 billion in funding will be available over the next 10 years (about \$3 billion of which is committed through 2027). This expected level of funding will allow MDOT MTA to make significant strides in addressing the backlog over 10 years.
 - This projection shows an estimated funding gap for SGR Needs of about \$110 million over the 10-year period, though the annual level of need (\$512 million) is
- **Figure 5-5** illustrates the forecasted SGR funding levels over the 10-year period against the SGR Needs identified, including annual average needs.
- **Figure 5-6** illustrates the projection of MDOT MTA's backlog from the 2019 CNI through 2031 assuming the estimated funding over the next 10 years and prioritization of the capital program in line with the CNI results.
- **Enhancement Funds:** Of the identified \$1.19 billion in Enhancement Needs, it is estimated that about \$407 million in funding will be available over the next 10 years (about \$244 million of which is committed through 2027).
 - This projection shows an estimated funding gap for Enhancement Needs of about \$782 million over the 10-year period.

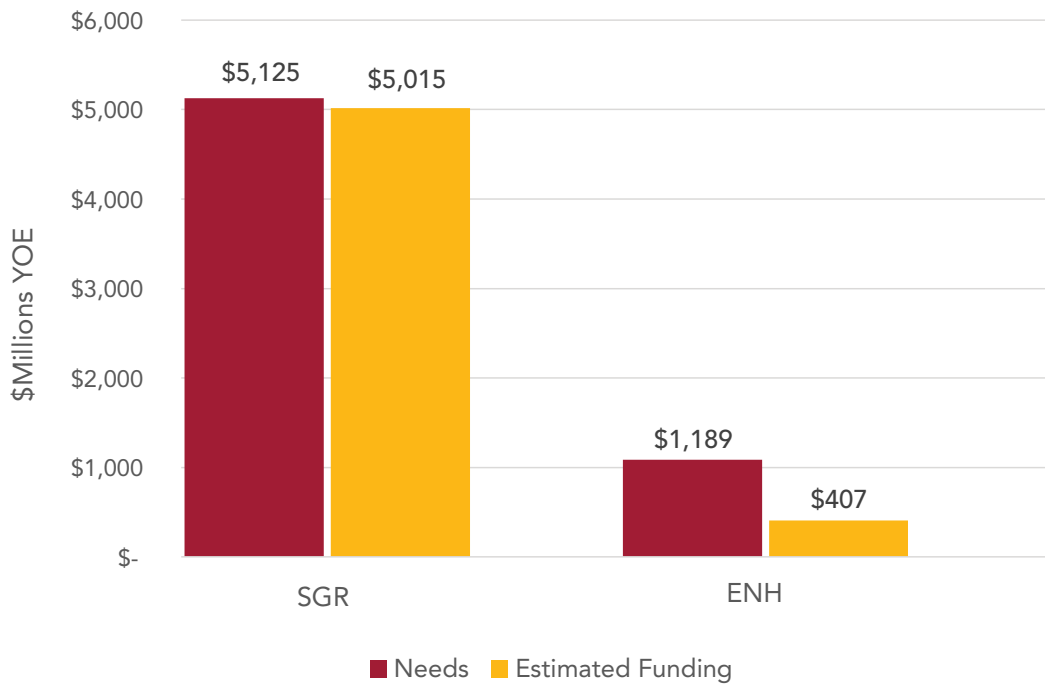


Figure 5-4. 10-Year SGR and Enhancement Needs and Funding

10-Year Capital Needs Inventory & Prioritization

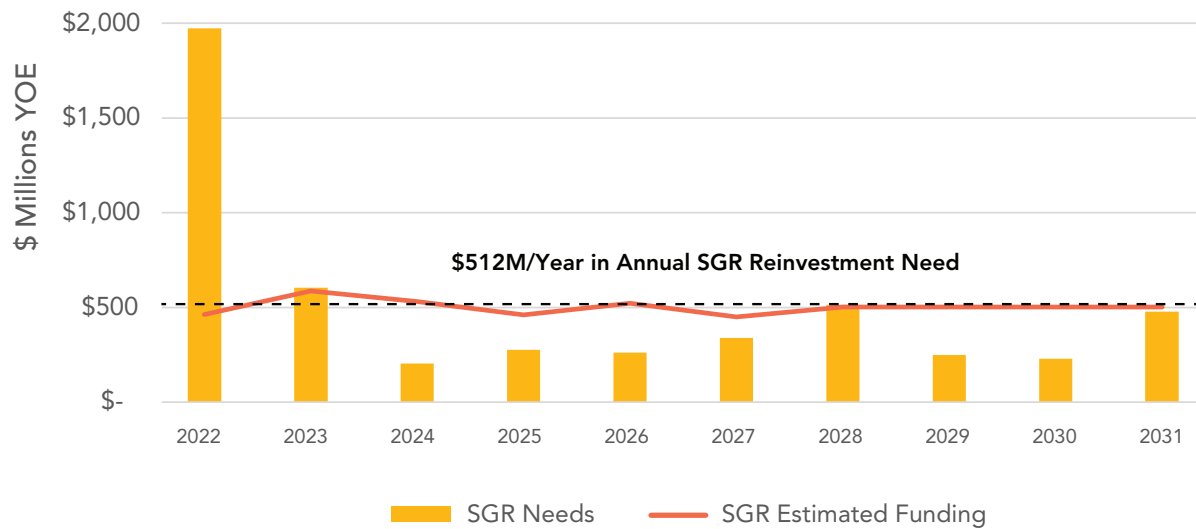


Figure 5-5. 10-Year SGR Needs vs. SGR Funding Forecast (\$Millions YOY)

*Note: Analysis does not include MDOT MTA needs or funding associated with the Purple Line, LOTS, or freight rail.

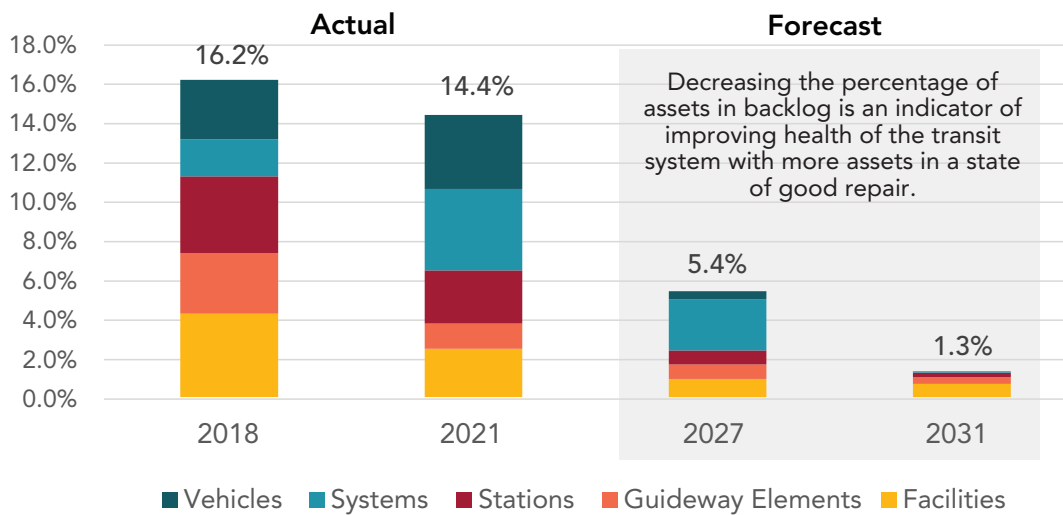


Figure 5-6. MDOT MTA Backlog as Percent of Asset Base

6. CONCLUSION

As the 13th-largest multimodal transit system in the United States, MDOT MTA depends on more than \$12 billion in physical assets to provide more than 44 million annual rides (unlinked passenger trips) across the State of Maryland. MDOT MTA's 2,560-square-mile service area connects communities, across a variety of demographics, with Maryland's job centers, schools, healthcare, retail, and cultural centers. It is imperative for the agency to maintain its assets in an SGR to sustain current levels of service. The Enhancement Needs identified in this document are required to support much-needed improvements to accessibility, system reliability, efficiency, and customer service.

Since the 2019 CNI, the funding shortfall for transit has significantly decreased, with injections of both federal and state funding to support the system going forward. This additional funding provides MDOT MTA the opportunity to reduce the backlog of SGR Needs over the next 10 years. For example, federal funding relief through the American Rescue Plan Act of 2021 (ARPA) has helped to address SGR rail needs through interlocking and track replacements and launch the \$43 million Fast Forward program, which will improve transit reliability, system safety, and customer experience through investments in:

- Designing and constructing additional dedicated bus lanes,
- Implementing transit signal prioritization,
- Making lane modifications that promote faster, more efficient transit,
- Creating new and enhanced transit hubs,
- Adding more bus shelters,
- Making ADA and pedestrian safety improvements near bus stops,
- Improving signage to convey real-time information, and
- Enhancing wayfinding along Light RailLink routes.

MDOT MTA will continue to prioritize safety-critical needs and leverage technology, practical design, partnerships, shared mobility solutions, and discretionary grants to extend dollars and achieve enhancements. As noted above, MDOT MTA has already invested in modernizing Kirk Bus Garage, updating Camden Station, and replacing multiple Metro SubwayLink interlockings to improve SGR. These investments have decreased the backlog from 16.2 percent to 14.4 percent of the asset base in the past three years.

MDOT MTA also continues to aggressively apply for competitive discretionary funding opportunities and was successfully awarded a Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant in 2021 to complete a \$50-million multimodal enhancement project in an East-West transit corridor along two of the agency's highest ridership routes. This enhancement project will fund at least ten miles of dedicated bus lanes, complimentary transit signal priority at select intersections, bus stop amenities, bioretention facilities, curb bump-outs, signal improvements, real-time signage, ADA improvements, electric vehicle charging stations and bicycle infrastructure along this critical corridor. Without this additional stream of federal grant dollars, complementing State and City investments, this project may not have been possible. Additional local, state, and federal support is also utilized address Enhancement Needs, though a funding gap remains (see **Figure 6-1**). As presented in the

10-Year Capital Needs Inventory & Prioritization

FY22–FY27 CTP, outside of the Purple Line, a high percentage of MDOT MTA funding is prioritized for SGR Needs to address the backlog of SGR Needs across the transit system. MDOT MTA continues to prioritize SGR Needs and the backlog of deferred maintenance while balancing the need for system enhancements—which is reflected in the relative funding gaps below.

Governor Hogan has made significant investments in transit in the State of Maryland, with improvements since 2019 in guideway, facilities, stations, and vehicles. The relative size of the SGR backlog has decreased in this time and current CTP investment levels are projected to further decrease the percentage of MDOT MTA's assets in backlog to 5.4 percent by 2027. With this progress, a funding gap still remains.

Multiple high-priority items have been addressed including modernized facilities at the Kirk Bus

Garage, replacement BaltimoreLink buses and MobilityLink vehicles, and renewed Metro SubwayLink interlockings. MDOT MTA continues to progress the high-priority replacement of Metro SubwayLink railcars and the related signaling system through the current CTP. MDOT MTA also has worked collaboratively with funding partners and the industry to leverage new sources of funding and new technologies to improve the delivery of the capital program, and continuous improvement of the TAM program and CFP process will continue to strengthen the resulting CNI updates.

Similarly, MDOT MTA has worked with stakeholders in the region and across the state to develop visions for the future of transit in the RTP and STP. The needs in this CNI will progress these plans and begin to achieve the benefits of improved transit for MDOT MTA's customers and community.

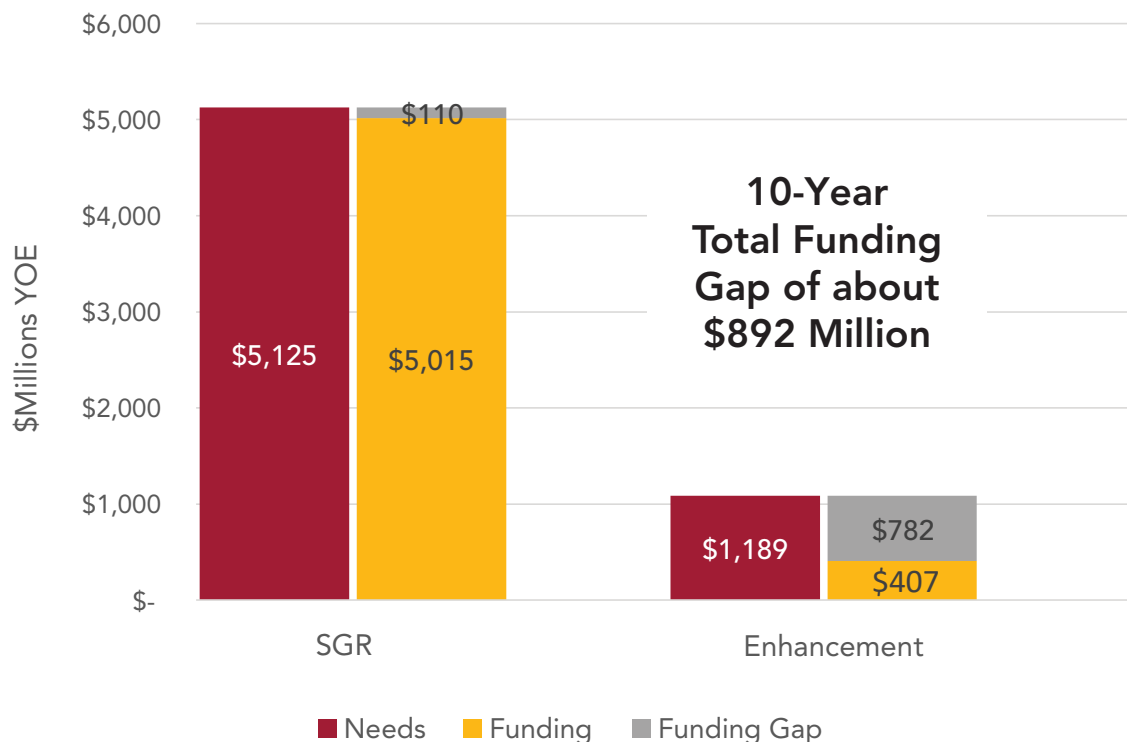


Figure 6-1. 10-Year Total Capital Needs vs. Total Capital Funding Forecast (2022 to 2031, \$ Millions YOY)

APPENDIX: DETAILED PROJECT TABLES

The tables below include all SGR and Enhancement Needs, disaggregated into individual line items, whereas **Tables 5-1** and **5-2** combine projects that address the same need into a single line item. Ten-year total costs are listed in YOE dollars based on expected cash flows of expenditures. The total costs shown are only from 2022 to 2031 and do not include previously expended project costs.

Project Name (*) projects that are either partially or fully funded are denoted with asterisk	Type	10-Year Total Cost (\$000s YOE)	Priority Score
Light RailLink Howard Street Rail*	SGR	\$39,639	177.80
Light RailLink Downtown Track Replacement*	SGR	\$10,677	177.80
Metro SubwayLink Railcar Truck Overhaul *	SGR	\$15,410	176.20
Metro SubwayLink Train Control and Communication (TC&C) Room Power Distribution*	SGR	\$3,060	175.96
Metro SubwayLink Railcar Sub-system Overhaul*	SGR	\$3,163	174.88
Agencywide Information Technology Program Migration *	SGR	\$12,723	170.68
Local Bus Revenue Vehicles*	SGR	\$210,000	169.30
Light RailLink Switch Tie Replacement North Ave Yard *	SGR	\$2,079	169.22
Metro SubwayLink Revenue Vehicle and Train Control Program*	SGR	\$323,669	167.81
Metro SubwayLink Rail and Switch Heater System Replacement*	SGR	\$2,380	167.76
Light RailLink Howard Street Transit Signal Priority Improvements*	SGR	\$530	167.33
MARC Train GP39 Locomotive Overhaul*	SGR	\$11,731	166.89
Light RailLink Rail and Switch Heater System Replacement*	SGR	\$4,450	166.60
MARC Train Locomotives*	SGR	\$125,500	166.41
Metro SubwayLink Tunnel Stray Current Monitoring System*	Enhancement	\$1,142	166.16
Local Bus Revenue Vehicle Preservation*	SGR	\$1,244	165.33
MARC Train Odenton Station Renovation*	SGR	\$2,600	165.15
Light RailLink Restraining Rail Curves*	SGR	\$62,500	164.62
MARC Train MARC III Coach Overhauls*	SGR	\$26,276	164.18
Light RailLink Grade Crossing - Timonium Business Park *	SGR	\$1,200	163.74
Light RailLink Grade Crossing - Maple and Twin Oaks*	SGR	\$2,400	163.70
Metro SubwayLink Rogers Avenue and Reisterstown Plaza Roof Replacement*	SGR	\$5,696	162.89
Local Bus Engine Replacement Program*	SGR	\$3,000	162.89
Light RailLink Grade Crossing - Camp Meade North*	SGR	\$3,000	162.71

10-Year Capital Needs Inventory & Prioritization

Project Name (* projects that are either partially or fully funded are denoted with asterisk)	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Light RailLink Grade Crossing - Cromwell P&R South Entrance*	SGR	\$2,400	162.66
Light RailLink Grade Crossing - 3rd Avenue*	SGR	\$1,100	162.66
Light RailLink Grade Crossing - Aviation Blvd*	SGR	\$4,000	162.66
Milford Mill Culvert Rehabilitation *	SGR	\$225	162.20
Metro SubwayLink Fire Protection Services*	SGR	\$2,720	161.92
Metro SubwayLink Reisterstown Plaza Station ADA Improvements & Stair Replacement*	SGR	\$1,737	161.26
Metro SubwayLink Section B Interlocking Reconstruction*	SGR	\$31,994	161.17
Metro SubwayLink Wabash Yard Systems Maintenance Building Roof Replacement*	SGR	\$1,150	160.72
Local Bus Bush Division Boiler Replacement*	SGR	\$3,667	160.39
Metro SubwayLink Wabash Yard Turnout Renewal*	SGR	\$8,471	160.26
Metro SubwayLink Penn North Escalators*	SGR	\$3,704	159.94
MobilityLink Revenue Vehicles*	SGR	\$5,380	159.75
Metro Subway Link Mondawmin Elevators*	SGR	\$8,282	159.40
Agencywide Elevator Rehabilitations*	SGR	\$152,527	159.38
Metro SubwayLink Tunnel Standpipe Repair*	SGR	\$1,510	159.24
Local Bus Total Maximum Daily Load Compliance (TMDL) Northwest Bus Facility *	SGR	\$2,549	158.39
Light RailLink Grade Crossing - Shawway Road*	SGR	\$4,000	158.30
Local Bus Facilities Maintenance Equipment*	SGR	\$1,618	157.70
Local Bus Bush Division Window Replacement*	SGR	\$5,200	157.07
Local Bus Eastern Bus Facility Replacement*	SGR	\$426,936	156.85
Agencywide Voice Over Internet Protocol (VOIP) Replacement*	SGR	\$781	156.71
MARC Train MP36PH-3C Locomotive Overhaul*	SGR	\$67,872	156.64
Light RailLink Interlockings at North Avenue Yard*	SGR	\$23,050	155.83
Agencywide LED Lighting Replacement*	SGR	\$6,000	155.49
Light RailLink North End Signal Power System Replacement*	SGR	\$5,490	155.34
Agencywide Fare Collection System Replacement*	SGR	\$42,162	155.08
Metro SubwayLink TMDL Milford Mill*	SGR	\$3,729	154.57
Metro SubwayLink Long-term Electrical and Lighting Replacements*	SGR	\$92,203	154.53

APPENDIX

Project Name (*) projects that are either partially or fully funded are denoted with asterisk	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Metro SubwayLink Station Lighting Program*	SGR	\$26,200	154.53
MARC Train SC-44 Diesel Locomotive Overhaul*	SGR	\$4,000	154.07
Metro SubwayLink Dewatering Station Controls and Equipment Replacement*	SGR	\$1,846	153.75
Light RailLink Fiber Optic Cable Replacement*	SGR	\$2,729	152.53
Metro SubwayLink Reisterstown Plaza East Interlocking Replacement*	SGR	\$9,286	152.50
Light RailLink TMDL North Linthicum*	SGR	\$13,434	152.28
Light RailLink BWI Extension/Mainline Junction Interlocking Replacement*	SGR	\$3,000	151.90
MARC Train IV Coach Truck Overhaul*	SGR	\$14,520	151.28
Metro SubwayLink Full DC Switchgear Replacement*	SGR	\$21,941	150.87
Metro SubwayLink Traction Power Substation (TPSS) Isolation Switches*	SGR	\$2,100	150.87
Local Bus BUS Unified Systems Architecture (USA)*	SGR	\$3,039	150.61
Metro SubwayLink TMDL Old Court Station and Shop*	SGR	\$520	149.32
Light RailLink TMDL Warren Road*	SGR	\$939	149.24
Light RailLink Train Control Signals UPS Upgrade*	SGR	\$1,511	148.98
Metro SubwayLink Wabash Yard Shop Equipment*	SGR	\$9,615	148.77
Metro SubwayLink Interlocking Yard Renewals*	SGR	\$2,048	148.76
Agencywide OPTRAM *	SGR	\$2,031	148.62
Metro SubwayLink Long-Term Annual Tunnel Maintenance*	SGR	\$25,615	147.81
Metro SubwayLink Tunnel Preservation*	SGR	\$1,661	147.81
MARC Train Riverside Heavy Maintenance Building*	SGR	\$46,875	146.91
Metro SubwayLink AVTEC Replacement*	SGR	\$3,106	144.95
MARC Train Laurel Platform Replacement*	SGR	\$5,680	143.51
Light RailLink Grade Crossing - Conway*	SGR	\$2,000	140.52
MARC Train Martins Yard Power Switch*	Enhancement	\$6,475	140.35
Local Bus Long-term Shelter Replacements *	SGR	\$8,834	138.61
Local Bus Shelter Preservation*	SGR	\$300	138.61
Local Bus Yard Management System*	Enhancement	\$4,075	137.19
MARC Train Martin State Airport Yard Improvements*	Enhancement	\$11,048	136.47
North Avenue Rising*	Enhancement	\$3,444	133.77

10-Year Capital Needs Inventory & Prioritization

Project Name (*) projects that are either partially or fully funded are denoted with asterisk	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Local Bus BaltimoreLink Transitways*	Enhancement	\$2,523	129.86
Local Bus RAISE Transit Priority Project*	Enhancement	\$50,000	129.50
Local Bus Zero Emission Bus Charging Infrastructure for Kirk and Northwest Bus Divisions*	Enhancement	\$145,840	128.42
Beyond the Bus Stop *	Enhancement	\$4,485	128.12
Metro SubwayLink, Signage and Wayfinding Updates	Enhancement	\$8,331	126.44
Agencywide Planning *	Enhancement	\$48,608	126.24
Local Bus BaltimoreLink Bus Shelters*	Enhancement	\$3,393	123.67
Interactive Voice Response and Multimodal Operations Control Center Server Upgrade*	Enhancement	\$306	123.20
TICC and MOCC Remote Telework Agent Equipment*	Enhancement	\$145	116.21
MARC Train Amtrak Northeast Corridor Contributions*	SGR	\$165,091	100.00
MARC Train Long-Term Capital Contributions	SGR	\$160,014	100.00
MARC Train CSX Joint Benefits Contributions*	SGR	\$48,241	100.00
Light RailLink and Metro SubwayLink Track Maintenance of Way *	SGR	\$13,877	100.00
Light RailLink Train Control	SGR	\$58,584	83.30
Light RailLink Catenary System Renewal	SGR	\$1,975	74.05
MARC Train Revenue Vehicles (MARC IIA & GP40)*	SGR	\$140,332	71.45
Local Bus Long-Term Vehicle Replacements	SGR	\$188,630	69.30
Metro SubwayLink Aerial Rehabilitation	SGR	\$7,230	69.22
Agencywide Electrical Systems Upgrade*	SGR	\$2,400	67.97
Local Bus Scheduled Maintenance Program	SGR	\$12,000	66.95
Light RailLink First Year of Vehicle Replacements	SGR	\$56,222	65.57
Light RailLink Revenue Vehicle Overhauls*	SGR	\$51,481	65.57
Light RailLink Station Platforms	SGR	\$22,717	64.80
Metro SubwayLink Long-term Trackwork FY28-FY31	SGR	\$96,836	64.74
Metro SubwayLink Station Booth Replacement*	SGR	\$3,850	64.53
MARC Train Bi-level Railcars Overhauls and Replacement*	SGR	\$41,150	64.18
Metro SubwayLink TC&C Equipment	SGR	\$122,459	63.71
Agencywide Stormwater Management and Drainage*	SGR	\$15,201	62.62
Metro SubwayLink Heavy Rail Tunnel Drainage	SGR	\$6,835	62.62

APPENDIX

Project Name (*) projects that are either partially or fully funded are denoted with asterisk	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Light RailLink Long-term Catenary System Replacement *	SGR	\$40,465	61.85
Light RailLink Catenary Wire Replacement*	SGR	\$8,000	61.85
MARC Train Camden and Brunswick Lines Low Level Platform Replacement*	SGR	\$4,875	60.98
Metro SubwayLink Monument Street Ventilation Fan Replacement	SGR	\$1,800	60.94
Local Bus Bush Division Transportation Building Renovation*	SGR	\$340	60.59
Agencywide Vehicular and Pedestrian Door Replacement*	SGR	\$22,000	60.43
MobilityLink Long-Term Vehicle Replacements*	SGR	\$110,361	59.75
Metro SubwayLink Platform Surface and Snow Melt System Rehabilitation*	SGR	\$24,400	58.98
Metro SubwayLink Deluge Valve Room and Valve Pit Rehabilitation*	SGR	\$3,730	58.25
Local Bus Bush Division Pavement Reconstruction*	SGR	\$3,519	57.40
Metro SubwayLink Long-term Ventilation System Replacements	SGR	\$13,311	57.23
Metro SubwayLink Ventilation System Equipment Replacement	SGR	\$4,240	57.23
Agencywide Escalator Rehabilitations*	SGR	\$177,876	56.84
Agencywide Radio System	SGR	\$7,185	56.53
Metro SubwayLink Wayside Lubrication System for Mainline Curves	Enhancement	\$1,322	56.32
Metro SubwayLink Station Ventilation Actuator Replacement	SGR	\$2,030	56.05
Metro SubwayLink Sewage Ejector Replacement*	SGR	\$3,540	55.98
Light RailLink Wayside Communications and Train Control Replacement*	SGR	\$39,835	55.95
Light RailLink Signal System Rehabilitation*	SGR	\$12,500	55.95
Metro SubwayLink Tunnel Cleaning and Preservation Program*	SGR	\$9,000	55.76
Light RailLink Interlocking Renewal (Mainline)*	SGR	\$5,500	55.56
Light RailLink Station Amenities	SGR	\$17,565	55.55
Agencywide Tracking Non-Revenue Vehicles System	Enhancement	\$22,525	55.20
Agencywide In-station Revenue Collection Equipment Replacements	SGR	\$46,267	55.08
Metro SubwayLink Station Platform Structure*	SGR	\$30,513	53.92
Metro SubwayLink Vent Shaft Rehabilitation	SGR	\$12,000	53.84
Metro SubwayLink SCADA Replacement	SGR	\$40,874	53.82

10-Year Capital Needs Inventory & Prioritization

Project Name <i>(*) projects that are either partially or fully funded are denoted with asterisk</i>	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Metro SubwayLink Passenger Communication Systems*	SGR	\$6,341	53.82
Metro SubwayLink TPSS Building Components	SGR	\$152,284	53.54
Metro SubwayLink Third Rail and Cabling	SGR	\$113,232	53.54
Metro SubwayLink Signals and Switch Machines	SGR	\$27,897	53.54
Agencywide 241 Franklinton Road Renovation	SGR	\$460	53.33
Agencywide IT Switch Replacement (FY27)	SGR	\$1,000	53.33
Metro SubwayLink Trash Receptacle Replacement	SGR	\$280	53.15
Metro SubwayLink Sound Attenuation Panel Replacement	SGR	\$2,600	53.11
MARC Train Penn Line Station Platform Replacement*	SGR	\$40,000	53.06
Metro SubwayLink Above-ground Station Stairs Rehabilitation*	SGR	\$2,900	52.97
Metro SubwayLink Wabash Yard Vehicle Wash Upgrade*	SGR	\$10,885	52.63
MARC Train IV Railcar Overhaul*	SGR	\$58,800	52.28
Metro SubwayLink Retaining Walls	SGR	\$1,347	52.00
Metro SubwayLink Pedestrian and Parking Access	SGR	\$8,513	51.39
Commuter Bus Park & Rides	SGR	\$4,255	51.24
Metro SubwayLink TPSS Load Break and Tie Switches*	SGR	\$5,050	51.08
Metro SubwayLink Substation Equipment Replacement	SGR	\$17,748	50.63
Metro SubwayLink Transformer and DC Switchgear Rehabilitation	SGR	\$11,000	50.63
Light RailLink Retaining Walls	SGR	\$23,544	50.53
Agencywide Water Reclamation System Rehabilitations	SGR	\$1,000	50.21
Metro SubwayLink Portal Storage Upgrade	Enhancement	\$6,550	50.16
MARC Train BWI Parking Access and Revenue Control System	SGR	\$530	50.15
Metro SubwayLink Station Buildings	SGR	\$67,036	49.54
Metro Subway Link Mondawmin Exterior Improvements	SGR	\$7,392	49.53
Agencywide Non-Revenue Vehicles	SGR	\$48,831	48.94
Metro SubwayLink Wabash Yard Track Rehabilitation*	SGR	\$13,200	48.92
Metro SubwayLink Long-term Bridge Maintenance*	SGR	\$16,613	48.89
Metro SubwayLink Repairs to Structures*	SGR	\$8,050	48.89
Metro SubwayLink Replacement of Aerial Girders*	SGR	\$18,800	48.89

APPENDIX

Project Name (* projects that are either partially or fully funded are denoted with asterisk)	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Metro SubwayLink Passenger Shelters*	SGR	\$2,800	48.68
MARC Train BWI Parking Garage Repair *	SGR	\$3,000	48.48
Agencywide Facility Roof Replacements FY28-FY31	SGR	\$5,238	48.48
MARC Train Parking Lots and Garage Rehabilitations	SGR	\$18,001	48.47
Metro SubwayLink TC&C Room Air Conditioning Replacement	SGR	\$5,540	47.90
Metro SubwayLink Aerial Pier Drain Relocation*	SGR	\$14,700	47.89
Local Bus Park and Ride	SGR	\$1,009	47.72
Local Bus Bush Division Building 8 HVAC Upgrades*	SGR	\$600	47.62
Agencywide Maintenance Equipment	SGR	\$86,095	47.40
Agencywide IT Hardware	SGR	\$31,647	47.31
Light RailLink TPSS Major Rehabilitation*	SGR	\$67,863	47.27
Agencywide Wastewater/Pollution Treatment	SGR	\$11,302	47.19
Light RailLink Storage Yards	SGR	\$1,344	47.17
Local Bus Bush Division Building 5 HVAC Replacement*	SGR	\$3,000	47.00
Light RailLink Load Break Disconnect Feeder Tie Switches*	SGR	\$6,500	46.86
MARC Train Station Platforms FY28-FY31	SGR	\$68,846	46.43
Metro SubwayLink Salt Shed Replacement	SGR	\$225	46.41
Agencywide Ongoing Facility Renewal	SGR	\$39,450	46.33
Light RailLink Station Access	SGR	\$9,571	46.30
Light RailLink CCTV	SGR	\$7,053	45.83
Agencywide IT Server Preservation*	SGR	\$51,735	45.78
Agencywide Access Control Upgrades	SGR	\$1,000	45.77
Agencywide Facility Parking and Pavement	SGR	\$7,040	45.27
Metro SubwayLink UPS Battery Replacement	SGR	\$2,715	44.87
Metro SubwayLink Stat X Fire Extinguishing Agent Replacement	SGR	\$1,288	44.76
Metro SubwayLink Wabash Yard Snow Melter System	SGR	\$140	44.36
Metro SubwayLink Tunnel Leak Repairs & Mitigation	SGR	\$2,596	44.07
Police Video Management System Replacement*	SGR	\$12,150	43.33
MARC Penn Line Station Platform Replacement (Edgewood)	SGR	\$17,000	43.04

10-Year Capital Needs Inventory & Prioritization

Project Name (*) projects that are either partially or fully funded are denoted with asterisk	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Light RailLink In-street Guideway Replacement	SGR	\$2,704	43.03
MARC Train Maintenance Facilities	SGR	\$6,281	43.02
Light RailLink Bridge Rehabilitation*	SGR	\$2,200	42.88
MARC Train Switch Machine Repairs	SGR	\$68,978	42.53
Light RailLink Step-to-Touch Grounding Rehabilitation	SGR	\$3,000	41.93
East Baltimore Transit Hub	Enhancement	\$7,563	41.80
Metro SubwayLink Tunnel and Station Door Replacement*	SGR	\$5,794	41.72
Towson Transit Hub*	Enhancement	\$3,789	40.93
MARC Train CCTV Replacements	SGR	\$7,515	40.60
MARC Train Penn Line Storage *	Enhancement	\$248,453	40.30
MARC Train Station Buildings	SGR	\$12,369	40.22
RFID Automated Track Inspection	Enhancement	\$7,201	40.16
Agencywide Patapsco Avenue Pedestrian and Bicycle Bridge*	Enhancement	\$20,153	38.34
Local Bus Bush Division Paint Booth Replacement*	SGR	\$2,500	36.81
Metro SubwayLink Cellular Coverage in Tunnels*	Enhancement	\$1,126	36.44
Light RailLink Structural Bridge Tie Replacement*	SGR	\$1,793	36.27
MARC Train Brunswick Coach Maintenance Building Acquisition	Enhancement	\$30,734	35.87
MARC Train Brunswick Coach Maintenance Building Expansion	Enhancement	\$27,484	35.87
MARC Martin State Airport Station High-Level Platforms and Station*	Enhancement	\$75,000	33.74
Local Bus Fast Forward Campaign *	Enhancement	\$44,832	33.12
Energy Storage Systems	Enhancement	\$12,918	32.91
HOPE Hub - Fayette/Caroline	Enhancement	\$3,149	32.80
Light RailLink Intertrack Fence	Enhancement	\$588	32.43
Bus Hub at Baltimore Arena*	Enhancement	\$2,450	32.10
Metro SubwayLink Operator Simulator*	Enhancement	\$1,071	32.04
Light RailLink Operator Simulator*	Enhancement	\$2,174	31.98
Agencywide 301 N Calverton Renovation	SGR	\$105	31.32
Agencywide Transit Hub Charles Center	Enhancement	\$20,645	30.24
Agencywide Point of Presence WLAN	Enhancement	\$6,899	30.00

APPENDIX

Project Name <i>(*) projects that are either partially or fully funded are denoted with asterisk</i>	Type	10-Year Total Cost (\$000s YOY)	Priority Score
Transit Priority Initiative (TPI) - Saratoga Street	Enhancement	\$1,219	29.55
TPI - Belair/Gay Corridor*	Enhancement	\$3,134	29.09
MARC Train New Expansion Locomotive Procurement*	Enhancement	\$154,449	29.08
Agencywide Retro-commissioning Program	Enhancement	\$3,204	28.66
TPI - Madison & Monument	Enhancement	\$1,827	28.51
TPI - Garrison Corridor*	Enhancement	\$3,134	28.37
Agencywide Sub-metering Program	Enhancement	\$4,241	26.68
Metro SubwayLink Owings Mills Station Sound Barrier	Enhancement	\$2,738	26.66
Agencywide Blue Light Phones for Passenger Safety	Enhancement	\$2,694	26.28
Priority Corridor planning and design*	Enhancement	\$80,510	26.24
Statewide Transit Plan Implementation, Studies, and Updates	Enhancement	\$1,884	26.24
Bicycle Initiatives	Enhancement	\$912	26.24
Amber Alert Integration	Enhancement	\$776	25.00
Agencywide Station Area, ADA/Access, and Small Area Plans	Enhancement	\$1,022	24.24
Local Bus Stop Improvements	Enhancement	\$23,388	23.67
Critical Parking Lots CCTV Buildout	Enhancement	\$8,492	23.38
Mobile CCTV Response Unit	Enhancement	\$706	23.38
Real-Time Information System (RTIS) Expansion*	Enhancement	\$5,604	23.24
TOD Needs Assessments and Concept Plans	Enhancement	\$1,034	22.24
Police Facility Improvements	Enhancement	\$19,894	21.20
Planning and Design Software*	Enhancement	\$1,146	20.60
TICC and Mobility Customer Surveys	Enhancement	\$232	17.60
Mobility Operations Relocation Study	Enhancement	\$102	16.86

This page intentionally left blank.

