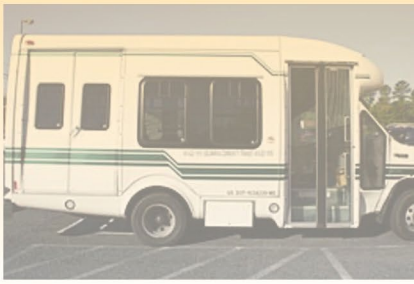
Locally Operated Transit System (LOTS)

Tier II Group

Transit Asset Management Plan (TAMP)



2022

MARYLAND DEPARTMENT OF TRANSPORTATION

MARYLAND TRANSIT ADMINISTRATION

DOCUMENT APPROVAL
(LOTS ACCOUNTABLE EXECUTIVES)

This Asset Management Group Plan has been approved by the following Accountable Executives with receipt of a signed letter of approval. Signed letters are provided in the Appendix.

Greyed out names indicate approval has not been received.

Allegany County (Allegany County Transit)	Name	Elizabeth Robison-Harper
	Title	Transit Division Chief
Annapolis (Annapolis Transit)	Name	Kwaku Agyemang-Duah
	Title	Acting Director
Anne Arundel County (Anne Arundel Transit)	Name	Sam Snead
	Title	Director of Transportation
Baltimore City (Charm City Circulator)	Name	Monica White
	Title	Transit Services Administrator
Baltimore County DPW& T (CountyRide)	Name	Anthony Russell
	Title	Acting Deputy Director of Transportation
Calvert County (Calvert County Transportation)	Name	Sandra Wobbleton
	Title	Transportation Division Chief
Caroline/Kent/Talbot/Dorchester Counties (Delmarva Community Services)	Name	Santo A. Grande
	Title	President/CEO
Carroll County (Carroll Transit)	Name	Doug Brown
	Title	Acting Director of Public Works
Cecil County (Cecil Transit)	Name	David Trolio
	Title	Community Services Director
Charles County (VanGo)	Name	Jeffry P. Barnett
	Title	Chief of Transit, Department of Planning & Growth Management
Frederick County (TransIT)	Name	Roman Steichen
	Title	Transit Division Director
Garrett County (Garrett Transit Service)	Name	Michael D. Hill
	Title	Director of Transportation
Harford County (Harford Transit LINK)	Name	Gary Blazinsky
	Title	Administrator
Howard County (Regional Transportation Agency of Central Maryland)	Name	Bruce Gartner
	Title	Administrator

Queen Anne's County (County Ride)	Name	Steve Palmer
	Title	Transit Administrator
St Mary's County (St. Mary's Transportation Services)	Name	Allison Swint
	Title	Transportation Supervisor
Somerset/Wicomico/Worcester Counties (Shore Transit)	Name	Andrew Wile
	Title	Transit Director
Town of Ocean City (The Beach Bus)	Name	Robert Shearman Jr.
	Title	Transit Manager
Washington County (Washington County Transit)	Name	Kevin Cerrone
	Title	Director

EXECUTIVE SUMMARY

This group Transit Asset Management Plan (TAMP) lays out an approach to ensuring that capital transit assets used in the services provided by Maryland's Tier II Locally Operated Transit Systems (LOTS) are maintained above a minimum acceptable level of service over their lifecycle. Per federal regulations, Maryland Department of Transportation – Maryland Transit Administration (MDOT MTA) is required to sponsor this plan on behalf of the Tier II LOTS in the state and support their implementation of asset management practice and the federal requirements.

LOTS Included in the TAMP

3 Not included in this Group TAMP

13 Offer demand response & fixed route services

3 Offer fixed route services

2 Offer demand response services

Federal Asset Management Requirements
(49 CFR § 625)

- ✓ Develop a transit asset management plan that includes:
  - Inventory of capital assets
  - Condition assessment
  - Description of decision support tools used to prioritize needs
  - Project-based prioritization of investments
- ✓ Set annual performance targets
- ✓ Designate an Accountable Executive to approve the TAMP and annual targets.

There are 22 LOTS in Maryland who are subject to the federal asset management regulations. Of those, 20 are Tier II agencies (smaller, non-rail agencies) who are participants in this group plan. The primary services offered by the Tier II LOTS are fixed route bus service and demand response service, typically used by commuters, the elderly, and the disabled to get to work centers, medical centers, shopping centers, and recreational centers.

Asset Portfolio

Collectively, the Tier II LOTS manage an asset inventory of 678 revenue vehicles, most of which are cutaway buses or medium- and heavy-duty buses. In addition, there are 46 facilities mainly used for administrative and maintenance functions, with some passenger and parking facilities, and 355 equipment assets including non-revenue vehicles. The cumulative replacement value of the Tier II LOTS asset inventory is nearly $301 million, which corresponds to an average asset portfolio of $15 million per LOTS.

Key Operating performance measures – FY2015 to FY2017

- Serves 13M riders annually, on average
- Experienced 8.9% compounded annual ridership growth from
- Observed fluctuations in operating costs per hour, mile, and trip but have decreased overall
- Local operating revenue consistently decreased by 2% annually
- Safety measures fluctuated; however, zero fatalities occurred

Key Asset Performance Measures

- % revenue vehicles that have met of exceeded their ULB by asset class
- % of non-revenue vehicles that have met or exceeded their ULB
- % -of facilities with a condition rating below 3.0 on the FTA TERM Scale

In accordance with federal regulations, asset condition is evaluated based on the number of assets that have exceeded their Useful Life Benchmark (ULB) and facilities below a physical condition threshold, which is set based on asset class. Current performance at the end of FY 2021 showed 22 percent of revenue vehicles and 27 percent of equipment (37 percent of non-revenue vehicles) at or past ULB, and zero percent of facilities below the condition threshold.

Inventory		Current Performance	
	671 Revenue Vehicles		**22.2%** at or past ULB
	46 Facilities		**0.0%** in poor condition
	353 Equipment		**27.5%** at or past ULB

NTD Vehicle Type	FY22 Target
Revenue Vehicles	
Articulated Bus	60%
Automobile	100%
Bus	22%
Cutaway Bus	28%
Ferry Boat	75%
Minivan	19%
Trolleybus	0%
Van	11%
Equipment	
Non-Revenue Vehicles (Trucks and Other Rubber Tire Vehicles)	57%
Facilities	
Administrative/ Maintenance*	0%
Passenger/Parking	0%

Performance Targets

Federal regulations require that agencies set annual performance targets for their assets, based on current asset performance and anticipated investments to meet the target. For MDOT MTA, the asset management and target-setting processes are intended to be aligned with the existing capital decision-making processes. Targets are set with consideration of the assets that are expected to be retired or brought into service during the applicable fiscal year.

Asset and Safety Risk Management

While federal regulations do not require formalized risk management processes as part of a transit agency's asset management practice, guidance for prioritizing capital asset investments recommend the consideration of asset and safety risks. In addition, Federal safety regulations include safety risk management as a component of the safety management system. This TAMP identifies enterprise and project-level risks in six categories that can have repercussions for asset performance or overall system safety.

Risk Categories

5 IT | 17 Asset | 8 External | 6 Financial | 7 HR | 8 Operational

Enterprise & Project Risks

= 5 Risks

7 Unacceptable | 24 Undesirable | 18 Acceptable w/ Review | 2 Acceptable

Project level risks were evaluated using a standard risk management process which scored risks based on likelihood and consequence to classify each one in four types (unacceptable, undesirable, acceptable with review, and acceptable). Mitigation actions were also identified for each risk to complete the risk register.

Challenges and Opportunities for Ongoing Asset Performance Management

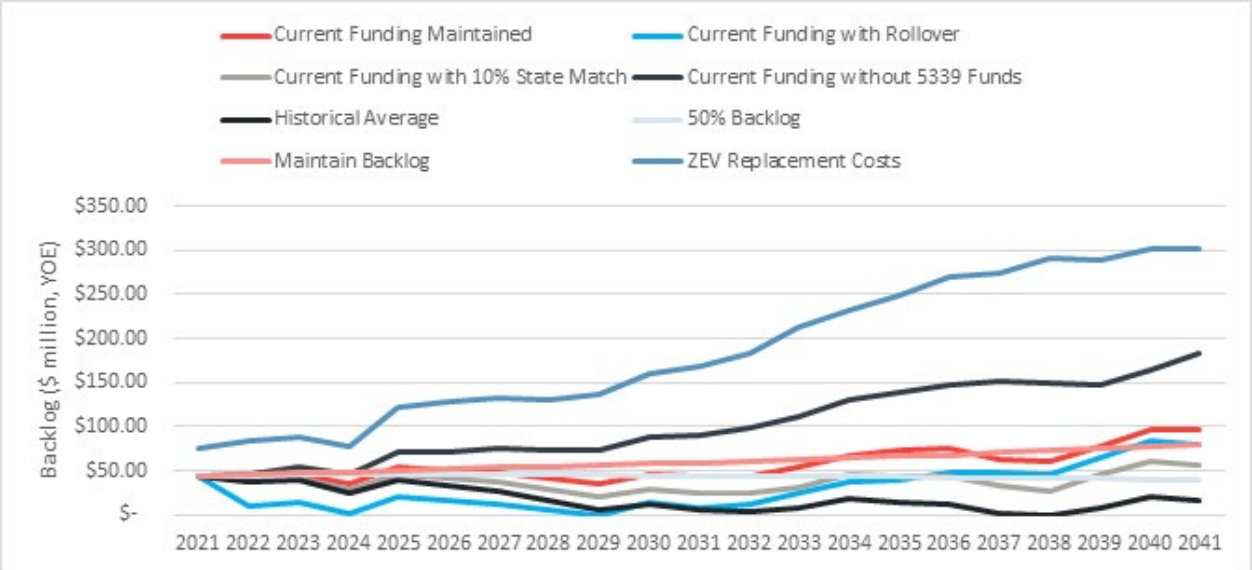
Over the last two years, LOTS agencies have continually faced asset and performance management challenges presented by the COVID-19 global health pandemic. While the pandemic brought much of the world to a pause throughout 2020, LOTS, recognizing the essential service they provide, took steps to adapt to these unique conditions to maintain operations while taking advantage of much needed guidance provided from national organizations such as American Public Transportation Association (APTA) and National Association of City Transportation Officials (NACTO). LOTS agencies also took the necessary steps to ensure that their frontline employees were vaccinated.

The pandemic has presented both unique challenges and opportunities regarding funding for LOTS agencies, primarily in the use of Federal and State grants to fund their capital projects. While LOTS did see a reduction in existing revenues, largely due to reduced ridership, the three main Federal emergency response funding mechanisms (CARES, CRRSAA, and ARP) have introduced additional opportunities, even in light of funding allocation and use restrictions. With ongoing changes in revenues and budget allocations at all levels, continued careful analysis of funding will be needed for LOTS to continue providing transit service and complying with maintenance lifecycle requirements in the next few years.

In addition to the challenges presented by COVID-19, LOTS have also been presented with the opportunity (or challenge) to improve revenue service greatly through the introduction of zero-emission vehicle (ZEV) technology. Zero-emission vehicles are vehicles designed to produce none of the exhaust or pollutants typically associated with vehicles with internal combustion engines. With the state's recent passage of

the Zero-Emission Bus Transition Act, MDOT MTA has committed to transitioning 50% of its existing fleet to zero-emission buses by 2030. Although LOTS are not subject to the requirements of this act, OLTS launched an initial assessment of the steps that would be needed to guide the transition of all LOTS in Maryland to zero-emission fleet operations. While there are considerations to be made for funding strategies, procurement, lifecycle and maintenance strategies, and infrastructure requirements, the opportunities to be gained from transitioning to this new, cleaner technology must be fully explored to determine (and possibly exploit) the benefits for LOTS.

Funding Analysis and Scenarios



Out of the total asset value of $301 million, the current state of good repair backlog for all Tier II LOTS was $44 million as of the end of FY 2021. This is an improvement over the previous year attributed primarily to improved data quality and capital investments in critical asset replacements. To eliminate the backlog and maintain it at zero, the total unconstrained need is projected to be $512 million over the next 20 years – an average of about $25.6 million per year.

This TAMP evaluates eight funding scenarios, finding that if funding is maintained at the most recent fiscal year's levels (which included discretionary funding – see Scenario 1), the state of good repair backlog will grow by $12 million. If funding is maintained at current levels without discretionary grants or emergency funding, the backlog will grow by about $61 million in 20 years (Scenario 4). If funding is maintained at the 7-year historical average (Scenario 5), the backlog will decrease by $34 million over 20 years.

Scenario	Average Annual Expenditure	Average Annual Funding Gap	Backlog at Period End (2021$)	Backlog at Period End (2041$)
1. Current Funding + 5339 Sustained	$20.0 million	$5.5 million	$56.0 million	$97.6 million
2. Current Funding + 5339 + Rollover	$21.6 million	$4.0 million	$46.1 million	$80.4 million
3. Current Funding + 5339 + 10% State Match	$22.0 million	$3.5 million	$32.6 million	$56.9 million
4. Current Funding - 5339	$14.8 million	$10.7 million	$105.0 million	$183.1 million
5. Historical Funding	$24.1 million	$1.5 million	$9.9 million	$17.3 million
6. 50% Backlog	$23.0 million	$2.6 million	$22.6 million	$39.5 million
7. Maintain Backlog	$21.1 million	$4.5 million	$45.2 million	$78.9 million
8. Historical Funding with ZEV replacements	$24.1 million	$20.5 million	$172.8 million	$301.4 million

Making Capital Investment Decisions

Decision Support

- Excel-based Inventory Forms
- ATP Process
- OLTS Project Prioritization Tool
- ProjectWise File Sharing
- TERM Lite
- TDP

Given the current state of Tier II LOTS assets and the projected funding available, MDOT MTA must make strategic decisions about where to invest capital funding to maintain assets in the best possible condition. Capital projects are programmed into all the major transportation planning processes and submitted through the Annual Transportation Planning (ATP) process for funding to be granted. As the designated recipient of FTA funds in the state, MDOT MTA disburses funds for procurement of capital assets, preventive maintenance, and others, generally prioritizing vehicles over equipment and facilities. Funding decisions consider multiple factors including asset condition, risk management, safety, and asset lifecycle strategies, and the asset management and ATP processes are supported by several decision support tools used by OLTS and also by the LOTS themselves.

Investment Prioritization

Investment prioritization occurs on an annual basis for MDOT MTA and the Tier II LOTS through the ATP grant award process. The final list of grant awards is based on current Federal funding (including any emergency response funding), adjusted state funding, and any changes to the LOTS ability to provide a local match to awarded funding. Using the existing ATP process, MDOT MTA has selected to fund the following projects for FY2023. Total federal and state investment for these projects is $19.7 million. Note that this includes funding for the LOTS' preventive maintenance programs.

LOTS	Project
Allegany	Preventive Maintenance
City of Annapolis	2 Medium Duty Buses
	Automatic Vehicle Location System
	Preventive Maintenance
Anne Arundel County	Rideshare Program
	5 Small Cutaway Buses
Baltimore City	Rideshare Program
	Passenger Ferry
Baltimore County	Rideshare Program
	2 Small Cutaway Buses
	2 Medium Duty Buses
Calvert County	Rideshare Program
	Preventive Maintenance
	2 Small Cutaway Buses
	Transfer Station Needs Assessment
	Fuel Depot
Carroll County	Rideshare Program
	2 Small Cutaway Buses
	1 Minivan
	Preventive Maintenance
Cecil County	Preventive Maintenance
	Phase 2 Design and Engineering
Charles County	Preventive Maintenance
	Facility Construction & Oversight
Dorchester County	Preventive Maintenance
	Parking Lot Improvements
	Fencing
	1 Small Cutaway Bus
	1 Transit Sedan

LOTS	Project
Frederick County	Preventive Maintenance
	2 Heavy Duty Buses
	1 Small Cutaway Bus
Garrett County	Preventive Maintenance
Harford County	Rideshare Program
	Support Vehicle
	Preventive Maintenance
Howard County	Rideshare Program
	3 Heavy Duty Buses
Queen Anne's County	Preventive Maintenance
St. Mary's County	Preventive Maintenance
	2 Small Cutaway Buses
	1 Medium Duty Bus
Talbot/Caroline/ Kent Counties *(Delmarva Community Services)*	Preventive Maintenance
	1 Small Cutaway Bus
	1 Support Vehicle
	1 Van
Town of Ocean City	Preventive Maintenance
	2 Articulated Buses
Washington County	Forklift
	Vehicle Wash Machine
	WCT Facility Roof Replacement
Wicomico/ Worcester/ Somerset Counties *(Shore Transit/ TCCLES)*	Preventive Maintenance
	3 Small Cutaway Buses
	2 Medium Duty Buses
	Mobility Management

Continuous Improvement Initiatives

- Asset Inventory Standard Operating Procedures
- (completed)
- Refining Existing Asset Inventory (completed)
- Facility Physical Condition Assessment (completed)
- Facility Asset Verification (completed)
- Automated/Cloud-Based Asset Inventory Collection and ATP Process
- LOTS Asset Management Dashboard Improvements
- LOTS Risk Management Process Improvements
- Multi-Year Budgeting
- OLTS Asset Management Manual
- LOTS Asset Management Training Manual
- Asset Management Resource and Competency Improvements
- Prioritization Tool Improvements

Continuous Improvement

This TAMP has been developed to investigate strategies to best utilize the limited funding available for Tier II LOTS' capital asset needs. This document will be updated on an annual basis to reflect updated asset portfolio information. Following FTA regulations, the TAMP will also undergo a complete overhaul every four years to capture key improvements in the overall asset management process towards an increased state of good repair. Since the initial TAMP in 2018, some of the key improvement initiatives identified have been accomplished. Over the next four years, MDOT MTA will continue to explore the feasibility of improvement initiatives identified and actions that could be taken to continue to improve TAM for the LOTS.

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ACRONYMS

ADA	Americans with Disabilities Act
ARRA	American Recovery and Reinvestment Act
ATP	Annual Transportation Plan
CFR	Code of Federal Regulations
CMTMC	Central Maryland Transportation and Mobility Commission
COVID 19	Coronavirus Disease
CY	Calendar Year
DHS	Department of Health Services
DR	Demand Response
DT	Demand Response-Taxi
FCEB	Fuel Cell Electric Bus
FTA	Federal Transit Administration
FY	Fiscal Year
ISO	International Organization for Standardization
ISO31000	International Organization for Standardization Risk Management Standard
ITS	Intelligent Transportation Systems
JOBS	Job Opportunity Access Program
LOTS	Locally Operated Transit System
LRTP	Long-Range Transportation Plan
MAP 21	Moving Ahead for Progress in the 21st Century
MB	Motor Bus
MIS	Management Information System
MDOT	Maryland Department of Transportation
MDP	Maryland Department of Planning
MTA	Maryland Transit Administration
NTD	National Transit Database
O&M	Operations and Maintenance
OLTS	Office of Local Transit Support
PM	Preventive Maintenance
RP	Regional Planner
SGR	State of Good Repair
STIP	Statewide Transportation Improvement Program
TAM	Transit Asset Management
TAMP	Transit Asset Management Plan
TDP	Transportation Development Plan
TERM	Transit Economic Requirements Model
TIP	Transportation Improvement Program
ULB	Useful Life Benchmark
US	United States
VOMS	Vehicles Operated at Maximum Service
YOE	Year of Expenditure
ZEV	Zero-Emission Vehicles

1. Introduction

This Plan sets forth MDOT MTA's approach to improving transit asset management (TAM) capabilities for the Tier II LOTS in the state, in compliance with requirements initially established by the Moving Ahead for Progress in the 21st Century (MAP-21) Act of 2012 and further defined by the Federal Transit Administration's (FTA) Final Rule on Transit Asset Management (49 Code of Federal Regulations (CFR) 625 and 630). Known as the LOTS Group Transit Asset Management Plan (Group TAMP), this master document sets objectives and strategies for delivering all commitments in the LOTS TAM policy and describes how the capital project selection process has been enhanced using TAM principles.

MDOT MTA's Office of Local Transit Support (OLTS) exists to provide a variety of technical assistance services to the LOTS operating in the State of Maryland. OLTS provides support regarding federal and state regulatory compliance, operations, management, planning, and training. A county's LOTS services vary depending on the jurisdiction's size, population density, and specific needs. Jurisdictions have extensive fixed-route service or door-to-door demand response service, or a combination of the two. When executed properly with increasingly limited resources, asset management allows for improved asset condition and more efficient and effective transit service.

1.1 LOTS SERVICE OVERVIEW

In Maryland, there are 22 LOTS who are subject to the federal asset management regulations. This plan applies to the 20 LOTS that are recipients of 5311 funding, or those that receive 5307 funding and operate less than 100 vehicles or serve an American Indian tribe. These providers, referred to as Tier II LOTS, are listed in Table 1, with a summary of the service they provide.

Local Operating Transit Systems (LOTS)

Of the 20 LOTS included in this TAMP, 16 offer both demand response and fixed route service, three (3) offer fixed route only, and one (1) offers demand response service only. All fixed route services provide complimentary Americans with Disabilities Act (ADA) services, which is different from the demand response service.

Table 1. Summary of Services Provided by LOTS

LOTS	Fixed Route	Demand Response
Allegany County Allegany County provides public transportation through a fixed-route system and complementary ADA demand response service. 20 buses run in peak service. *FY 2021 ridership: 55,112*	✓	✓
City of Annapolis Annapolis Transit provides fixed route transit and on-demand paratransit services to the City of Annapolis and the surrounding Anne Arundel County. The service is operated by the City of Annapolis although over 35% of the total service area is in Anne Arundel County. 10 buses run in peak service. *FY 2021 ridership: 134,660*	✓	✓
Anne Arundel County Anne Arundel County has contracts with Annapolis Transit (AT) and the Regional Transportation Agency of Central Maryland (RTA) using contractual grant agreements to operate deviated and fixed route service. The Taxi Voucher Program provides coupons for discounted taxicab service within the county to persons 55 years and older (as of CFY 2022) and people 18 or older with disabilities, who meet the income guidelines. 20 buses run in peak service. *FY 2021 ridership: 117,835*	✓	✓
Baltimore City – Charm City Circulator Charm City Circulator is a City operated, free, fixed-route bus system that services the Central Business District of Baltimore City. Together with the Harbor Connector, which is the water adjunct of the Charm City Circulator, the Charm City Circulator's route structure and robust operating schedule, has contributed greatly to the quality of life in Baltimore City. 16 buses run in peak service. *FY 2021 ridership: 699,141*	✓	

LOTS	Fixed Route	Demand Response
Baltimore County DPW& T CountyRide is the Locally Operated Transit System in Baltimore County that provides demand-response service for senior adults, persons with disabilities ages 18 – 59 and residents in rural areas of the County. The service also operates to Baltimore City to partnership medical facilities. 20 buses run in peak service. The Towson Circulator is a free transit service that quickly and conveniently connects residents, commuters, students, and visitors to stops throughout Towson's central business district. The Towson Loop launched the Orange and Purple routes in October 2021. 8 buses provide the Loop routes six days a week. Over ten thousand riders have been served since the launch of the free ride program. *FY 2021 ridership: 25,415*	✓	✓
Calvert County Calvert County Public Transportation provides coordinated public transportation services to its citizens with eight deviated-fixed routes and five daily specialized routes for demand response and ADA transportation services. 14 buses run in peak service. *FY 2021 ridership: 60,551*	✓	✓
Carroll County The Carroll Transit System provides demand-response service, known as door-to-door, and seven deviated-fixed routes in more densely populated areas. Carroll County's demand-response service is a shared ride program that operates on a space and time available capacity. 22 buses run in peak service. *FY 2021 ridership: 42,076*	✓	✓
Cecil County Cecil Transit operates deviated fixed routes and demand-response transportation in Cecil County for the public, senior citizens and individuals with disabilities. Cecil Transit also offers a discount Taxi Voucher program for Cecil County seniors, persons with disabilities, and low-income individuals. 21 buses run in peak service. *FY 2021 ridership: 41,878*	✓	✓
Charles County The Department of Planning & Growth Management exercises a coordinated approach to providing public transit to the residents of Charles County, marketed as VanGO, by integrating fixed route services with specialized services, including demand response and Americans with Disabilities Act (ADA) transportation. 33 buses run in peak service. *FY 2021 ridership: 403,895*	✓	✓

LOTS	Fixed Route	Demand Response
Dorchester County (Delmarva Community Service) Delmarva Community Services (DCS) is a non-profit community service agency that has been designated by Dorchester County to provide public transit service. DCS provides these services through its transportation operator - Delmarva Community Transit (DCT). DCT provides fixed route and demand response transit service to the public, the elderly, and to persons with disabilities. Also, DCT provides Americans with Disabilities Act (ADA) transportation services to people with disabilities who are unable to access a fixed route and are eligible for the service. Public transportation provides the citizens of Dorchester County access to shopping, medical, educational, and recreational facilities, as well as employment and social/human service centers throughout the mid-shore region. The program has thirty (30) buses in peak service. *FY2021 ridership: 61,593*	✓	✓
Frederick County Frederick County "TransIT" operates fixed routes in urbanized areas of Frederick County as well as commuter shuttle routes and countywide ADA paratransit and demand response service for seniors and people with disabilities, known as TransIT-plus. TransIT-plus also provides service for seniors and those with disabilities under the Statewide Specialized Transportation Assistance Program (SSTAP). 38 buses run in peak service. *FY 2021 ridership: 626,180*	✓	✓
Garrett County Garrett County Community Action Committee, Inc., a non-profit human services organization, operates Garrett Transit Service. It is the only public transportation provider in Garrett County covering all 640 square miles. GTS provides demand response and subscription services. 13 buses run in peak service. *FY 2021 ridership: 53,038*		✓
Harford County Harford Transit LINK provides fixed route service for the County's general population and demand response bus services throughout Harford County for people 60 years of age and older and for individuals with disabilities of any age. 27 buses run in peak service. *FY 2021 ridership: 98,756*	✓	✓

LOTS	Fixed Route	Demand Response
Howard County Howard County's transit services are branded, RTA. The services are managed and operated by the Regional Transportation Agency of Central Maryland under a bus service management contract with First Transit. The County provides fixed route service as well as demand-response transportation services for the elderly and persons with disabilities, including ADA complementary paratransit. 49 buses run in peak service. *FY 2021 ridership: 262,131*	✓	✓
Ocean City The Town of Ocean City's Public Works Department operates a fixed route public transportation service that runs 365 days per year. Ocean City also provides complementary ADA paratransit service for those individuals who cannot access or use fixed route service. 52 buses run in peak service. *FY 2021 ridership: 693,177*	✓	
Queen Anne's County The Queen Anne's Department of Aging operates County Ride, which provides deviated-fixed route and demand response service to the public, elderly, and persons with disabilities. 16 buses run in peak service. *FY 2021 ridership: 11,681*	✓	✓
Shore Transit The Tri-County Council of the Lower Eastern Shore (TCCLES) is a quasi-governmental entity designated by the State Legislature to serve as a regional economic development center for Somerset, Wicomico and Worcester counties. Through a planned consolidation process to streamline services, Shore Transit has become the transportation department of TCCLES and is responsible for providing fixed route and demand response transit services to the public, elderly, and to persons with disabilities throughout the lower-shore region. 37 buses run in peak service. *FY 2021 ridership 152,777*	✓	✓
St. Mary's County St. Mary's Transit System (STS) provides fixed route services and connects with Charles County's VanGO and Calvert County Transit. St. Mary's Transit ADA Complementary Paratransit service and Statewide Specialized Transportation Assistance Program Services (SSTAP) is provided countywide serving the elderly and disabled, and citizens unable to use the fixed route services. 18 buses run in peak service. *FY 2021 ridership: 176,849*	✓	✓

LOTS	Fixed Route	Demand Response
Talbot/Caroline/Kent Counties (Delmarva Community Service) Delmarva Community Services (DCS) is a non-profit community service agency that has been designated by Talbot County to provide public transit service. DCS provides these services through its transportation operator - Delmarva Community Transit (DCT). DCT provides fixed route and demand response transit service to the public, the elderly, and to persons with disabilities. Also, DCT provides American with Disabilities Act (ADA) transportation services to people with disabilities who are unable to access a fixed route and are eligible for the service. The program has twenty (20) buses in peak service. *FY 2021 ridership: 33,579*	✓	✓
Washington County Washington County Transit operates all public transportation in Washington County. The system runs eight fixed urban routes in addition to multiple specialized services. WCT provides transportation for the elderly and persons with disabilities through a rider assist voucher program funded by SSTAP and ADA Complementary Paratransit service for individuals with disabilities who cannot access fixed route service. WCT also operates the Job Opportunity Access Program (JOBS) in cooperation with the Washington County Department of Social Services. 13 buses run in peak service. *FY 2021 ridership: 293,045*	✓	

1.2 FEDERAL TAM REQUIREMENTS

Federal regulations for transit asset management require transit service providers to establish performance measures and targets and develop a TAMP. The final TAM Rule was published on July 26, 2016 and went into effect on October 1, 2016. The rule itself amended the United States (U.S.) CFR Title 49 Parts 625 and 630, which relate to TAM and the National Transit Database (NTD) respectively.

The FTA Transit Asset Management Final Rule distinguishes requirements between large and small or rural transit agencies. Figure 1 summarizes the qualifications that determine whether a LOTS is classified as a Tier I or Tier II provider.

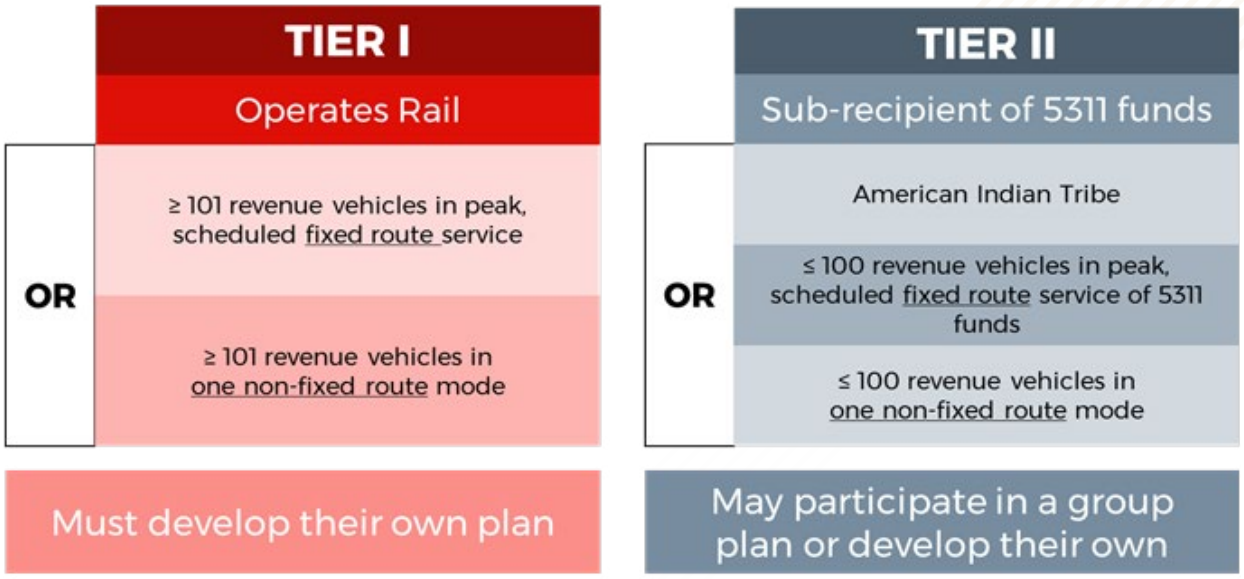

Figure 1. Comparison of Tier I and Tier II Qualifications

Due to the size and type of service provided, all LOTS covered in this TAMP are Tier II providers as identified in FTA TAM Final Rule. For these small transit providers (Tier II), MDOT MTA must sponsor a single Group TAMP the first of which was completed by October 1, 2018, in compliance with regulations. The Group TAMP participants collaborated with the MDOT MTA in developing the Plan.

Each LOTS designated an Accountable Executive to approve the Transit Asset Management Plan. As required by the FTA, TAMPs must be updated at least every four years, cover a minimum four-year period, and coincide with the Statewide Transportation Improvement Plan (STIP).

1.3 ORGANIZATION OF THE MDOT MTA GROUP TAMP

TAMP Required Contents:

- Inventory of capital assets
- Condition assessment
- Description of decision support tools used to prioritize needs
- Project-based prioritization of investments

This Group TAMP is organized into ten chapters following asset management best practice and incorporating the elements required by Federal Regulation (US 49 CFR 625). Table 2 identifies the federal rule requirements for Tier II Group Plans with the corresponding section in this TAMP. In addition to the required sections for Tier II providers, this Group TAMP also includes a Transit Asset Management Policy (Section 2) and a risk management process (Section 5), and an updated section addressing challenges and opportunities related to the ongoing industry transition to zero-emission vehicles, and the coronavirus global health pandemic of 2020 (COVID-19).

Table 2. Group TAMP Chapters and Content

U.S.49CFR625 Ref	Requirement	TAMP Section
A Tier II TAMP must include the following elements:		
49 CFR § 625.25 (b)(1)	Inventory of the number and type of all capital assets a provider owns, except equipment with an acquisition value under $50,000 that is not a service vehicle.	**Sec 4:** Capital Asset Portfolio
49 CFR § 625.25 (b)(1)	An inventory must also include third-party owned or jointly procured exclusive-use maintenance facilities, passenger station facilities, administrative facilities, rolling stock, and guideway infrastructure used by a provider in the provision of public transportation.	**Sec 4:** Capital Asset Portfolio
49 CFR § 625.25 (b)(2)	Condition assessment of those inventoried assets for which a provider has direct capital responsibility and to level of detail to monitor, predict performance of assets, and inform investment prioritization.	**Sec 3:** Levels of Service **Sec 4:** Capital Asset Portfolio
49 CFR § 625.25 (b)(3)	Description of analytical processes or decision-support tools to estimate capital investment needs over time and develop its investment prioritization.	**Sec 6:** Asset Lifecycle Strategies **Sec 8:** Work Plans & Budget Forecasts
49 CFR § 625.25 (b)(4)	Project-based prioritization of investments.	**Sec 8:** Work Plans & Budget Forecasts
When developing its investment prioritization, a provider must:		
49 CFR § 625.33 (a)	Identify a program of projects to improve or manage the state of good repair (SGR) of capital assets for which the provider has direct capital responsibility over the TAMP horizon period;	**Sec 8:** Work Plans & Budget Forecasts
49 CFR § 625.33 (b)	Rank projects to improve or manage the SGR of capital assets in order of priority and anticipated project year;	**Sec 8:** Work Plans & Budget Forecasts
49 CFR § 625.33 (c)	Ensure project rankings are consistent with its TAM policy and strategies;	**Sec 6:** Asset Lifecycle Strategies
49 CFR § 625.33 (d)	Give due consideration to state of good repair projects to improve those that pose an identified unacceptable safety risk;	**Sec 5:** Risk Management **Sec 8:** Work Plans & Budget Forecasts
49 CFR § 625.33 (e)	Take into consideration its estimation of funding levels from all available sources that it reasonably expects will be available in each fiscal year during the TAMP horizon period; and	**Sec 8:** Work Plans & Budget Forecasts
49 CFR § 625.33 (f)	Take into consideration requirements under 49 CFR 37.161 and 37.163 concerning maintenance of accessible features and the requirements under 49 CFR 37.43 concerning alteration of transportation facilities.	**Sec 6:** Asset Lifecycle Strategies

2. LOTS Asset Management Policy

The following language represents the Policy Statements already signed by the Accountable Executives of each LOTS. The policy was developed based the main MDOT MTA TAM Policy, and identifies the priorities of OLTS, the Maryland Department of Transportation Maryland Transit Administration (MDOT MTA), and the LOTS.

Whereas MDOT MTA is the designated recipient of federal transit funding in the State of Maryland and provides technical assistance to the LOTS throughout the state, this policy provides guidelines for MDOT MTA and each LOTS' overall asset management approach in a manner consistent with current federal regulations (49 U.S.C. 5326).

The following LOTS are subject to this policy:

- **Allegany County** (Allegany County Transit)
- **Anne Arundel County**
- **Baltimore City** (Charm City Circulator)
- **Baltimore County DPW&T** (CountyRide)
- **Calvert County** (Calvert County Transportation)
- **Carroll County** (Carroll Transit)
- **Cecil County** (Cecil Transit)
- **Charles County** (VanGo)
- **City of Annapolis** (Annapolis Transit)
- **Dorchester County** (Delmarva Community Transit)
- **Frederick County** (TransIT Services)
- **Garrett County** (Garrett Transit Service)
- **Harford County** (Harford Transit LINK)
- **Howard County** (Regional Transportation Agency)
- **Queen Anne's County** (County Ride)
- **St. Mary's County** (St. Mary's Transit System)
- **Talbot, Caroline, and Kent Counties** (Delmarva Community Transit)
- **Town of Ocean City** (The Bus)
- **Tri County Council for Lower Eastern Shore** (Somerset, Wicomico, and Worcester Counties Shore Transit)
- **Washington County** (Washington County Transit)

It is the policy of MDOT MTA and the aforementioned LOTS to effectively manage all capital assets and maintain each of their respective transit systems in a state of good repair. This policy sets the direction for establishing asset management strategies and plans that are achievable with available funds.

MDOT MTA and all LOTS commit to:

- ✓ Maintain an Asset Inventory that includes all vehicles, facilities, and equipment used in the delivery of transit service;
- ✓ Identify all Safety-Critical assets within the Asset Inventory and prioritize efforts to maintain those Safety-Critical assets in a state of good repair (SGR);
- ✓ Clearly define ownership, control, accountability, and reporting requirements for assets, including leased and third-party assets;
- ✓ Set annual asset performance targets and measure, monitor, and report on progress towards meeting those targets;
- ✓ Consider asset criticality, condition, performance, available funding, safety considerations, and the evaluation of alternatives that consider full lifecycle benefits, costs, and risks in capital project prioritization and other asset management decisions; and
- ✓ Maintain a group asset management plan, in coordination with MDOT MTA and LOTS safety policies and plans, as a means of delivering this policy.

Each LOTS' asset management program applies to all modes of service and will be monitored by the MDOT MTA OLTS. It is the responsibility of each MDOT MTA and LOTS employee to support the achievement of the goals and objectives established by this policy. OLTS can be contacted to provide signed copies of the policy.

3. Levels of Service

Levels of service refers to the measurement of transit performance from two different perspectives: operating performance measurement and asset performance measurement. Operating performance measures involve costs to deliver service, passenger utilization of services, and operating assistance. These metrics indicate the degree to which the LOTS are efficiently providing service. Asset performance measures relate to technical characteristics of the assets in line with federal regulation and expectations; specifically, asset condition, age and useful life related to target performance.

3.1 OPERATING PERFORMANCE MEASUREMENT

The 20 LOTS included in this Group TAMP serve an average of about 6.8 million riders each year. Table 3 provides total ridership (unlinked passenger trips) from FY19 to FY21, showing that ridership has decreased over this period. The drastic decrease from FY19 to FY20 is largely attributed to the coronavirus disease (COVID-19) global pandemic, a consistent trend in transit experienced by most cities and providers. Service performance data from FY19 through FY21 shows that total ridership has declined by 57 percent.

Table 3 Ridership Metrics (FY19-FY21)

Total Ridership		
FY 2019	**FY 2020**	**FY 2021**
9,475,961	6,843,417	4,043,264
Average Annual Ridership		6,787,547

In addition to ridership, the OLTS and the LOTS use the following operating metrics to assess performance on an annual basis:

- **Operating Cost per Hour:** how much it costs an agency to provide an hour of revenue service on average. An agency's total operating costs divided by its total service hours equals operating cost per hour.
- **Operating Cost per Mile**: how much it costs an agency to provide one mile of service on average. An agency's total operating costs divided by its total revenue service miles equals operating cost per mile.
- **Operating Cost per Passenger Trip**: how much it costs an agency to provide a single trip for a single customer on average. An agency's total operating costs divided by total unlinked passenger trips equals operating cost per passenger trip.
- **Local Operating Revenue Ratio:** a measure of an agency's local operating revenues relative to its operating costs on average. This metric gives an indication of financial stability. An agency's local operating revenue is equal to the sum of its farebox receipts, advertising revenues, and other local operating revenues such as rebates and warranties. The local operating revenue ratio is calculated by dividing the agency's total local operating revenue by its total operating costs.
- **Farebox Recovery Ratio:** a measure of an agency's fare revenues relative to its operating costs on average. This metric provides insight regarding financial stability. An agency's farebox recovery ratio is calculated by dividing its total farebox receipts by its total operating costs.
- **Passenger Trips per Mile:** how many passengers utilize a service on a per mile basis. This metric gives an indication of service route efficiency. Passenger trips per mile is calculated by dividing total passenger trips by total revenue service miles.
- **Passenger Trips per Hour:** how many passengers utilize a service on an hourly basis. This metric gives an indication of service schedule efficiency. Passenger trips per hour is calculated by dividing total passenger trips by total revenue service hours.
- **Fatalities:** the total number of reportable deaths.
- **Injuries:** the total number of reportable injuries.
- **Safety Events:** the total number of reportable events (accidents and incidents).

Table 4 summarizes the operating performance for the LOTS in FY 2019, FY 2020, and FY 2021 and the National Average for FY18-FY20. The numbers shown in the table represent the average performance for all LOTS included in this Group TAMP.

Table 4. Operating Levels of Service

Performance Measure	FY 2019 Average	FY 2020 Average	FY 2021 Average	National Average (FY 18-FY20)[1]
Operating Cost per Hour ($/hour)	$58.5	$64.8	$63.8	$93.20
Operating Cost per Mile ($/mile)	$4.3	$4.8	$5.2	$1.43
Operating Cost per Passenger Trip ($/trip)	$13.7	$17.6	$28.7	$9.96
Local Operating Revenue Ratio (%)	29%	29%	25%	-
Farebox Recovery Ratio (%)	12%	10%	7%	12%
Passenger Trips per Mile (trips/mile)	0.69	0.55	0.37	0.63
Passenger Trips per Hour (trips/hour)	7.6	6.3	3.9	10.0
Fatalities (per billion trips)	0	0	0	0
Injuries (per million trips)	2	5	1	1
Reportable Incidents (per million trips)	3	2	4	2

As shown, the LOTS have realized an increase in operating cost per hour, per mile and per passenger trip since FY19. Although, the local operating revenue ratio remained steady from FY19 to FY20, the ratio decreased by 4 points from FY20 to FY21. The farebox recovery ratio has steadily declined from FY19 to FY21 as have passenger trips per mile and passenger trips per hour. Safety operating measures show consistently low rates, which is typical of many small agencies. Fortunately, none of the LOTS experienced any fatalities over the three-year period. Note that many LOTS experienced zero fatalities, injuries, or safety events over the three-year period, so a major incident or accident at just one LOTS can have a significant impact on the overall group safety performance.

Table 4 shows that while the LOTS agencies' operating cost per hour is significantly less than the National Average for similar-sized agencies that operate less than 100 vehicles in peak service for most of the measures., the operating cost per mile and per passenger trip is relatively higher than the National Average.

These operating levels of service are important in the context of asset management for several reasons. The ability to maintain assets in good condition can support high levels of reliability in service provision. Furthermore, with cost-effective decision-making as a key principle in asset management, financial prudence is essential, as it affects a provider's financial capacity to maintain its assets. Good practice is to be diligent in ensuring financial stability, which includes analyzing operating costs and revenues to identify potential areas for improvement.

3.2 ASSET PERFORMANCE MEASUREMENT

The FTA requires tracking specific performance measures for each asset category to monitor whether

1 Includes only agencies comparable to the Tier II LOTS, i.e. that operate fewer than 100 vehicles at maximum service (VOMS). National average was calculated using the most recent NTD data.

the assets are in a state of good repair (SGR). Table 5 shows the required performance indicators and measures by asset category. Note that performance measures are applied by asset class and targets must be set for each asset class within the category.

Table 5. Performance Measures and Targets by Asset Category

Asset Category	Performance Indicator	Performance Measure
Rolling Stock *All revenue vehicles*	Age	% of revenue vehicles that have met or exceeded their ULB by asset class
Equipment *Non-revenue vehicles*	Age	% of non-revenue vehicles that have met or exceeded their Useful Life ULB
Facilities *All buildings or structures*	Condition	% of facilities with a condition rating below 3.0 on the FTA Transit Economic Requirements Model (TERM) Scale

For vehicles, "ULB is defined as the expected lifecycle or the acceptable period of use in service for a particular transit provider's operating environment. It takes into account a provider's unique operating environment (e.g., geography, service frequency, passenger loads, etc.)."[2] All participants share the same ULBs in a group plan. Vehicles that have aged beyond their ULB are considered to not be in a state of good repair.

It is important to distinguish between useful life and ULB. Generally, useful life determines the minimum age at which an asset becomes eligible to be replaced or disposed. In contrast, ULB is a projection for when an asset ought to be replaced once it has surpassed its useful life but remains in use until replaced. Figure 2 illustrates the relationship between the two terms.

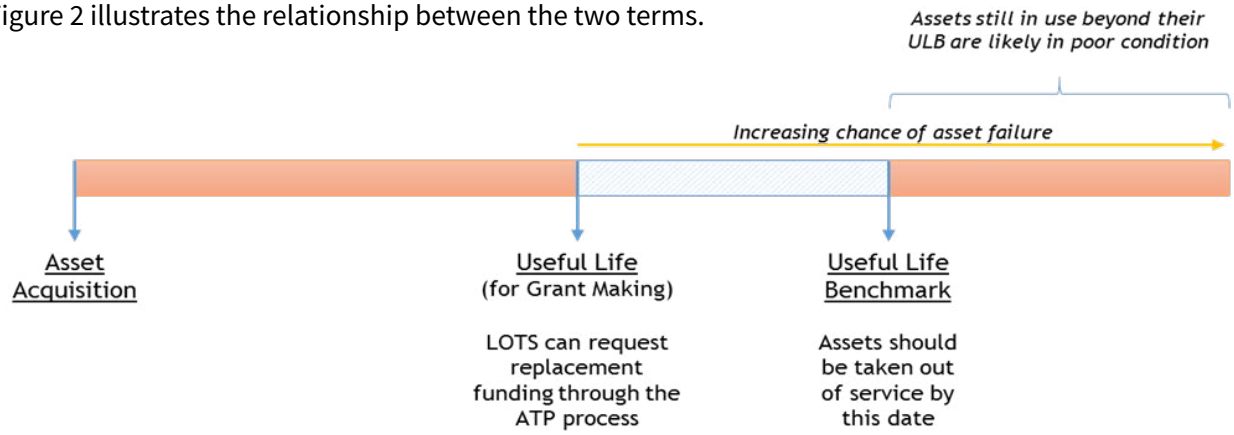

Figure 2. Useful Life versus Useful Life Benchmark Timeline

Facility condition is measured using the FTA's TERM condition scale (Figure 3). Facility condition is determined either by a physical condition assessment or by aged-based analysis in the TERM Lite tool[3]. While this Plan presents facility condition as determined by using the TERM Lite age-based model, all facilities will undergo a physical condition assessment over the next four years, in compliance with federal regulations.

2 *2017 LOTS Manual definition*
3 *Transit Economic Requirements Model tool available through FTA at https://www.transit.dot.gov/TAM/TERMLite*

Facility SGR

Rating	Condition	Description
5	Excellent	No visible defects, new or near new condition, may be under warranty if applicable
4	Good	Good condition, but no longer new, may have some slightly defective or deteriorated component(s), but overall is functional
3	Adequate	Moderately deteriorated or defective components; but has not exceeded useful life
2	Marginal	Defective or deteriorated component(s) in need of replacement; exceeded useful life
1	Poor	Critically damaged component(s) or in need of immediate repair; well past useful life

Figure 3. TERM Condition Rating Scale for Facilities

Federal regulations require MDOT MTA to set asset management performance targets for group plan participants each fiscal year for implementation in the following fiscal year. The target-setting process involves:

1. Evaluating current performance for each asset class;
2. Assessing funding availability and performance scenarios based on available funding;
3. Selecting annual performance targets for each asset class for the next fiscal year.

4. Capital Asset Portfolio

The Tier II LOTS capital asset portfolio includes revenue vehicles, facilities, and equipment (including non-revenue vehicles). MDOT MTA's policy for Tier II LOTS is to include mission critical equipment regardless of value, and maintenance and other equipment valued over $15,000 or integral to the public transportation system or network.

INVENTORY	CURRENT PERFORMANCE
671 revenue vehicles	22.2% at or past ULB
46 facilities	0.0% in poor condition
353 equipment	27.5% at or past ULB

4.1 CAPITAL ASSET INVENTORY

The following tables provide a summary of the capital asset inventory covered in this TAMP (inventory snapshot at the end of FY21) with a crosswalk between nomenclature for NTD asset types and MDOT MTA asset types. As shown in Table 6, most revenue vehicles are cutaway buses, representing 51 percent of the total revenue vehicle inventory, with heavy and medium duty buses at 41 percent.

At the end of FY21, Tier II LOTS had a total of 46 facilities for which they have capital responsibility, which includes five (5) passenger/parking facilities (Table 7). FTA's Facility Performance Measure Reporting Guidebook defines a facility as a single building; for sites that have multiple buildings, each building is considered a facility. In addition, the FTA Guidebook's definition of a passenger facility excludes bus shelters and canopies. Since most of the LOTS' passenger facilities are bus shelters and canopies, these assets are excluded from consideration in this Group TAMP.

Table 6. Revenue Vehicles Inventory

NTD Vehicle Type	MDOT MTA Vehicle Type	Quantity
Bus	Large Heavy-Duty Bus	274
	Medium Heavy-Duty Bus	
	Medium-Duty Bus	
Articulated Bus	Articulated Bus	5
Cutaway Bus	Light-Duty Bus	342
Automobile	Accessible Car	11
Van	Accessible Van	19
Minivan	Minivan	15
Trolleybus	Trolleybus	1
Ferry Boat	Passenger Ferry	4
Totals		**671**

Table 7. Facilities Inventory

Facility Type	Quantity
Administrative/ Maintenance*	41
Passenger/ Parking	5
Totals	**46**

**Administrative also includes operational facilities*

Table 8 summarizes the Tier II LOTS equipment inventory by NTD asset type and MDOT MTA asset type. Non-revenue vehicles (including trucks and support vans) make up 30 percent of the total equipment inventory, and 14 percent of the total vehicle inventory (i.e. revenue and non-revenue).

Table 8. Equipment Capital Inventory

NTD Equipment Type	MDOT MTA Equipment Type	Quantity
Communications	Phone System	3
	Radio	48
	Safety and Security	13
Revenue Collection	Revenue Collection	38
Intelligent Transportation Systems (ITS)	ITS	64
Non-Revenue Vehicles	Non-Revenue Vehicles	105
Other Equipment	Maintenance Equipment	82
TOTAL		**353**

Collectively Tier II LOTS manage an asset inventory base of over $300 million in replacement value (2021 dollars) with an average of about $15 million per LOTS. Note that costs for facilities are adjusted for percent used for transit if shared with other non-transit services. Figure 4 and Table 9 summarize the value of the asset portfolio by asset category and class. Facilities represent the largest category by cost, an estimated replacement value of $154.1 million, which comprises 51 percent of the asset base. Revenue vehicles have an estimated replacement cost of $124.7 million, and 42 percent of the overall asset base and equipment assets are $21.8 million (7 percent of the asset base). This represents an increase in the value of the Tier II asset portfolio from 2020.

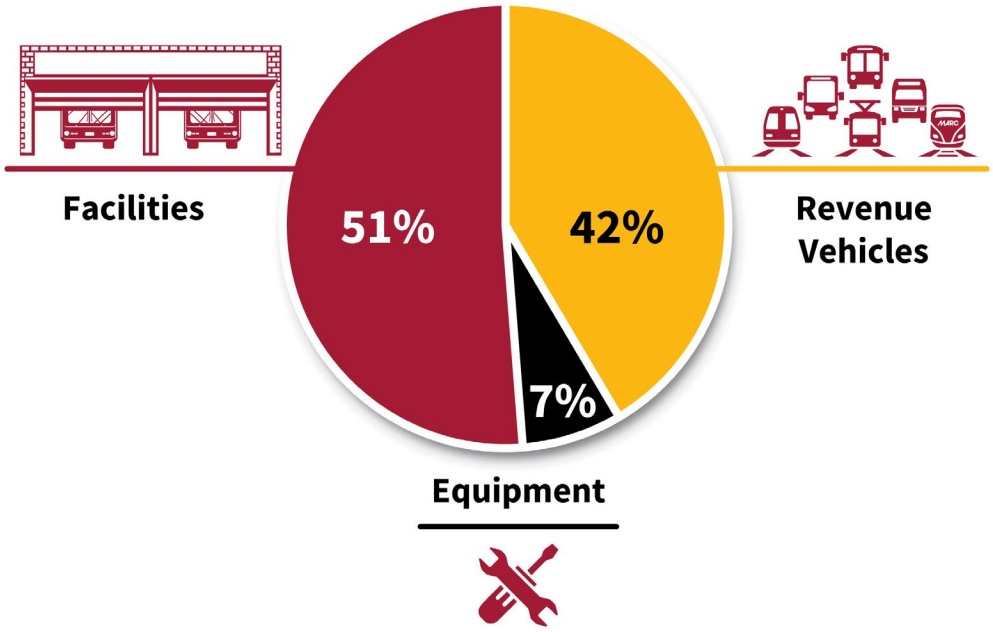

Figure 4. Asset Category Breakdown by Replacement Value (2021 dollars)

Table 9. Asset Replacement Value by Type/ Category (2021 dollars)

Asset Category/Type	Total Replacement Value/ Cost (2021 $)	% of Asset Base (by Cost)
Revenue Vehicles	**$124,782,014.88**	**41.6%**
Articulated Buses	$3,698,706.33	1.2%
Automobile	$370,677.56	0.1%
Bus	$90,717,393.84	30.1%
Cutaway Bus	$25,956,222.57	8.8%
Ferry Boat	$1,767,161.11	0.6%
Minivan	$507,304.53	0.2%
Trolleybus	$770,794.87	0.3%
Van	$993,754.07	0.3%
Equipment	**$21,897,808.18**	**7.3%**
Non-Revenue Vehicles	$3,778,074.87	1.3%
Communications	$1,959,924.63	0.7%
Revenue Collection	$1,343,992.60	0.4%
ITS	$3,366,949.14	1.1%
Maintenance Equipment	$11,448,866.94	3.8%
Facilities	**$154,143,337.16**	**51.2%**
Administrative/Maintenance*	$120,469,608.83	40.0%
Passenger/Parking	$33,673,728.33	11.2%
Total	**$300,823,160.22**	**100.00%**

** Administrative also includes operational facilities*

4.2 ASSET CONDITION

Condition assessment of LOTS' assets is currently based on age, except for facilities assets which are assessed through physical condition assessments. For facilities assets, age-based assessments were initially conducted using the FTA's TERM Lite tool; however, between 2017 and late 2019, physical condition assessments were conducted for all LOTS facilities except for two new Ocean City facilities constructed/commissioned in 2019 after the last round of inspections were completed. Since this TAMP captures asset condition as of the end of FY21, condition assessments for those two new facilities and any other changes that occurred during FY2022 are not captured in this TAMP.

Table 10 provides information on the end of FY21 performance metrics for Tier II LOTS revenue vehicles, showing approximately 22 percent of all revenue vehicles are at or past their ULB (i.e. in poor condition). Although Automobiles and Ferry Boats make up relatively low percentages of revenue vehicles (2 percent and 1 percent), they have the highest percentages in poor condition (63.6 percent and 75 percent).

Table 10. Revenue Vehicles Current Performance

Asset Class	ULB (Years)	Total Vehicle Quantity	Quantity at or past ULB	Percent at or past ULB
Bus	Various	274	57	20.8%
Articulated Bus	14	5	0	0%
Cutaway Bus	8	342	79	23.1%
Automobile	7	11	7	63.6%
Van	7	19	1	5.3%
Minivan	7	15	2	13.3%
Trolleybus	12	1	0	0%
Ferry Boat	10	4	3	75.0%
Total	**N/A**	**671**	**149**	**22.2%**

Table 11 provides information on current performance metrics for Tier II LOTS equipment, which includes non-revenue vehicles. Like revenue vehicles, equipment performance is determined based on the percentage of assets at or past their ULB. As shown, the equipment asset category has approximately 27 percent of assets at or past their ULB. While this table shows the condition for all equipment asset classes, condition assessments (and corresponding targets) are only required for non-revenue vehicles. Altogether, 48 percent of non-revenue vehicles are at or past their ULB.

Table 11. Equipment Current Performance

Asset Class	MDOT MTA Equipment Type	ULB (Years)	Total Equipment Quantity	Quantity at or past ULB	Percent at or past ULB
Communications	Phone System	12	3	2	66.7%
	Radio	10	48	17	35.4%
	Safety and Security	20	13	0	0.0%
Revenue Collection	All	12	38	0	0.0%
ITS	All	12	64	15	23.4%
Other Equipment	Maintenance Equipment	Various	82	13	16.0%
Trucks and Other Rubber Tire Vehicles	Non-Rev Vehicle, Support Car Truck, Support Van	10	105	50	47.6%
Total	**N/A**	**N/A**	**353**	**97**	**27.5%**

Table 12 provides information on the current performance for Tier II LOTS facilities. Facilities performance is determined based on the percentage of facilities with an overall condition rating less than three on the TERM scale. For this plan, about 3 percent of facilities scores are based on the TERM Lite age-based analysis and the remaining 97 percent of facilities have scores obtained from a physical condition assessment. As shown in the table, of the 46 total facilities with capital responsibility, no facilities assets are in poor condition.

Table 12. Facilities Current Performance

NTD Facility Type	Total Facility Quantity	Quantity Below 3 TERM Rating	Percent Below 3 TERM Rating
Administrative/Maintenance*	41	0	0.0%
Passenger/Parking	5	0	0.0%
Total	**46**	**0**	**0.0%**

**Administrative also includes operational facilities*

4.3 TERM LITE ANALYSIS OF TIER II LOTS ASSET CONDITION

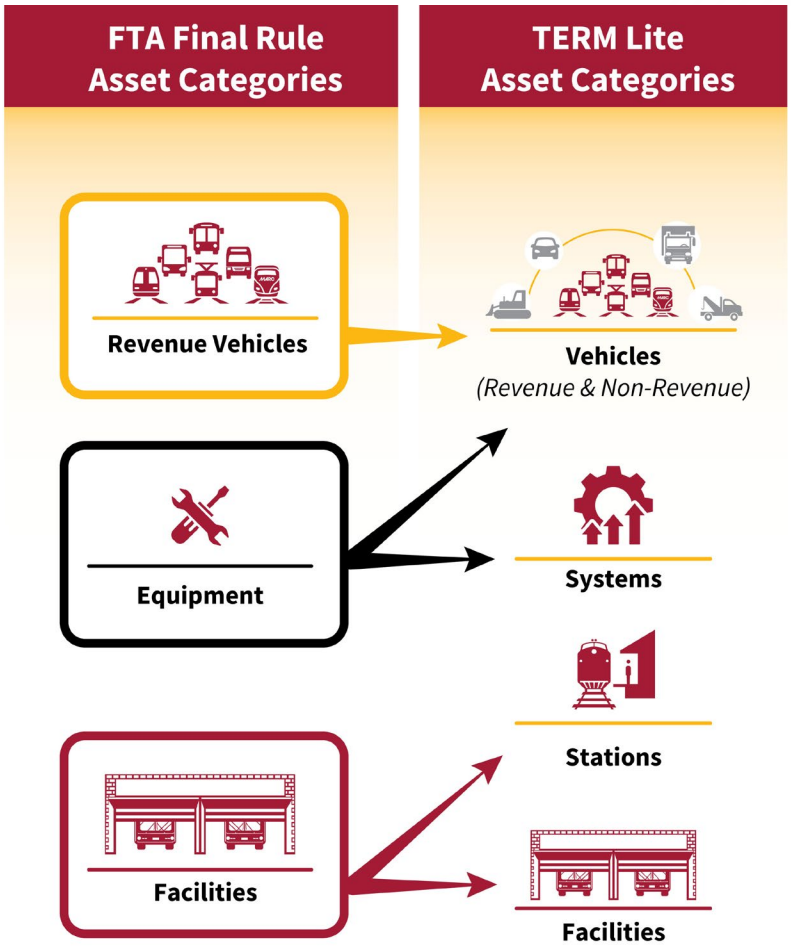

Figure 5. Crosswalk Between FTA and MDOT MTA

MDOT MTA utilizes the FTA TERMLite program as a key tool to support decisions throughout the asset management process. The primary use of the tool is to assess the asset portfolio's age-based condition and predict future condition and investment needs. This section provides a report of the total asset portfolio condition based on the TERMLite analysis to establish the anticipated needs to maintain Tier II LOTS assets in a state of good repair.

In the preceding sections, asset condition reporting is directly tied to federal regulations, using federally mandated asset categories and asset definitions. In this section, the analysis uses the asset category breakdown built into the TERMLite tool. Figure 5 provides a crosswalk between the FTA asset categories and the TERMLite categories that MDOT MTA has historically used.

Table 13 provides additional insight regarding the condition of the asset inventory (by cost), showing the percentage of assets at or past their ULB by asset type, category, and overall. Based on the TERMLite analysis, the total replacement value of LOTS transit assets beyond their ULB is estimated to be $44 million in 2021 dollars. This SGR backlog is about 15 percent of all Tier II LOTS assets by cost. This current backlog shows a reduction of about $14 million since last year's TAMP, as a result of improved data quality and investments in critical asset categories. Figure 6 summarizes the distribution of SGR backlog across the three asset categories.

Table 13. Asset Condition by Cost (Backlog)

Asset Category/Type	Total Replacement Value/Cost (2021 $)	Value of Assets at or Past ULB (2021 $)	% of Assets at or Past ULB
Revenue Vehicles	**$124,782,015**	**$22,412,523**	**18%**
Articulated Buses	$3,698,706	$0	0%
Automobile	$370,678	$253,315	68%
Bus	$90,717,394	$14,896,732	16%
Cutaway Bus	$25,956,223	$5,848,436	23%
Ferry Boat	$1,767,161	$1,306,519	74%
Minivan	$507,305	$66,370	13%
Trolleybus	$770,795	$0	0%
Van	$993,754	$41,151	4%
Equipment	**$21,897,808**	**$4,252,307**	**19%**
Non-Revenue Vehicles	$3,778,075	$1,778,660	47%
Communications	$1,959,925	$278,376	14%
Revenue Collection	$1,343,993	$0	0%
ITS	$3,366,949	$333,541	10%
Maintenance Equipment	$11,448,867	$1,861,730	16%
Facilities	**$154,143,337**	**$17,377,431**	**11%**
Administrative/ Maintenance*	$120,469,609	$11,778,147	10%
Passenger/Parking	$33,673,728	$5,599,284	17%
Total	**$300,823,160**	**$44,042,261**	**15%**

**Administrative also includes operational facilities*

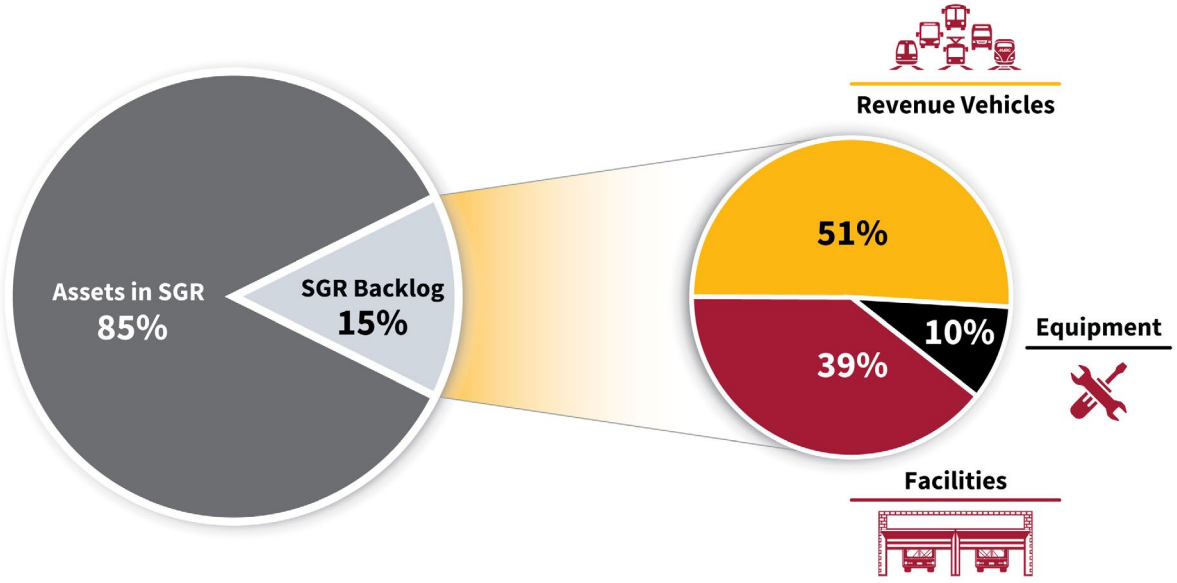

Figure 6. SGR Backlog Distribution by Asset Category (2021 dollars)

Most of the Tier II LOTS backlog is made up of revenue vehicle assets at an estimated value of $22.4 million – 51 percent of the total SGR backlog and 18 percent of the revenue vehicle asset base by cost. This is a reduction of approximately $17.1 million in the revenue vehicles backlog since 2020. The facilities backlog, at approximately $17 million, comprises 39 percent of the total SGR backlog and 11 percent of the facilities asset base by cost. This represents a $2.4 million increase in the facilities backlog since 2020. It is important to note that the TERMLite facilities condition assessment is based on the age of individual facilities components (e.g. roof, HVAC, etc.), as opposed to the overall condition assessment calculated for the physical condition assessments (Table 12). Equipment assets (including non-revenue vehicles) have the lowest value of assets beyond their ULB by cost ($4.2 million), representing 10 percent of the total SGR backlog and about 19 percent of the total value of equipment assets. The equipment assets backlog has slightly increased since 2020, likely due to additional assets being classified as equipment in comparison to the 2020 TAMP.

Figure 7 shows the amount of funding investment necessary to clear the current asset backlog for Tier II LOTS and maintain all assets in good condition (i.e. maintain a $0 backlog) for a 20-year period. This projection of unconstrained needs is shown by TERMLite asset category (facilities, vehicles, systems and stations) with an initial investment of $57.1 million in 2022 (which covers the current backlog and other replacements to prevent any additional backlog). While the 20-year average unconstrained investment need is approximately $25.6 million, significant peaks are expected in 2025 ($34.6 million), 2030 ($34.7 million), 2033 ($38.2 million) and 2039 ($45.9 million) primarily driven by sizeable projections for vehicle replacements. Over the 20-year projection period, total unconstrained needs for vehicles, facilities, systems, and stations are estimated to be $327.0 million, $167.5 million, $17.1 million and $0.9 respectively, for a total of $512.3 million.

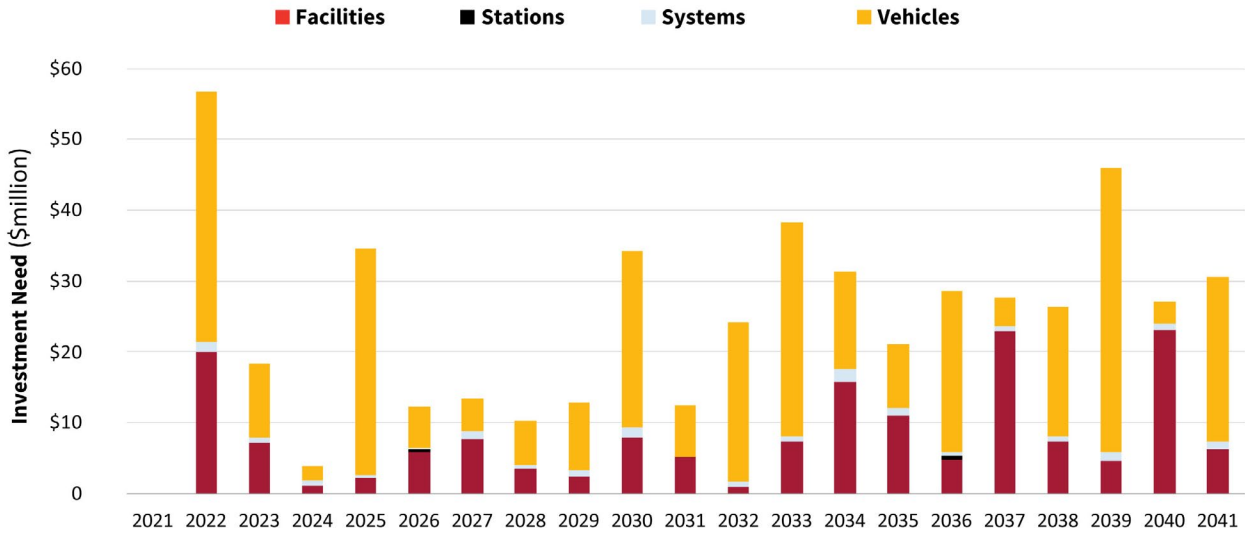

Figure 7. Unconstrained Needs by Category (Year of expenditure (YOE) dollars, Calendar Year (CY))

4.4 FY 2022 PERFORMANCE TARGETS

Based on the reported asset condition at the end of FY21, targets were set for each asset class taking the projected funding levels into consideration. Table 14 summarizes FY 2021 targets, FY 2021 performance and FY 2022 targets for Tier II LOTS assets. Targets have been set based on the anticipated funding availability and the priorities of both the LOTS and MDOT MTA for capital investment. As shown in the table, nine performance targets were met in FY21 with actual performance coming in either at or below the target percent past ULB. While this table does not show this, it is important to note that the Useful Life Benchmarks (ULBs) for some of the LOTS revenue vehicles asset types have been adjusted to better match the operating environment of the LOTS and the state useful life for grantmaking. The primary reason for several revenue assets not meeting their FY21 target was because of the change in ULB, especially in the case of Buses and Cutaway Buses, as well as data quality improvements to correct the categorization of specific assets (e.g. between vans and minivans). With improved data quality and more meaningful ULBs, the LOTS group can make a more reasonable effort towards ensuring the progress towards the targets continues in FY22.

Table 14. FY 2021 Target Asset Performance for All Vehicles

NTD Vehicle Type	FY21 Target	FY21 Performance	FY22 Target
Revenue Vehicles			
Articulated Bus	0%	0%	60%
Automobile	64%	64%	100%
Bus	18%	21%	22%
Cutaway Bus	32%	24%	28%
Ferryboat	75%	75%	75%
Minivan	0%	13%	19%
Trolleybus	-	0%	0%
Van	28%	5%	11%
Equipment			
Automobile	60%	41%	47%
Trucks and Other Rubber Tire Vehicles	42%	53%	57%
Facilities			
Administrative/Maintenance*	0%	0%	0%
Passenger/Parking	0%	0%	0%

**Administrative also includes operational facilities*

5. Asset & Safety Risk Management

While federal regulations do not require formalized risk management processes as part of a transit agency's asset management practice, incorporating a risk management process into asset lifecycle management supports the goals of asset management. Identifying, evaluating, and managing asset and safety risks, and developing a risk management strategy that informs capital investment prioritization represents good practice for ensuring that assets are maintained in a state of good repair.

MDOT MTA has adopted a risk management framework following the ISO risk management standard ISO31000, which defines the five-step risk management approach shown in Figure 8. For the LOTS, federal safety management regulations require a safety risk management methodology that focuses on identifying, evaluating, and mitigating safety risks. This Group TAMP defines a blended asset management and safety risk process which incorporates asset and safety risk management into the asset lifecycle management process. The adopted risk management framework identifies two categories of risks: enterprise risks and project level risks. Enterprise risks are high-level, organization wide risks which may constrain the general asset management processes or the development of an effective asset management strategy. These risks may also have broad impacts on the entire Tier II LOTS group, or one or more agencies, potentially affecting areas aside from strictly asset management (e.g. reputation). In contrast, project level risks are risks associated with a specific asset or groups of assets represented in the form of a capital project or program (e.g. system wide elevators/escalators), whether at one or multiple LOTS.

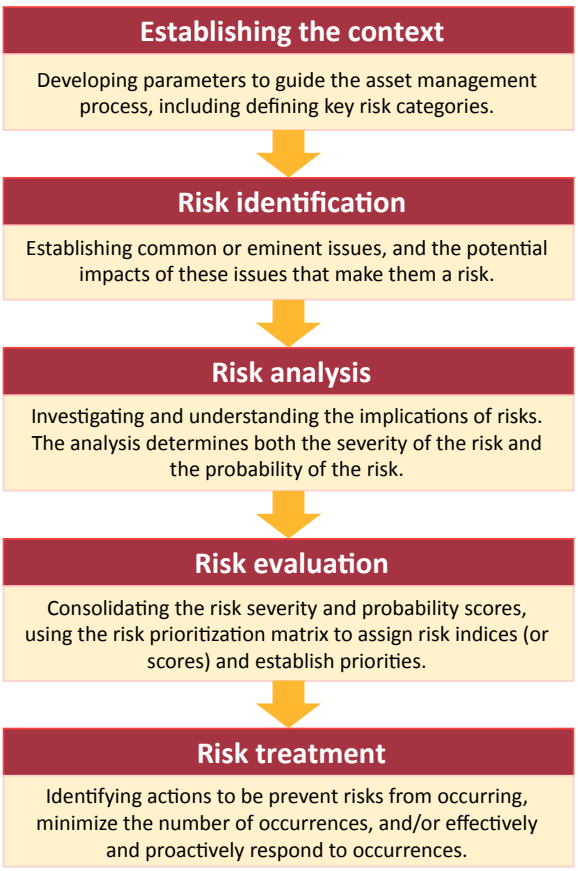

Figure 8. ISO 31000 Risk Management Process

Enterprise and project level risks were identified by the LOTS collectively and evaluated using the risk management matrix shown in Figure 9. Risks are prioritized based on their probability of occurrence and the severity of the consequences. In addition, risk mitigation strategies were identified for those risks that require action. As the LOTS asset management process and practice continuously evolves, these risk scores will be incorporated into the investment prioritization process to help identify projects that alleviate or mitigate the consequences of any risks.

LEGEND

Unacceptable
- Cannot be accepted as is, must be mitigated

Undesirable
– Should be mitigated, or can be accepted with Executive Management concurrence

Acceptable
– with Technical Review (must identify who signs off)

Acceptable without further review

Risk Indices

Probability	Severity Category: 1 Catastrophic	2 Critical	3 Moderate	4 Minor	5 Insignificant
A Frequent	1A	2A	3A	4A	5A
B Probibale	1B	2B	3B	4B	5B
C Occasional	1C	2C	3C	4C	5B
D Remote	1D	2D	3D	4D	5D
E Improbable	1E	2E	3E	4E	5E

Figure 9. Risk Prioritization Matrix

5.1 ENTERPRISE RISKS

Collectively, the LOTS identified the following enterprise risks that can affect their operations (Table 15). As the process continuously evolves, these risk scores will be incorporated into the investment

prioritization process to help identify projects that alleviate or mitigate the consequences of any risks.

Table 15. 2022 Enterprise Risks

Number	Category	Risk	Risk Score	Mitigation
E1	**Human Resources**	**Staffing Shortages** Shortage of qualified (CDL) drivers and other staff impacting the ability to provide service.	**2B**	• Provided CDL Training and hire non CDL Drivers. • Increase bonuses, referral bonuses, incentives to entice drivers to your service. • Increase advertising and recruitment. • Allow for an increase in overtime.
E2	**Financial**	**Inflation** Inflation or increased expenses force LOTS to reduce service	**2C**	• Use CARES funding • Find new funding sources • Consolidate routes/services • Explore micro-transit as a more affordable option • Conduct cost/benefit analysis on micro-transit to assess value compared to fixed route services
E3	**External**	**ZEV transition** Possible legislation or mandates from Federal or State governments may strain LOTS funding.	**2C**	• Engage with decision makers early and often to ensure transit is a stakeholder from the beginning • Partner with other County agencies to help fund potential vehicle costs • Investigate and estimate potential costs against existing funding availability
E4	**External**	**Impact of COVID on ridership** Sustained reduced ridership due to COVID may lead to continued reduction in funding available	**2C**	• Investigate fund braiding and nontraditional funding and revenue sources • Investigate new services/new locations/new service delivery models that can be added or modified • Figure out why ridership is reduced and utilize strategies to return to average ridership

Number	Category	Risk	Risk Score	Mitigation
E5	**Financial**	**Funding** Insufficient funding to cover operational expenses	**2C**	• Use CARES funding • Find new funding sources • Partnerships with employers or social service agencies • Evaluate workforce, look at union contracts, potentially bargain to reduce costs • Reduce hiring where possible
E6	**Financial**	**Insufficient county-level funds to match federal and state funding** Many federal funding programs are contingent on the local jurisdictions' ability to provide a local match. Some LOTS have difficulty coming up with the local match, which puts the LOTS in jeopardy of losing federal funding.	**2C**	• Local governments can increase taxes • A small portion in the increase of property tax revenue could be set aside for transportation funding • Increase parking rates • Improve relationship with local governments to prevent funding cuts
E7	**Operational**	**Changing demographic of riders and the developing population (medical services)** A growing senior population results in increased demand for ADA service. This demand increase may require additional inventory needs (more ADA compliant vehicles) or additional service needs (more frequent service to medical facilities and other services heavily utilized by seniors).	**3B**	• Provide travel training to get ADA passengers on fixed route • Look for additional funding sources • Analyze ridership to look for efficiencies

Number	Category	Risk	Risk Score	Mitigation
E8	External	**Unexpected demand on existing transit system** Economic development (such as the opening of a new job center), political influences, and other unexpected factors may prevent LOTS from delivering the appropriate level of service for customer demand.	3C	• Operationalize efficiencies and restructure operations to reflect these needs • Review routes with low ridership to see if they can be reallocated • Partner with community organizations, human services providers, and/or other departments/ agencies to balance demand (e.g. paratransit riders, employer shuttles, human services + specialized providers)
E9	External	**Political Turnover** Change in elected officials may change local policies that affect transit service provisions	3C	• Inform your new leadership about your service delivery model: how it works, where it works, how it's funded, why it's important • Engage with community groups who are able to advocate on your behalf and ensure the critical service continues
E10	Human Resources	**Leadership Turnover** During leadership transitions (e.g. due to political appointments), lack of succession planning and leadership development result in loss of institutional knowledge and other complications related to efficient operations.	3C	• Improve written policies and procedures • Cross training with leaders and team • Succession planning
E11	Human Resources	**Driver Safety** Increased assaults on LOTS' drivers creating safety risks.	3C	• Advocate for stricter laws • Install barriers • De-escalation training • Sensitivity training

Number	Category	Risk	Risk Score	Mitigation
E12	Information Technology	**Cyber attack & computer hacks** Increasing connectivity and usage of internet tools may expose weaknesses in LOTS cyber security resulting in property damage and a need to rebuild systems.	3D	• Consider employee training to assist preventing hacks (e.g. identifying suspicious e-mails and eliminating personal use of work computers) • Work with IT to develop effective safeguards • Utilize antivirus, malware, etc. security programs and maintain them • Reduce access to systems to needed personnel only
E13	Financial	**Difficulties maintaining operational budget efficiency** Rising operational costs such as fuel and overtime costs, may lead to reduced financial stability.	3D	• Review budget line items quarterly to proactively address unexpected inflation • Re-evaluate and re-prioritize planned projects/tasks based on immediate needs to accommodate rising operational costs • Include a calculated inflation multiplier to annual budgets
E14	Financial	**Insufficient funding and procurement mechanisms** Insufficient funding and procurement mechanisms to maintain rolling stock and associated equipment in a SGR, threaten asset performance and service reliability.	3D	• Pursing more federal discretionary grants • Exploring opportunities to secure the local match to federal funds

Number	Category	Risk	Risk Score	Mitigation
E15	Operational	**Resource capability and competence** Lack of qualified personnel to support new mandates, and an undisciplined workforce impact operating and asset performance.	4C	• Collaborate with Human Resources to ensure competence specific descriptions are advised and qualified personnel are hired • Ongoing on-site training to personnel • Engage with a third-party company for redundancy when workforce is impacted • Develop formal or informal inter-LOTS peer exchange network (e.g. mentor/mentee program) to facilitate growth
E16	Information Technology	**Implementation of new transportation technologies** LOTS struggle to prepare for/adapt to the influx of new transportation technologies (fare collection, apps, etc.), which impacts service reliability and performance and the management of related new assets.	4C	• Training (employees and customers) such as training videos, QR codes, mailings to help customers acclimate to new technology and how to use • Run both simultaneously, crossover while learning new
E17	Financial	**Fare evasion** When passengers utilize LOTS services without paying the fare, revenue available to properly maintain service is reduced.	4E	• Calculate revenue lost from passengers who utilize LOTS services without paying. • Include buffer into maintenance budgets to allow for deficiency.

5.2 PROJECT LEVEL RISKS

The risk register below (Table 16) identifies project level risks, impacts and potential mitigation strategies, arranged in order of risk priority. As the process continuously evolves, these risk scores will be incorporated into the investment prioritization process to help identify projects that alleviate or mitigate the consequences of any risks.

Table 16. 2022 Project-Level Risk Register

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P1	Supply chain shortages	Assets	• Supply chain shortages of chassis, microchip, and other parts resulting in difficulties maintaining assets in good condition	2B	• Develop new business/ community partnerships • Network amongst peer agencies • Fleet consistency when ordering • "Cannibalize" buses/parts as needed • Source parts from salvage yards
P2	Delay in receiving replacement buses	Operational	• Delays in receiving replacement busses may reduce the service reliability of the existing fleet	2C	• Interim engine/transmission replacements • Borrow buses from other transit agencies • Increase headways on some routes • Modify service
P3	Vehicle manufacturing and delivery delays	Operational	• Delays in manufacturing and delivery may leave LOTS with a shortage of vehicles and difficulties maintaining maintenance standards on the existing fleet	3B	• Interim engine/transmission replacements • Borrow buses from other transit agencies • Increase headways on some routes

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P4	Vehicles exposed to severe weather	Assets	• Damage sustained from severe weather events may cause a reduction in serviceable vehicles	3B	• Proper storage of vehicles to decrease possible exposure to severe weather events • Coordinate with other transit agencies when vehicles are compromised by weather
P5	Vehicle breakdowns	Assets	• Service delays	3C	• Rely on spare vehicles to supplement service; • Ensure vehicles meet useful life standards • Fund vehicle replacements quickly to minimize funds lost for excessive maintenance procedures • Ensure compliance with manufacturer's maintenance standards • Modernize the fleet • Complete regular preventative maintenance • Perform pre-trip inspections and empower drivers to report problems as soon as possible
P6	Vehicle condition deterioration (due to age, mileage, and body damage)	Assets	• Performance • Public perception • Service reliability	3C	• Refurbish or dispose of vehicles based on the circumstances • Work with MDOT MTA to rotate vehicles when they reach their useful life • Develop a short-term financially constrained vehicle replacement plan to ensure ULB standards are met; consider a mid-life overhaul • Ensure all vehicles get the same level of use

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P7	Bus collisions with fixed objects	Assets	• Vehicle damage • Transit facility damage • Reduction in spare ratios • Service impacts	3C	• Improved training for drivers and rewards for safe driving • Regular defensive drivers training; emphasize the importance to drivers • Design facilities to minimize the risk of collisions
P8	Poor roadway conditions	External	• Vehicle damage • Reduced safety	3C	• Report conditions to officials/ Public Works and reduce schedule for weather related issues • Invest in better quality vehicles to reduce risk • If road salts are causing damage, consider an accelerated vehicle wash schedule
P9	Scheduling software failure	Information Technology	• Operational inefficiencies • Service disruption	3C	• Move from local servers to the cloud • Replace current software with a more reliable product; work with IT to ensure software stability and manufacturer to address failures • Train staff to manually use readily available programs (e.g. Microsoft Excel) as back-up • Make the service contractor responsible for maintaining software; train staff
P10	Equipment failures	Assets	• Service interruptions • Performance	3C	• Examine preventative maintenance effectiveness • Develop a replacement plan to ensure on-time performance as equipment reaches ULB • Maintain equipment per manufacturer standards • Increase spare ratio

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P11	Severe weather impacts on fixed route and paratransit services	External	• Service interruptions	3C	• Communicate with demand-response clients to adjust schedules as necessary • Procure small, 4x4 support vehicles that can be used in inclement weather to transport patients • Limit service reductions only when safety is a concern
P12	Roof cave in due to deterioration	Assets	• Roof cave ins due to deterioration may result in a temporary shutdown of operations	2E	• Monitor facility condition assessments results to keep track of potential risk • Develop and maintain facilities maintenance plan
P13	Ramp deployment failures	Assets	• Service delays • Injury to operators and/or passengers • Lawsuits	3D	• Update preventive maintenance practices to include complete evaluation of ramps, including immediately addressing rust and cycling lifts/ramps with sandbags to simulate real-world conditions • Train drivers to perform minor troubleshooting • Ensure pre-trip inspection of ramps and lifts
P14	Major accidents	Assets	• Significant damage to bus fleets	3D	• Regular defensive driving training • Monitor driver performance • Daily announcements over the radio dispatcher system to emphasize the importance of defensive driving

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P15	Lack of funding, and difficulty sourcing routing, scheduling and dispatch software/ hardware	Information Technology	• Delays in service delivery • Reduced dispatching functionality • Reduced reporting capabilities • Inability to demonstrate service levels and operational statistics	3D	• Internal discussion for internal funding, supplement with potential grant funding • Impact analysis to show implications without funding • Working with other local entities to assist in transportation and share resources • Work with local IT for any potential software shortcuts
P16	Fuel facility issues causing operational delays	Assets	• Operational delay	3D	• Identify redundancy options, for example-outside contracting facilities and other transit agencies. • Consider options for using commercial consumer facilities
P17	GenFare computer system failures	Information Technology	• Inability to use fareboxes as intended • Operating efficiency	3D	• Ensure that preventive maintenance is being performed • Charge damages if the service is contracted • Train maintenance staff to detect and solve problems • Maintain adequate spare parts to replace non-functional parts • Consider installing a better system and work with IT

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P18	Electric bus fires	Assets	• Service interruptions • Asset damage • Injuries • fatalities	3E	• Adherence to manufacturer's recommended maintenance schedule and component replacements • Regular preventive maintenance • Train staff and mechanics to look for signs of an issue • Report and repair issues as quickly as possible • If the overall fleet is at risk, work with the manufacturer for a long-term solution
P19	Bus vandalism	External	• Asset condition • Public perception	3E	• Increase police presence in the area, specifically in areas with a history of bus vandalism • Store vehicles in secure, well-lit, fenced-in locations with video surveillance; shut-down vehicles • Limit access to storage facilities • Install on-board cameras to identify and deter violators • Train drivers to report vandalism
P20	Vehicle theft	External	• Impacts performance	3E	• Ensure that drivers always secure/lock their vehicle when unattended • Store vehicles in a secure, well-lit location under video surveillance; shut-down vehicles • Reduce access to the public • Add proposed risk mitigations to end-of-day/post-trip checklist

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P21	Major equipment malfunctions (e.g. bus wash)	Assets	• Causes corrosion • Public perception	**4C**	• Use a power washer for bus cleaning • Use anti-corrosive additive in soap • Adhere to scheduled maintenance of the bus wash system; hire a contractor for vehicle washing if needed • Acquire a commercial grade pressure washer as back-up, undercarriage spray equipment for cleaning during the winter, or other necessary equipment • Emphasize to mechanics that rust must be addressed immediately
P22	Current workforce is untrained and/or low on resources to conduct facility inspections	Human Resources	• Lacks bandwidth to perform mandated physical facilities condition assessment	**4D**	• MDOT MTA can continue to provide trained consultants to assess facilities condition • Conduct training for LOTs staff where feasible
P23	Small parking lots	Operational	• Insufficient capacity for the number of vehicles that are stored	**4D**	• Acquire/lease more property (adjacent or nearby), potentially for spares • Look for opportunities to share parking resources with other departments/agencies • Consider additional parking needs throughout service planning • Evaluate automated vehicle options

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P24	Minimal storage space	Operational	• Lack of storage for oil, transmission fluid, windshield wiper fluid • Third party contractor maintenance facilities will not provide access outside of their hours	4D	• Re-negotiate contracts to allow access to these materials or find a better maintenance contractor • Consider above-ground storage tanks (inexpensive and require minimal storage space) • Use fluids in smaller containers (e.g. 55 gal) and arrange with waste oil recycling companies for regular removal • Purchase storage tanks and place them for 24-hour access
P25	Insufficient space for current staff in offices	Human Resources	• Operational efficiency	4D	• Consider relocating staff • Short-term: satellite offices, share space with other agencies, work from home • Consider facility expansion • Adjust schedules to have fewer staff in the facility at once; revolving schedules
P26	Bus Shelter & Electronic Sign Damage	Assets	• Reduction in passenger safety as a result of glass debris; cost of repairs	4D	• Graffiti peels for shelters • Install bollards in front of electronic signs near parking areas • Set up pressure washing of shelters • Repair quickly • Budget for the timely repair/ replacements of these assets • Have a surplus of parts or on hand components
P27	Driver barriers not installed or permanent	Human Resources	• Reduction in driver safety	4D	• Request funds from MDOT MTA from discretionary grants • Benefit cost analysis to leadership.

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P28	Bus wash failure	Assets	• Vehicle maintenance not performed as required	**4D**	• Identify redundancy bus wash options, for example other agencies (private or public) • Ensure preventative maintenance on the bus wash is performed accordingly • Utilize outside services to perform PMs and be on-call in the event of a failure
P29	Lack of ZEV charging infrastructure	Assets	• Shortened routes	**4D**	• Build partnerships to split costs • Coordinate with other departments or agencies • Utilize grants and statewide environmental funding programs to make needed infrastructure investments. • Know where the existing stations are (open to public), establish account/partnership • Build in for future capacity/ growth
P30	Non-transit vehicle collisions with bus shelters	Assets	• Damage to shelters • Asset performance	**4E**	• Install protective bollards, barriers, signs, and lighting for visibility • Improve driver training • Review location factors for bus shelters; move shelters back from the road
P31	Lack of system to track vehicle repairs and failures	Operational	• Operational and maintenance efficiency	**4E**	• Develop a system • Create or purchase spreadsheet programs such as Google Docs, Microsoft Excel, or Access to track vehicle history; ensure adequate training for all staff

Number	Risk	Category	Impact	Risk Score	Proposed Mitigation
P32	Frequent turnover in contracted demand response workforce	Human Resources	• Service interruptions	5D	• Charge the contractor damages for service interruptions • Screen for behavior and competency before hiring a contractor • Provide opportunities for knowledge sharing through training, mentoring, presentations, etc. • Provide a competitive and comprehensive benefits package (life insurance, disability insurance, flexible hours, etc.) • Increase workforce to maintain back-up drivers; continuous recruiting
P33	Bus charging station shed failure	Assets	• Electric bus fleet exposed to severe weather	5E	• Proper storage of vehicles to decrease possible exposure to severe weather events • Coordinate with other private and public agencies when facilities are compromised by weather • Monitor facility condition assessment result to keep track of potential risks • Develop and maintain facilities maintenance plan
P34	Shared bays	Operational	• Service delays	5E	• Consider contracting for available space • Develop a plan to use limited bays efficiently • Schedule workload more efficiently; stagger mechanic shifts and use revolving preventive maintenance schedules

6. Asset Lifecycle Strategies

This section identifies key management practices across the asset lifecycle including procurement, maintenance, replacement, and disposal for each asset class. These strategies and policies are documented in detail in the LOTS Program Manual, developed to provide comprehensive guidance on federal and state rules for the LOTS.

6.1 CAPITAL INVESTMENT DECISIONS

New vehicles, equipment, and facilities capital expenses are programmed into all the major transportation planning processes, including the Transportation Improvement Program (TIP), Statewide Transportation Improvement Program (STIP), Long-Range Transportation Plan (LRTP), and the Transportation Development Plan (TDP). Once programmed, these projects go through the Annual Transportation Planning (ATP) process to obtain funding for procurement, rehabilitation, preventive maintenance, and other investments that will require federal and/or State capital funding. MDOT MTA is the designated recipient of all FTA funds in the state of Maryland and disburses grant funds through sub-grant agreements to the LOTS.

Funding distribution is based on a grant-making process that allocates capital assistance based on need and the availability of state and federal funds. Generally, vehicles are prioritized over equipment and facilities. To support its asset management system, MDOT MTA uses a project prioritization tool which considers multiple factors including TERM Lite analysis, asset condition, environmental reliability, risk management, and safety.

In addition to capital funding, ATP applications also include operating budget requests. While use of the awarded funds are up to each LOTS, asset lifecycle strategies must adhere to the guidelines laid out in the LOTS Program Manual.

6.2 VEHICLE LIFECYCLE STRATEGIES

6.2.1 VEHICLE PROCUREMENT

Each LOTS develops individual written procedures, which comply with federal and state local requirements as necessary, related to purchasing, procurement, and contracting for all services that use federal or state funds. For vehicles, procurements are often done centrally through existing MDOT MTA contracts on behalf of the LOTS, for vans, small buses, medium buses, and sometimes large buses. LOTS often prefer to procure large buses on their own to avoid delivery time delays.

For future procurements, LOTS hope to rely on group procurements as much as possible. Additionally, MDOT MTA will take responsibility for and prioritize eliminating gaps in vehicle procurement contracts by beginning new procurements before current contracts expire. MDOT MTA will evaluate all procurement options, including maintaining a menu of contracts for all vehicle types, joint procurements, and utilizing grant funds (discretionary or competitive) for the group or for individual LOTS.

6.2.2 VEHICLE MAINTENANCE

To ensure federal and state-funded vehicles are adequately maintained, each LOTS develops a maintenance program and plan. The maintenance program involves two major components (preventive maintenance and repairs) and establishes goals and objectives to monitor maintenance performance, as well as strategies to achieve these goals. Goals and objectives can relate to vehicle life, major equipment failures, etc. Maintenance functions are performed by in-house staff, by a local government fleet maintenance office, or by a private contractor. The maintenance plan is included in the LOTS ATP submission to MDOT MTA and is resubmitted as updates occur. In addition, LOTS are encouraged to establish a Management Information System (MIS) to track maintenance information and analyze vehicle performance as it relates to maintenance of vehicles.

Based on current performance of the LOTS fleet, LOTS hope to make strategic investments towards more efficient vehicle maintenance for the coming years. Rehabilitation activities will be explored, such as evaluation of heavy-duty fleets to determine if rehabilitation is beneficial and refurbishing vehicle components and body.

6.2.3 SPARE VEHICLES MANAGEMENT

Spare vehicles supplement service when vehicles are taken out of service due to preventive maintenance, repairs, breakdowns, accidents, etc. Factors such as fleet size, condition, and maintenance program capacity to respond to preventive maintenance and repair needs determine the appropriate spare ratio. MDOT MTA has established a maximum spare ratio of 20 percent for LOTS. LOTS that are unable to comply with MDOT MTA's spare ratio standards develop a fleet management plan to explain extenuating circumstances that justify their current spare ratio and outline a strategy to reduce it in the future.

6.2.4 VEHICLE REPLACEMENT

Vehicles funded through specific federal and state programs are subject to minimum useful life standards (Table 17) established by MDOT MTA to ensure they are appropriately maintained to reach a normal useful life. These useful life standards are determined by vehicle classification; vehicles can be retired and replaced based on years in service or mileage, whichever surpasses useful life standards first. Under special circumstances, LOTS may retire a vehicle before it meets useful life standards. However, to justify the replacement, LOTS provide a detailed description of the vehicle condition, an explanation for the current condition, a list of repairs and associated costs necessary to keep the vehicle in service, and detailed maintenance records. Note that these useful life standards are different from the Useful Life Benchmark (ULB) as defined in Section 3.2; for LOTS, the ULB generally falls later than the minimum useful life, since vehicle replacements are generally requested before they are completely out of a state of good repair (see Figure 2).

Based on current vehicle performance, OLTS and the LOTS are considering various replacement strategies to determine which is optimal for their needs, including level setting revenue vehicle replacements over time to reduce spikes in vehicle replacement needs year by year.

Table 17. Vehicle Minimum Useful Life Standards

Vehicle Classification	Years	Miles	Length
Revenue Specialized Vehicles (accessible minivans and accessible taxicabs)	4	100,000	N/A
Light Duty Bus	5	150,000	25' – 35'
Medium Duty Bus	7	200,000	25' – 35'
Heavy Duty Bus-Medium Size	10	350,000	30' – 35'
Heavy Duty Bus-Large Size	12	500,000	Over 35'
Non-Revenue Specialized / Fleet Support Vehicles (Pick-Up Trucks, Utility Vehicles & Sedans)	10	200,000	N/A
Ferries	25	N/A	N/A

6.2.5 VEHICLE DISPOSAL

LOTS dispose of vehicles at the end of their useful life, in accordance with federal and state requirements, after consultation with MDOT MTA (for federal or state-funded vehicles). They make additional considerations prior to disposal of vehicles that are assessed by the insurance company as a total loss (usually due to a serious accident) before reaching useful life. In this situation, the LOTS will receive a payout from the insurance company to be reinvested in the service. If the insurance company does not dispose of the totaled vehicle, the LOTS may sell the vehicle, keep it for spare parts, or dispose of it themselves. LOTS have considered implementing new processes for vehicle disposal to realize cost savings. Similar to vehicle replacements, this includes consideration of level-setting disposals to have relatively similar number of disposals per year, to reduce spikes. Additionally, they currently consider auctioning disposed vehicles as well as selling vehicles for scrap parts.

6.3 EQUIPMENT LIFECYCLE STRATEGIES

6.3.1 EQUIPMENT PROCUREMENT

As with vehicles, LOTS develop and follow their own written procedures, which adhere to federal and state requirements related to purchasing, procurement, and contracting for all services that use federal or state funds. Equipment procurement procedures vary based on the nature of the equipment. LOTS equipment that is not installed on a vehicle (such as maintenance equipment, computer hardware, software) is procured locally. Equipment that is purchased separately from the vehicle to be installed on the vehicle once delivered, is also procured locally. Optional, factory-installed equipment, such as wheelchair lifts, can be procured in multiple ways. Procurement rules are detailed in the LOTS Program Manual.

LOTS have evaluated current equipment procurement processes to identify areas of improvement. One potential improvement measure the LOTS have identified is to rely more on group procurements for equipment (both led my MDOT MTA and not led by MDOT MTA), including fare boxes bus cameras, dispatch, and regional communications equipment.

6.3.2 EQUIPMENT MAINTENANCE

LOTS maintenance programs must include any equipment that supports rolling stock or daily operations. The equipment maintenance program must comply with manufacturers recommended standards. Examples of equipment to be included in the maintenance program include but are not limited to revenue collection systems, communication systems, etc.

Based on current equipment performance, LOTS have reassessed existing equipment maintenance processes. In the future, LOTS want to establish a lifecycle and replacement schedule for equipment assets based on original equipment manufacturer specifications. An Additional focus is to provide better training for employees on how to use the equipment to prevent breaking, particularly for large pieces of equipment.

6.3.3 EQUIPMENT REPLACEMENT

Equipment replacement projects are also funded through the ATP capital investment prioritization process and are based on existing asset condition and funding availability.

LOTS have evaluated current equipment replacement strategies and have identified areas of improvement. LOTS want to identify common equipment issues and the point in the lifecycle that these issues typically occur, to share this information with other LOTS so they can address the issue in advance of failure.

6.3.4 EQUIPMENT DISPOSAL

Each LOTS develops a written policy for equipment disposal practices which satisfies FTA, MDOT MTA, and local government disposal requirements as applicable. The equipment disposal policy is also included in the LOTS maintenance program. LOTS dispose of equipment assets near the end of their useful life, but will seek special approval by MDOT MTA to dispose of capital equipment assets that have not met minimum useful life standards. Where applicable, LOTS will consider alternative disposal methods for the coming years; for example, selling to other LOTS.

6.4 FACILITIES LIFECYCLE STRATEGIES

6.4.1 FACILITIES PROCUREMENT

Facilities development and procurement processes are more involved than vehicle or equipment procurement processes. The full facilities procurement process, with details on timing and specific requirements, is documented in the LOTS Program Manual.

LOTS have considered multiple strategies for more efficient facilities procurement and continue to look for opportunities to share resources and facilities within their counties or other entities outside their jurisdiction, to realize cost savings.

6.4.2 FACILITIES MAINTENANCE

LOTS maintain facilities in good condition, to remain eligible for federal and state assistance. To ensure that facilities are clean and functioning in good repair, each LOTS develops a facilities maintenance program accompanied by a written maintenance plan. The facilities maintenance program also accounts for facilities-owned equipment assets and includes an inspection program and a preventive maintenance program. LOTS conduct annual facilities inspections to ensure that maintenance needs can be adjusted over time.

LOTS plan special efforts to maintain passenger facilities (including bus shelters), as these facilities and respective assets are highly visible to the public. These efforts include but are not limited to regular garbage pick-up, graffiti-removal, and timely repair of shelter panels, whatever actions are necessary to ensure that facilities are clean and safe for customers.

Based on current facilities performance, LOTS have considered a variety of maintenance strategies to optimize facility condition. The goal is to shift the culture towards preventive maintenance (PM) and away from reactive maintenance, to include developing PM schedules by component, in accordance with maintenance plans developed during component purchase. Therefore, it will be important to update maintenance plans and require employees to follow them. LOTS will also prioritize PM and inspections for current components with low scores. Employee training will be an integral factor in improving facilities maintenance, so LOTS will strive for better training for maintenance workers. Additionally, LOTS aim to develop a 5-year plan to upgrade, change, and replace components and facilities to meet current and future needs.

6.4.3 FACILITY REPLACEMENT

LOTS plan for long-term replacement of any major facilities assets based on the typical life span for that asset. Planning for replacement of long-term assets allows LOTS to anticipate large capital funding needs and prepare to apply for capital funding in advance of the replacement. This also includes planning for facility-related equipment such as fuel tanks, roofs, HVAC systems, etc.

After evaluating current facility performance and replacement strategies, the LOTS have identified areas of improvement, for example, identifying common facilities and facility component issues and the point in the life cycle that these issues typically occur, to share this information with other LOTS so they can address the issue in advance of failure.

6.4.4 FACILITIES DISPOSAL

Each LOTS maintains a policy for property disposal practices in compliance with FTA, MDOT MTA, and local government disposal requirements as applicable. The property disposal policy is also included in the LOTS maintenance program. The LOTS have considered multiple facilities and facilities components disposal strategies to realize cost savings. One disposal strategy LOTS have identified is to sell facilities assets as-is.

7. Challenges & Opportunities For Ongoing Asset & Performance Management

This section discusses a national event that impacted (and continues to impact) transit service and asset management practices for LOTS agencies, as well as an industry trend that could improve asset and transit service efficiency in the long term. The discussion will focus on COVID-19 pandemic's ongoing impacts on LOTS service and ridership. The discussion will also touch upon the implications of OLTS/LOTS transition to an emerging zero-emission vehicle technology that could potentially improve revenue service greatly for its constituent agencies.

7.1 COVID-19 PANDEMIC

On March 5th, 2020, Governor Lawrence Hogan, Jr. proclaimed a state of emergency for the state of Maryland as a response to the COVID-19 pandemic. In the early months of the pandemic, transit providers across Maryland had to respond and quickly adapt to the COVID-19 global health pandemic. LOTS services faced instant impacts to safety of employees and customers, service operation, asset management practices, and funding revenues. While the pandemic brought much of the world to a pause throughout 2020, most transit agencies, recognizing the essential service they provide, took steps to adapt to these unique conditions to maintain operations. Additionally, the pandemic provided a couple of unforeseen positive impacts in the form of vehicle preservation and much needed funding assistance. As the world began to emerge from this pause in 2021, the efficacy of these changes was critical to continuing reliable service for a transit-dependent population.

7.1.1 INITIAL SERVICE IMPACTS & RESPONSE

The state of emergency initiated a broad set of restrictions to movement and activities across the state. This, in conjunction with the aftermath of the initial COVID-19 wave and its subsequent variants, greatly impacted ridership across the state. Many LOTS agencies adjusted service in the early months of the pandemic to operate on a reduced schedule with some completely halting fixed-route service. At least one LOTS reported converting some fixed routes to demand-response, with many limiting on-demand trips to essential travel only, sometimes with dispatch screening riders for potential COVID-19 infection. Where service was not reduced in the early months of the pandemic, LOTS found ridership falling below 50% of normal levels. Overall, there was a decrease of 57% in ridership across all LOTS services between FY 2019 and FY 2021.

Table 18 COVID Ridership Metrics (FY19-FY21)

Total Ridership			
Ridership	FY 2019	FY 2020	FY 2021
	9,475,961	6,843,417	4,043,264
Average Annual Ridership			6,787,547
Change from Previous Period		-27.8%	-40.9%
Change since FY 2019			**-57.3%**

Various emergency response measures were employed to ensure safety during the pandemic. Temporary policy changes during those early months included enforcing the statewide order to wear masks or face coverings on public transit, modifying boarding procedures on buses (including priority boarding for first responders and healthcare employees), introducing passenger limits with staggered seating, and even waiving fares. Additionally, LOTS introduced enhanced cleaning protocols such as drivers disinfecting buses at the end of their shift or in some cases, after each complete trip. In addition, facilities were being cleaned and disinfected regularly, including benches and shelters at busy transfer points. LOTS also supported their staff by providing personal protective equipment (PPE) to drivers and other employees and were participating in community services such as school lunch distribution.

While it was clear that reduced ridership negatively impacted LOTS service, it also provided unforeseen benefits in two major ways: asset preservation and federal funding assistance. Despite certain vehicle assets reaching a critical useful life age, reduced levels of service meant that less of these vehicles experienced the wear and tear they would have normally received, which resulted in above average asset conditions. Additionally, the federal government aided OLTS/LOTS by introducing emergency funding to help ease service and budget impacts due to COVID.

Actions taken by LOTS since the start of the pandemic have been in line with recommendations from industry organizations such as American Public Transportation Association (APTA) and National Association of City Transportation Officials (NACTO) who have published guidelines for small transit providers to respond and adapt to the conditions caused by the COVID-19 emergency. As LOTS continue to refine their response to the pandemic and restrictions continue to lift, these and other resources are available for continued safe operation of their assets.

7.1.2 LESSONS LEARNED

Many LOTS have already vaccinated their frontline employees, which will facilitate future transit service provision. Since the State's re-opening, most LOTS have been operating at modified levels of service. The FTA's COVID-19 requirements have allowed for better tracking and reporting of COVID-19 related data by transit agencies. FTA required the completion of a "baseline form" by all agencies capturing data on their service reductions/suspensions between March 2020 and the end of February 2021. This provided transit agencies with data to better understand the impacts COVID-19 has had over the last year and allowed for more informed planning that helped LOTS move into a full re-opening.

In addition to the "baseline form", agencies were also required to report COVID-19 positive cases among staff using FTA's "recurring form." Like NTD reporting, agencies that receive only Sec. 5311 funding will have their monthly COVID-19 case and vaccination data reported to FTA by OLTS on their behalf, and agencies receiving Sec. 5307 funding will report their own data, using the same form. This "recurring form" submission is due each month and tracks the following information:

- Total number of transit operators, frontline essential workers, and other agency workers;
- Service impacts due to COVID-19;
- Cumulative count of transit worker COVID-19 positive cases, COVID-19 related fatalities, COVID-19 recovery cases, and the number of unvaccinated employees.

In addition to these data points, agencies provided a yes/no response to whether they required workers to be vaccinated and on whether they implemented the TSA Security Directive requiring workers and passengers to wear face coverings on public transit.

As the impact of COVID-19 continues to be realized LOTS will also need to continue to review existing corrective and preventive maintenance practices and adjust them based on the most pertinent needs and recommended practice. As an industry best practice, any impact to the maintenance schedule should be documented in advance to comply with state and federal regulations. Some high-level approaches to inspection and maintenance of assets during and post-pandemic include:

- Identify the most critical assets and prioritize their maintenance
- Review the maintenance schedule against the available resources and develop a contingency plan
- If any vehicle or facility assets are owned and/or maintained by third-parties, set-up periodic reviews to ensure that there are no lags in maintenance activities
- Constantly capture data on the performance of the assets and the intensity of their use during the pandemic.

7.1.3 CURRENT CONDITIONS AND THE STATUS OF THE STATE OF EMERGENCY

As the LOTS enter year 3 of operational life with COVID-19, the state's earlier efforts to curtail COVID-19 hospitalization rates and spread have had a meaningful impact. According to the Maryland Department of Health, as of February 1st, 2022, the COVID-19 positivity rate had fallen below 2%. On February 3rd, 2022, by proclamation of Governor Lawrence Hogan, Jr., the state of health emergency due to COVID-19 was lifted. Mask mandates in schools around the state are being lifted or made optional, and the use of masks in general is encouraged but no longer required. Despite such marked improvements, officials are still encouraging residents who haven't been vaccinated or boosted to do so.

7.2 ZERO-EMISSION VEHICLES

7.2.1 BACKGROUND

Pursuant to the Greenhouse Gas Reduction Act plan (GGRA) and in accordance with the Zero-Emission Bus Transition Act, the Maryland Department of Energy (MDE) proposed the Greenhouse Gas Reduction Act plan (GGRA) to achieve Maryland's goal of reducing greenhouse gas (GHG) emissions by 40% (from 2006 levels) by 2030. The Zero-Emission Bus Transition Act prohibits MDOT MTA from purchasing buses for the state transit fleet that are not zero-emission vehicles. Additionally, MDOT MTA has committed to transitioning 50% of its existing fleet to zero-emission buses by 2030. Although the small transit agencies throughout the state are not subject to these requirements, OLTS launched an initial assessment of the steps that would be needed to guide the transition of all 23 LOTS in Maryland to zero-emission fleet operations.

7.2.2 OVERVIEW OF ZEV TECHNOLOGIES

Zero-emission vehicles (ZEVs) are vehicles designed to produce none of the exhaust or pollutants typically associated with vehicles with internal combustion engines. Research conducted as part of the MTA LOTS ZEV Study has identified fuel cell electric bus (FCEB) technology and battery electric bus technology as emerging ZEV propulsion types being used in transit services currently transitioning or planning on transitioning away from vehicles with internal combustion engines. As these technologies continue to evolve, it is imperative that a determination be made as to which form of ZEV system best suits the needs of LOTS service.

7.2.3 ASSET LIFECYCLE STRATEGIES AND ADDITIONAL CONSIDERATIONS

As the LOTS implement the transition from their current fleet vehicles to ZEV fleets, the impact of the cost of such a transition must be factored into their decision-making process. Replacement phasing must be managed in a way that does not negatively affect general agency budgeting. The following considerations were developed to help address additional concerns associated with the transition from internal combustion vehicles to ZEVs:

- Service and Schedule: Is there an assessment procedure in place to ensure that all acquired ZEV fleets meet the LOTS existing service requirements?
- Infrastructure: Can the agency support ZEV infrastructure? If so, what type and what are the constraints?
- Energy and Utilities: How much will it cost to get the power needed to support the fleet?
- Procurement and Schedule: What is the most optimal construction and bus procurement schedule to enable LOTS to transition in the most feasible way?
- Costs and Funding: What are the estimated capital and operating costs associated with this transition? What are some of the funding opportunities currently available to support this transition?

OLTS already has a dynamic, well-established set of strategies in place to address the asset lifecycle needs of the LOTS existing bus fleet. However, to ensure an efficient transition to ZEVs, OLTS will need to modify their strategies to manage the unique needs of the ZEVs and assets associated with this new technology. An assessment will need to be made to determine the similarities and differences between the maintenance practices of its existing fleet versus that of a ZEV fleet. Questions will need to be answered, including:

- How will procurement strategies differ between a ZEV fleet versus the existing LOTS bus fleet?
- What would a modified vehicle maintenance process look like for ZE buses?
- What would a modified equipment maintenance process look like for charging infrastructure associated with ZEVs?
- Would spare vehicle management for ZEVs be drastically different than for existing buses?
- Would there be an increased cost for vehicle disposal for ZEVs? If so, how much?
- Similar questions would need to be answered for any equipment and infrastructure associated with the maintenance of ZEVs.

OLTS will also need to consider how changes to the fleet will impact the current level of service for each LOTS fleet. It will be important to determine if a one-for-one exchange of ZE buses for diesel buses will be enough to maintain the current level of service or if additional vehicles will be needed. Will the ZEV fleet handle passenger loads and route distance as effectively as the vehicle fleets they will replace? How much of an impact will topography, HVAC use, and other battery-intense uses have on a ZE vehicle's range? And will these uses be a drastic reduction of operational effectiveness when compared to the existing fleet? It is crucial that OLTS assesses and addresses these issues and determine what other issues may arise with the integration of ZEV fleets.

Due to current ZEV range limitations agencies may need to increase fleet sizes to meet their service requirements. Additionally, the availability of ZEV types can impact the level of service offered by LOTS. For example, there are no ZEV replacement types for 30' shuttles or 29' low floor buses. This is critical, as about 45% of Tier 2 revenue vehicles are cutaway buses and vans. Table 19 breaks down the existing vehicle types across LOTS agencies, their ZEV equivalents, and the estimated cost for replacement.

Table 19. MDOT LOTS Vehicles with Zero Emission Equivalent

Vehicle Type	MDOT LOTS Agencies	Equivalent ZEV OEMs	Comment	ZEV Cost Est.
60-foot Articulated Bus	Town of Ocean City Ocean City Transportation	New Flyer	Fuel Cell option available	$1.2M - $1.5M
40-foot Low Floor Bus	Baltimore City DOT, Howard County, Town of Ocean City Ocean City Transportation	New Flyer, Proterra, Gillig, Nova Bus, Eldorado National-California (ENC)	Fuel Cell option available from New Flyer and ENC. ENC models are scheduled for Altoona Testing.	$7.5K - $1.1M
35-foot Low Floor Bus	Transit Services of Frederick County, Howard County, Town of Ocean City Ocean City Transportation	ENC	ENC models are scheduled for Altoona Testing. Fuel cell option available from ENC	$7.5K - $9.5K
30-foot Low Floor Bus	City of Annapolis, Transit Services of Frederick County, Harford County, Howard County	ENC	ENC models are scheduled for Altoona Testing. Fuel cell option available from ENC.	$7.5K - $9.5K
30-foot Cutaway / Shuttle	Board of County Commissioners of Allegany County Maryland, Anne Arundel County, Cecil Transit SSCT, City of Annapolis, Harford County, Tri-County Council Lower Eastern Shore, Washington County Transit	None		
<30' Low Floor Bus	Harford County, Queen Anne County	None		
<30-Foot Cutaway / Shuttle	Board of County Commissioners of Allegany County, Board of County Commissioners of Calvert County, Anne Arundel County, Board of County Commissioners of Calvert County, Board of Garrett County Commissioners, Cecil Transit SSCT, City of Annapolis, County Commissioners of Charles County, Dorchester County, Harford County, Howard County, Commissioners of St. Mary's County, Delmarva Community Services, Somerset County Commission on Aging SSTAP, Transit Services of Frederick County, Tri-County Council Lower Eastern Shore, Queen Anne's County, Washington County Transit	GreenPower Motor Company	This is the only vehicle that has Buy America and Altoona Testing Certification for this class.	$220K
Minibus / Van	Anne Arundel County, Baltimore County Department of Aging, Board of Carroll County Commissioners, Board of County Commissioners of Calvert County, Board of Garrett County Commissioners, Delmarva Community Services, Dorchester County, Howard County, Town of Ocean City Ocean City Transportation, Transit Services of Frederick County, Queen Anne's County, Washington County Transit	GreenPower Motor Company	This is the only vehicle that has Buy America and Altoona Testing Certification for this class.	$140K
Sedan	Board of Carroll County Commissioners, Howard County	Multiple Available	Electric Sedans are available from multiple manufacturers at various price points and capabilities.	$30K - $80K

1 – Table derived from the draft MDOT MTA LOTS ZEV Study

It may be advantageous for agencies to monitor ZEV technological improvements and delay expansion until further vehicle classes become available

7.2.4 FUNDING NEEDS WITH ZEV TECHNOLOGIES

Transitioning LOT's current vehicles to ZEV is going to have impacts on the funding needed to keep assets in a state of good repair. The Tier II LOTS group currently has a state of good repair backlog of approximately $44.0 million (2021 $) according to the performance baseline in Chapter 4. This estimate assumes that all vehicles will be replaced by similar models when they reach the end of their useful life. It is important to estimate the funding needed to keep assets in a state of good repair while also considering the costs needed to upgrade vehicles to ZEVs. TERMLite analysis was used to project the annual investment needed over the next 20 years to clear the backlog and maintain all assets in a state of good repair with the assumption that vehicles will be replaced with ZEVs when they reach the end of their useful life. To investigate this scenario, current vehicle replacement costs in the model were replaced with ZEV cost estimates from Table 19. Figure 10 shows the unconstrained need over the 20-year period by asset category when using ZEV replacement costs. The average annual funding over a 20-year forecast needed to maintain assets in a state of good repair in this scenario is $44.6 million. This is $19.1 million more than the average annual expenditure of $25.6 million when not assuming ZEV replacement costs (see Figure 7).

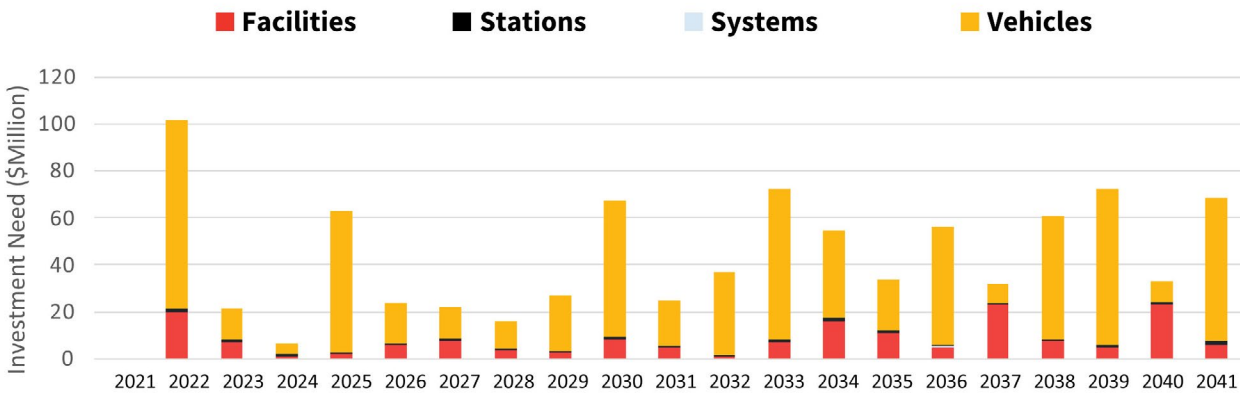

Figure 10. Needs by Category (Year of expenditure (YOE) dollars, Calendar Year (CY))

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8.1 CAPITAL FUNDING LEVELS

Table 20. Historical Capital Funding Levels (CY, YOE dollars)

Year	Capital Award Amount
2015	$11,054,698
2016	$11,329,089
2017	$16,414,957
2018	$18,403,235
2019	$27,767,874
2020	$27,601,839
2021	$15,263,771
Average	**$18,262,209**

**Does not include local match*

MDOT MTA requests funding from the federal and state governments on behalf of the LOTS and is responsible for distributing the funds for LOTS capital projects through the ATP process. Table 20 shows historical capital funding levels for Tier II providers from CY2015 – CY2021. While all LOTS are required to provide a local funding match to Federal and State funding, several also have additional local funding that supports their capital investments. The analysis in this TAMP does not include any additional local capital funding.

As shown, while funding from 2015 to 2021 has increased from about $11.1 million to $15.3 million over the period, the historical average is about $18.3 million. It is important to note that funding in CY 2019 and 2020 includes emergency funding provided in response to the COVID-19 global pandemic. Figure 12 shows the 20-year forecast for total capital funding collectively available to the LOTS, based on the average historical funding, and assuming a constant increase indexed to an annual inflation rate of 2.82 percent. Based on historical funding, the projected average funding available over the next 20 years is $24.4 million per year.

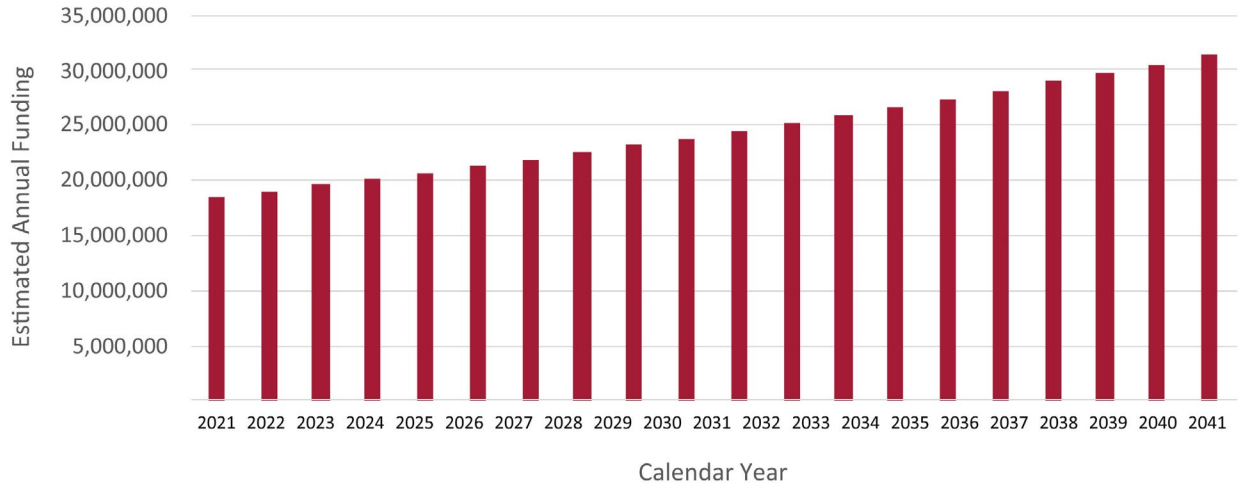

Figure 11. Projected Capital Funding Levels (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2 FUNDING NEEDS AND SCENARIOS

The performance baseline in Chapter 4, showed that the Tier II LOTS group has a backlog of approximately $44.0 million (2021 $) of assets that are not in a state of good repair. The projected average annual investment need over the next 20 years to clear the backlog and maintain all assets in a state of good repair was determined to be $25.5 million. Figure 13 shows this unconstrained need over the 20-year period by asset category with the projected funding (as illustrated in Figure 12). As shown, there are years where funding falls below the investment need and several years where projected funding exceeds the need; however, overall, the average of $24.4 million available funding is less than the average need of $25.5 million. Ultimately, in determining how to best manage the capital asset portfolio over the next twenty years, funding constraints must be considered.

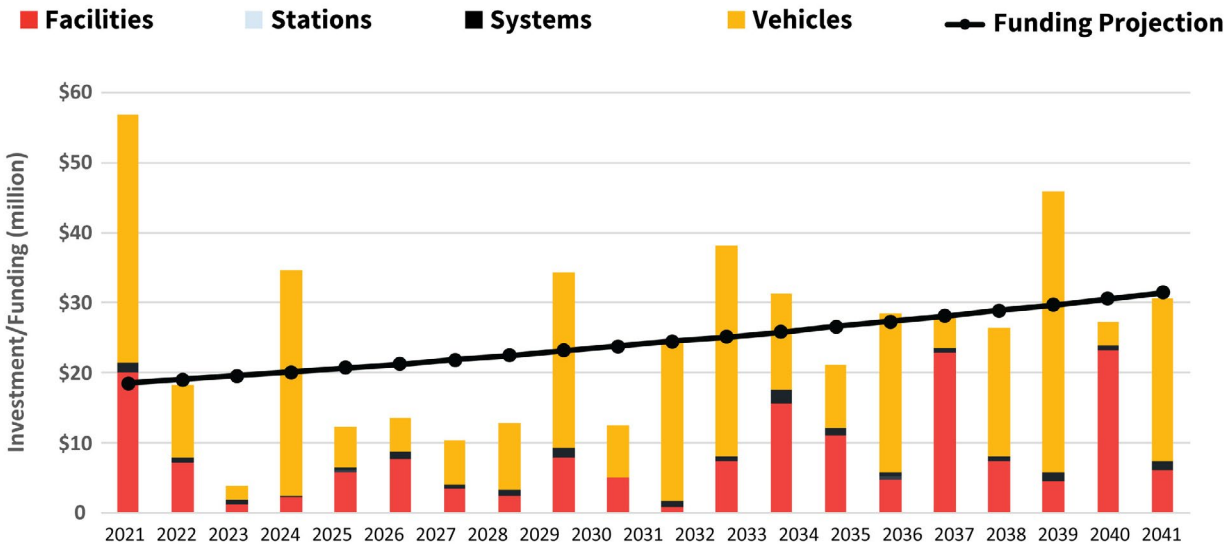

Figure 12. Twenty-Year Projected Needs and Funding (Year of expenditure (YOE) dollars, Calendar Year (CY))

MDOT MTA has considered eight funding scenarios to inform the capital asset management and investment prioritization process. The purpose of this analysis is to understand the impacts of different funding assumptions and constraints on the SGR backlog for Tier II LOTS. The scenarios are described below:

1. ***Scenario 1 (Current Funding + 5339):*** The first scenario is a current funding with 5339 discretionary grants scenario which assumes that funding levels in the most recent year are maintained (plus inflation) with 5339 discretionary funding awards each year. The model begins with $15.2M available in CY2022.
2. ***Scenario 2 (Rollover):*** The second scenario also assumes current funding with 5339 discretionary funding levels maintained but adds rollover spending of unspent capital awards from previous years. The model begins with $43.8M available in CY2022, dropping back down to $15.6M in CY2023.
3. ***Scenario 3 (State Match Added):*** In the most recent funding year, the 10% state match was replaced with additional Federal funding - the third scenario brings the state match back providing additional funding on top of current funding (with 5339 sustained). The model begins with $16.7M available in CY2022.

4. ***Scenario 4 (Current Funding – 5339):*** The fourth scenario assumes current funding levels (most recent year plus inflation), but without 5339 discretionary funding. The model begins with $11.2M available in CY2022.
5. ***Scenario 5 (Historical Average):*** The fifth scenario assumes historical average funding levels (shown in Table 20), which includes the recent special purpose funding such as COVID-19 emergency funding. The model begins with $18.3M available in CY2022.
6. ***Scenario 6 (50% Backlog Target):*** In the sixth scenario, the model evaluates the funding needed to achieve a backlog of 50 percent of current levels over the 20-year period.
7. ***Scenario 7 (100% Backlog Target):*** In the seventh scenario, the model looks to achieve a backlog of 100 percent of current levels over the 20-year period.
8. ***Scenario 8 (ZEV Transition):*** For this TAMP, an additional scenario considers the outlook for LOTS if all vehicles are replaced with ZEVs. This assumes historical average funding levels (reference Scenario 5) with vehicle costs updated to reflect ZEV replacement costs.

Each of these scenarios includes an annual inflation rate of 2.82 percent and were modeled using the FTA's TERM Lite application. The application incorporates a prioritization weighting structure that determines how funding is allocated to each asset and asset category (Table 21)

Table 21. Investment Prioritization Weighting Assumptions

Factor	Weighting
Asset Condition	50%
Safety and Security	25%
Reliability	15%
Efficiency (O&M Cost Impact)	10%

8.2.1 SCENARIO 1 – CURRENT FUNDING LEVELS WITH 5339 DISCRETIONARY FUNDING LEVELS MAINTAINED

Scenario 1 assumes that the base funding level in CY2022 is about $15.2 million, which escalates by 2.82 percent each year for an average annual funding of $20.1 million – this presents a $5.5 million funding gap from the average unconstrained need of $25.5 million. As previously mentioned, this funding for Scenario 1 does include 5339 discretionary grants received by the LOTS agencies in FY2021 assumed to be sustained over the period. In this case, the SGR backlog begins at $44.0 million in CY2021 and grows to reach $97.6 million by 2041.Facilities' SGR backlog is responsible for less than half of the CY2021 backlog, but this percentage grows so that Facilities' SGR backlog makes up close to 90% of the CY2041 backlog. Figure 14 shows the forecasted SGR backlog by asset category for Scenario 1. It is important to note that the resulting backlog discounted to 2021 dollars is $56.0 million. This suggests that the combination of increased FY2021 funding and maintaining current funding levels in the following years will lead to a steady increase in the backlog over the long-term.

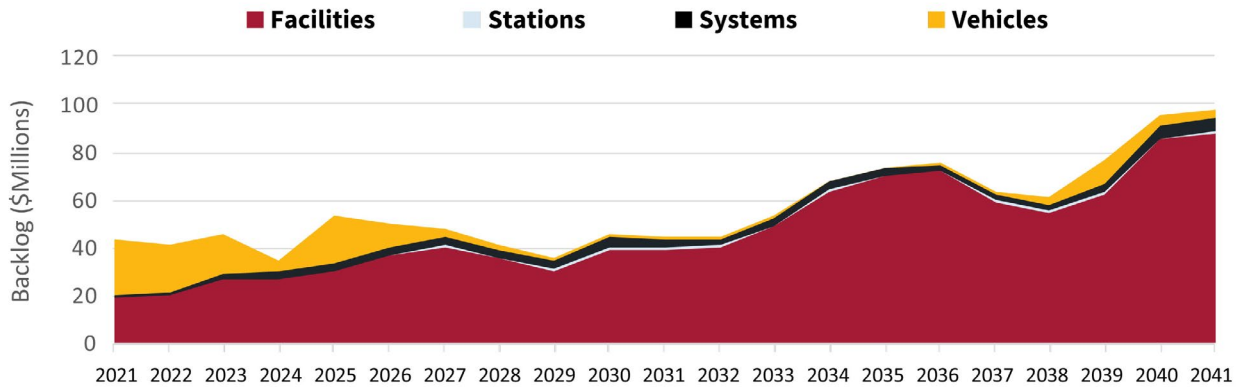

Figure 13. Backlog by Category, Scenario 1 (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.2 SCENARIO 2 – ROLLOVER PREVIOUSLY UNSPENT CAPITAL AWARDS

The second scenario estimates the amount of unspent capital funds the Tier II LOTS have been awarded in the past 7 years and allocates that additional money to future projects. Currently there is estimated to be $30.9 million in unspent capital funds. This scenario builds on the funding estimate presented in Scenario 1 of an initial $15.2 million of funding in CY2022 which increases by 2.82 percent each year. The $30.9 million in unspent funds are then allocated to CY2022. This results in a CY2022 funding projection of $46.1 million and an overall annual average funding level of $21.6 million. Figure 15 depicts the projected funding for the next 20 years under this scenario.

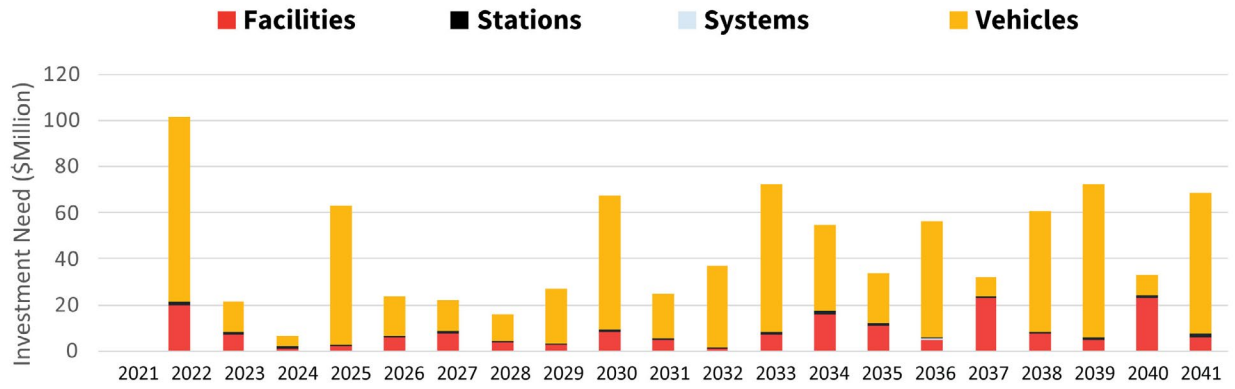

Figure 14. Scenario 2 Annual Funding Projections by Category (Year of expenditure (YOE) dollars, Calendar Year (CY))

The large amount of initial funding in CY2022 causes the SGR backlog to decrease dramatically, reaching a low of $0.3 million in CY2029. However, the SGR backlog then starts to gradually increase to a total of $80.4 million by CY2041. Figure 16 depicts these trends in the SGR backlog.

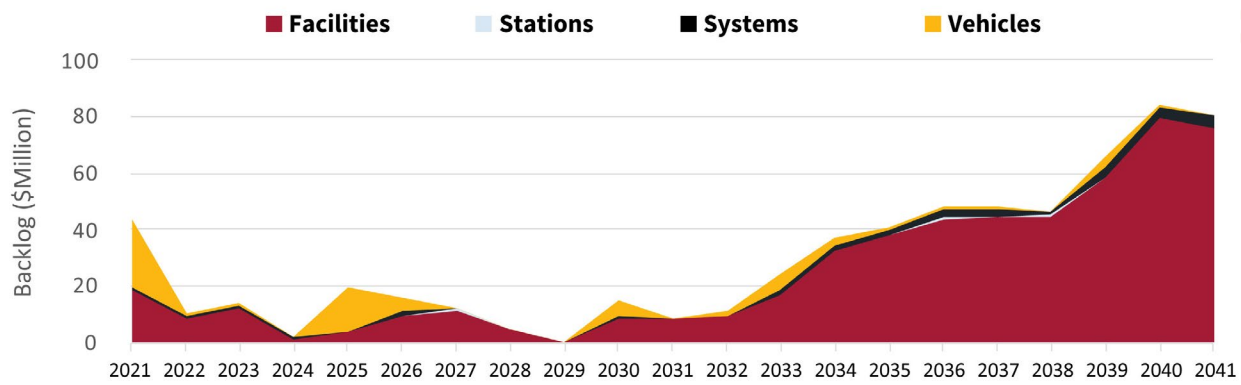

Figure 15. Backlog by Category, Scenario 2 (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.3 SCENARIO 3 – 10% STATE MATCH REINSTATED

The third scenario represents the best-case scenario for potential funding. It includes the 5339 discretionary grants and increased awards for facilities and other 5307 funding increases. It also includes the 10% state match that has not been in effect since 2020. With these forecast assumptions, the base funding level in CY2022 is $16.7 million, which increases by 2.82 percent each year for an average annual funding of $22.0 million. This represents a $3.5 million funding gap from the average unconstrained need of $25.5 million. In this scenario, the SGR backlog begins at $44.0 million in the CY2021 and decreases to $56.9 million in CY2041. Although this is a nominal increase, in 2021 dollars the CY2041 backlog is $32.6 million, meaning a decrease from the CY2021 level. As with other scenarios, the majority of the SGR backlog in CY2041 is the Facilities' SGR backlog. In CY2041, 96% of the total backlog is projected to be comprised of the Facilities' SGR backlog. Figure 17 shows the forecasted SGR backlog by asset category for Scenario 3.

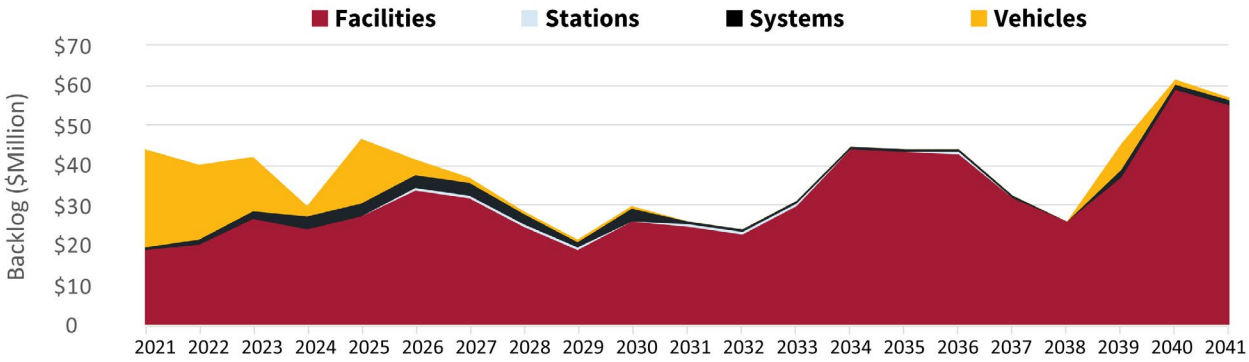

Figure 16. Backlog by Category, Scenario 3 (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.4 SCENARIO 4 – CURRENT FUNDING LEVELS WITHOUT 5339 DISCRETIONARY FUNDING

The fourth scenario represents the worst-case projection for future funding. The base funding level in CY2021 for Scenario 4 is $11.2 million (see Table 19), which is escalated 2.82 percent annually for an average annual funding of $14.8 million – this presents a $10.7 million gap from the average unconstrained need of $25.5 million. This funding scenario does not include the 5339 discretionary grants but does include increased awards for facilities and other 5307 funding increases. The total backlog grows more steadily in this scenario, from $44.0 million in CY2021 to $183.1 million in CY2041 (YOE dollars). Once again, the facilities category comprises most of the SGR backlog, growing from $18.9 million in CY2021 to $152.2 million in CY2041. The vehicles' SGR backlog decreases from $24.2 million in CY2021 to $23.2 million in CY 2041. Figure 18 shows the forecasted SGR backlog by asset category for Scenario 4.

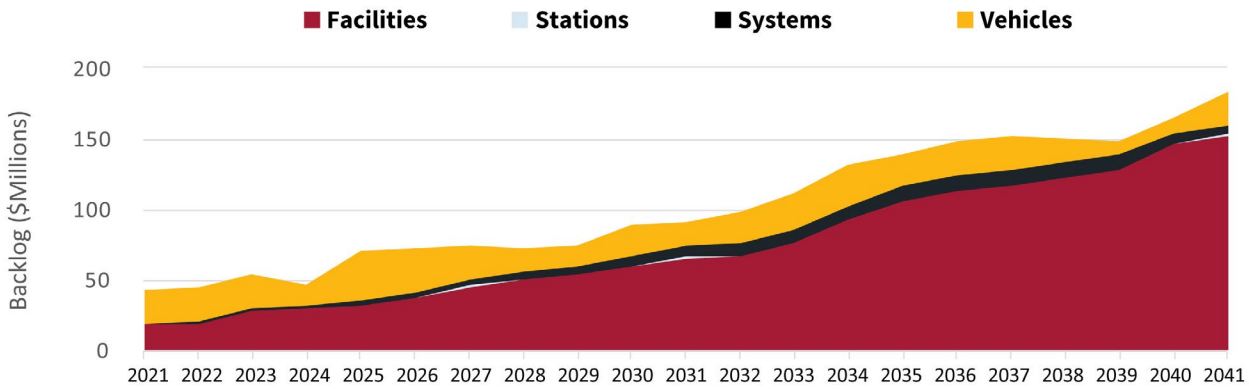

Figure 17. Backlog by Category, Scenario 4 (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.5 SCENARIO 5 - HISTORICAL AVERAGE FUNDING

The base funding level in CY2021 for Scenario 5 is the historical average level of $18.3 million (see Table 20) which is escalated 2.82 percent annually for an average annual funding of $24.1 million – this presents a $1.5 million funding gap from the average unconstrained need of $25.5 million. The total backlog declines over time in this scenario, from $44.0 million in CY2021 to $0 in CY2038 before rising again to $17.3 million in CY2041 (YOE dollars). Like other scenarios, the facilities category comprises most of the SGR backlog. Despite declining from $18.9 million in CY2021 to $17.3 million in CY2041, the facilities backlog makes up 100% of the backlog in the final year. The vehicles SGR backlog decreases from $24.2 in CY2021 to $0 in CY2028. Figure 19 shows the forecasted SGR backlog by asset category for Scenario 5.

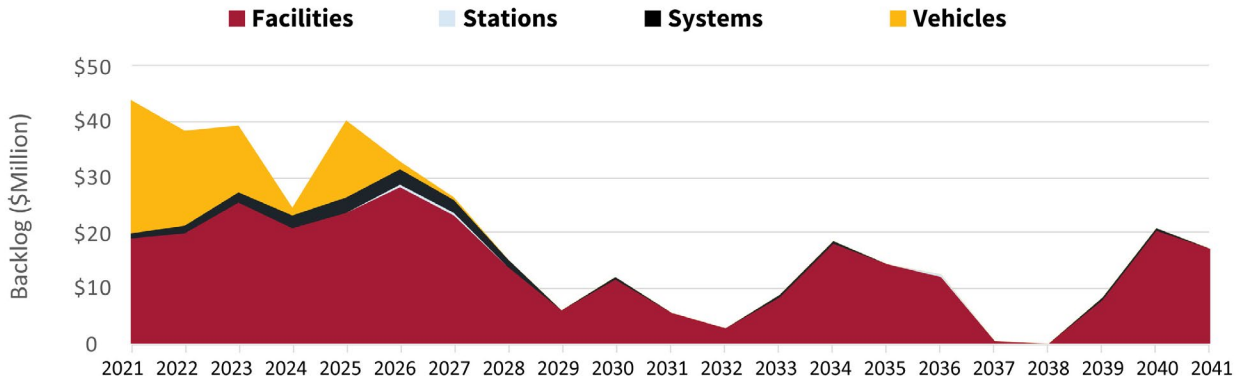

Figure 18. Backlog by Category, Scenario 5 (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.6 SCENARIO 6 - 50% BACKLOG TARGET SEEK IN 20 YEARS

The goal of the sixth scenario is to reduce the 2021 backlog to 50 percent of its current value by the end of the twenty-year period. Since the purpose of this scenario is to understand how much funding will be required to achieve the 50% backlog reduction goal, the model was run as an unconstrained scenario (i.e. no funding limits). This scenario achieved a 49 percent backlog reduction to $22.6 million (in 2021 dollars) which is equivalent to $39.5 million in 2041 dollars (see Figure 20).

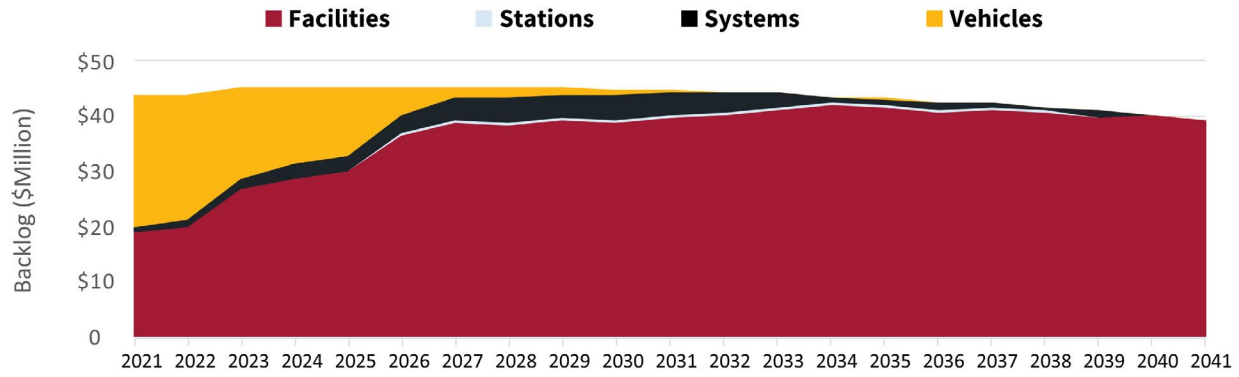

Figure 19. Backlog by Category, Scenario 6 (Year of expenditure (YOE) dollars, Calendar Year (CY))

While the vehicles backlog is almost completely cleared over the period, the facilities backlog grows significantly from $18.9 million in CY2021 to $39.5 in CY2041, making up most of the period-end backlog. To achieve this, the required initial funding in CY2022 is $12.7 million reaching a maximum of $44.7 million in CY2039 before reducing to $33.9 million in CY2041. Over the twenty-year period, the total investment is $459.3 million for an average of $23.0 million a year which is $3.0 million more than the average annual current funding level (with 5339 funding). Figure 21 shows the projected need by asset category for Scenario 6, showing that most of the investment over the years goes towards vehicle assets.

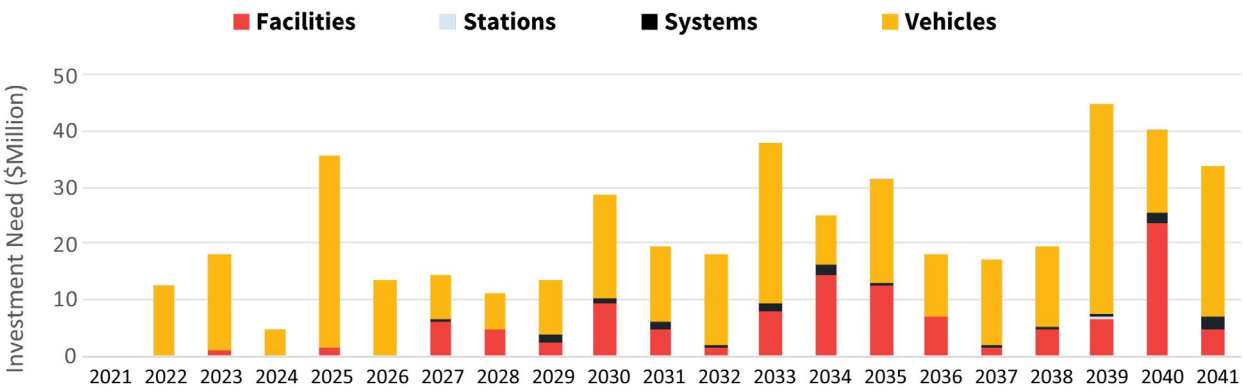

Figure 20. Scenario 6 Annual Investment Needs by Category (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.7 SCENARIO 7 – 100% BACKLOG TARGET SEEK IN 20 YEARS (MAINTAIN BACKLOG)

In the seventh scenario, the goal is to maintain the existing backlog at the same level through the twenty-year period. Figure 22 shows that the total backlog grows to $78.9 million in CY2041; however, this is equivalent to $45.2 million in 2021 dollars, indicating a relatively maintained backlog level compared to the starting backlog. As shown, facilities assets again make up most the period-end backlog increasing from $18.9 million in CY2021 to $74.4 million in CY2041. The greatest reduction is in the vehicle backlog starting with $24.2 million reducing to $2.7 million over the twenty-year period.

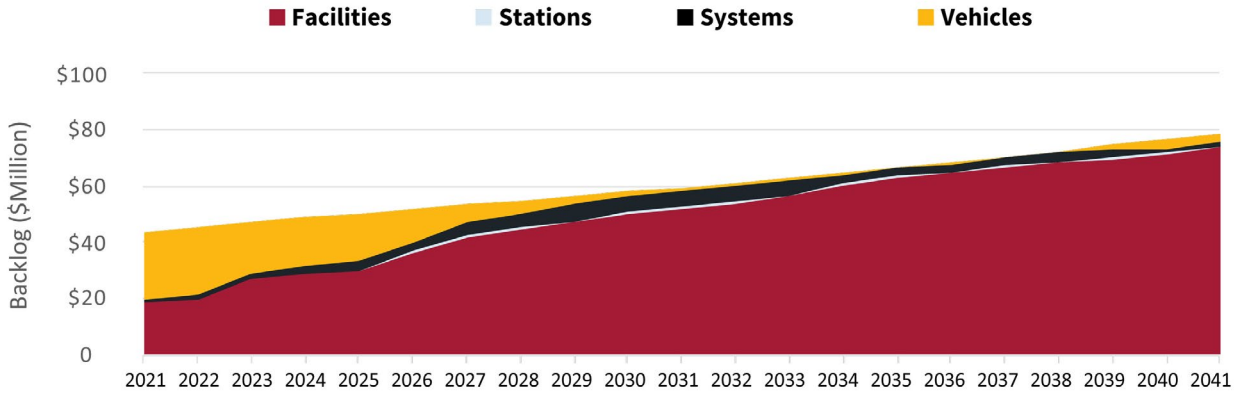

Figure 21. Backlog by Category, Scenario 7 (Year of expenditure (YOE) dollars, Calendar Year (CY))

To achieve this, the initial funding need in CY2022 is $11.6 million reaching a maximum of $46.3 million in CY2039. The total twenty-year investment is $321.8 million for an average of $16.1 million per year. Figure 23 shows the projected need by asset category for Scenario 7, showing that here again, most of the investment over the years goes towards vehicle assets.

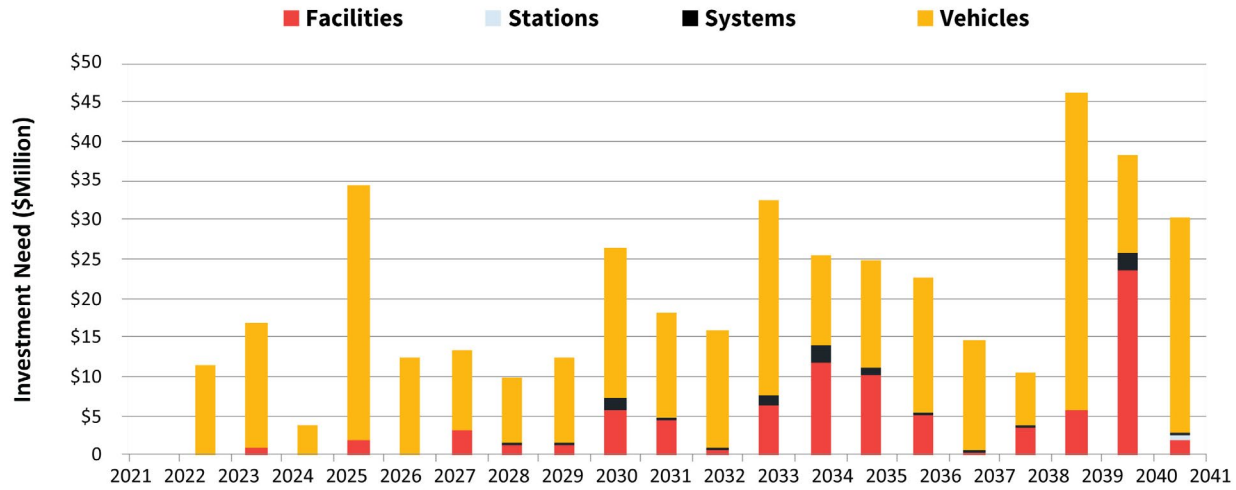

Figure 22. Scenario 7 Annual Investment Needs by Category (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.8 SCENARIO 8 – ZERO-EMISSION VEHICLE TRANSITION

In the eighth scenario, TERMLite analysis was used to project the state of good repair backlog over the next 20 years given ZEV replacement costs. In this scenario, current vehicle replacement costs were replaced with the ZEV replacement costs detailed in Table 19. Using the historical average funding from the past seven years, the base funding level in CY2021 is $18.3 million (see Table 20) which is escalated 2.82 percent annually for an average annual funding of $24.1 million. This presents a $20.5 million funding gap from the average unconstrained need of $44.6 million when considering ZEV replacement costs. The total backlog increases over time in this scenario, from $76.4 million in CY2021 to $301.4 million in CY2041 (YOE dollars). The vehicles SGR backlog increases from $56.6 in CY2021 to $117.3 in CY2041. Figure 23 shows the forecasted SGR backlog by asset category for this scenario. As expected, increased vehicle costs if LOTS have to transition to ZEV vehicles will cause a need for more funding to appropriately manage the resulting backlog.

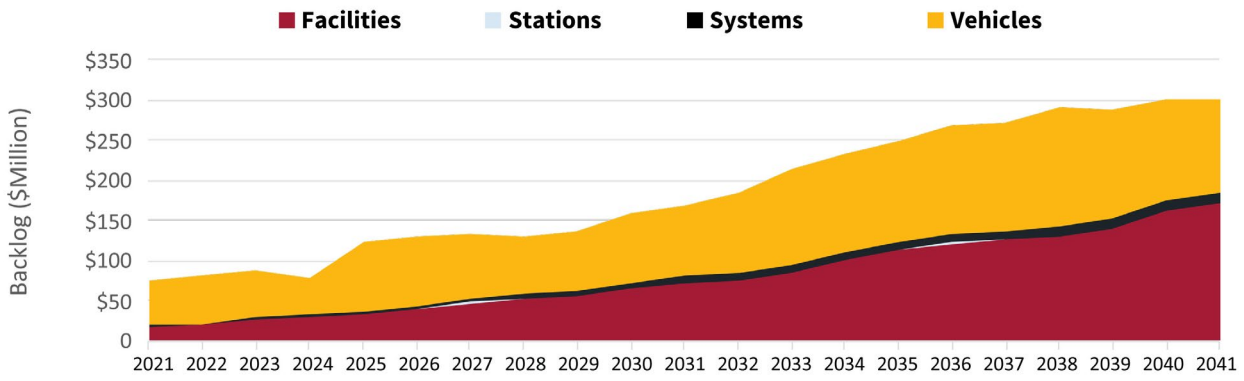

Figure 23. Backlog by Category, Scenario 8 (Year of expenditure (YOE) dollars, Calendar Year (CY))

8.2.9 COMPARISON OF FUNDING SCENARIOS

Model projections have shown that the total funding required to clear the Tier II LOTS SGR backlog and maintain it at zero for the twenty-year period is $510.7 million with an average of $25.5 million per year. This is an overall reduction from the 2021 projections, which illustrates an improvement in inventory condition as a result of inventory refinement, critical asset investments, and additional emergency funding over the last year. With funding maintained at current levels and the additional 5339 funding with inflation considered, the backlog is projected to increase from $44.0 million in 2021 to $97.6 million in 2041 dollars (Scenario 1). Adding the estimated $30.9 million in unspent capital funds to this scenario, the backlog still increases but to a lower level at $80.3 million (Scenario 2). With current funding levels maintained, additional 5339 discretionary funding, and the 10% state match in funds (Scenario 3), the backlog is projected to increase to $56.9 million dollars, this is equivalent to $32.6 million 2021 dollars and represents a reduction in the backlog over the twenty-year period. If funding is maintained without 5339 funding (Scenario 4), the backlog is projected to reach $183.1 million dollars which is equivalent to $105.0 million in 2021 dollars. This represents a large increase in backlog under this scenario. If funding is reverted to the historical average amount (Scenario 5), the backlog is projected to decrease even more to $17.3 million dollars, this is equivalent to $9.9 million in 2021 dollars. This represents decreases in both real and nominal dollar amounts. To reduce the backlog to 50% of its current value, an average annual investment of $23.0 million is needed (Scenario 6) and to maintain the backlog at the level it is now, accounting for inflation, an average annual investment of $21.1 million (Scenario 7). When considering increased replacement costs of ZEVs (Scenario 8), the backlog grows to $301.4 million, which is equivalent to $172.8 in 2021 dollars. Figure 25, provides an overview of the projected twenty-year period backlog for each scenario. This analysis shows that any reduction in funding will result in backlog growth and a worsening overall asset condition.

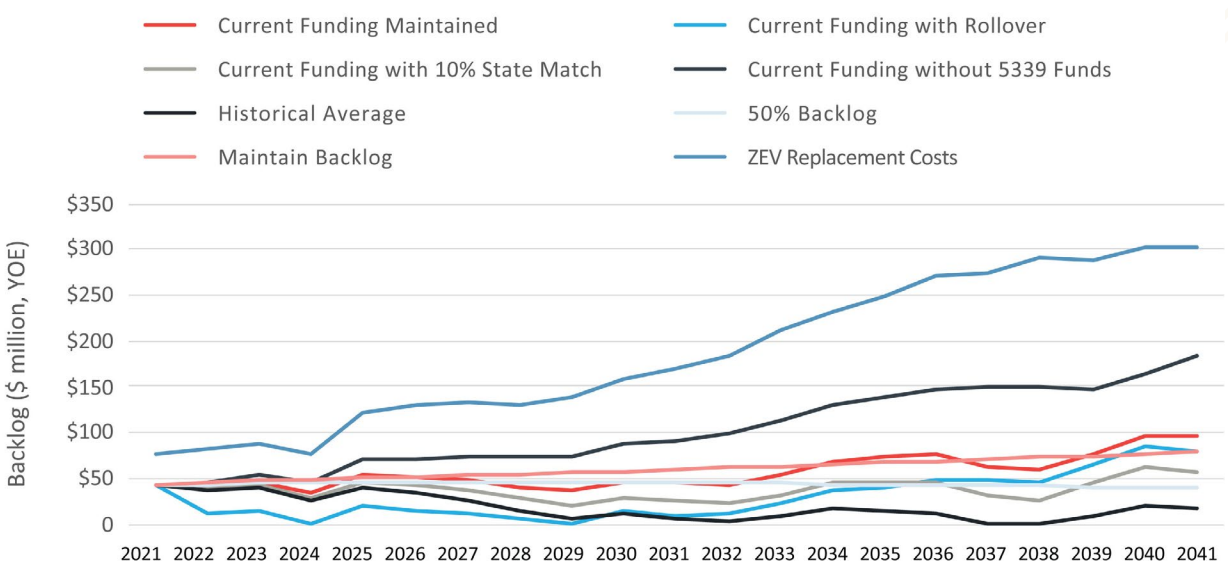

Figure 24. Scenario Analysis Backlog Growth (Year of expenditure (YOE) dollars, Calendar Year (CY))

Table 20 provides a comparison of the average annual investment, total funding and resulting funding gap over the forecast period, for each scenario. As shown, Scenario 5 is the most favorable of the seven scenarios in terms of the funding gap and resulting backlog. Scenario 4 is the worst-case scenario and results in the largest funding gap over the 20-year period and the highest backlog at period end.

Table 22. Comparison of 20-Year Total Funding and Gaps (YOE dollars)

Scenario	Average Annual Investment	Average Annual Funding Gap	Backlog at Period End (2041$)	Backlog at Period End (2021$)
1 – Current Funding + 5339 Sustained	$20.0 million	$5.5 million	$97.6 million	$56.0 million
2 – Current Funding + 5339 + Rollover	$21.6 million	$4.0 million	$80.4 million	$46.1 million
3 – Current Funding + 5339 + 10% State Match	$22.0 million	$3.5 million	$56.9 million	$32.6 million
4 – Current Funding - 5339	$14.8 million	$10.7 million	$183.1 million	$105.0 million
5 – Historical Funding	$24.1 million	$1.5 million	$17.3 million	$9.9 million
6 – 50% Backlog	$23.0 million	$2.6 million	$39.5 million	$22.6 million
7 – Maintain Backlog	$21.1 million	$4.5 million	$78.9 million	$45.2 million
8 – Historical Funding with ZEV replacements	$24.1 million	$20.5 million	$301.4 million	$172.8 million

8.3 INVESTMENT PRIORITIZATION

Investment prioritization occurs on an annual basis for MDOT MTA and the Tier II LOTS through the ATP process. LOTS identify candidate projects for funding based on their knowledge of their asset base, and ideally, based on the performance data that is made available to them. As the agencies mature in their asset management, the output of the TERM Lite models will also be used to inform project identification.

The final list of grant awards is based on current Federal funding (including any emergency response funding), adjusted state funding, and any changes to the LOTS ability to provide a local match to awarded funding. Using the existing ATP process, MDOT MTA has selected to fund the following projects for FY2023. Total federal and state investment for these projects is $19.7 million. Note that this includes funding for the LOTS' preventive maintenance programs.

Table 23. Selected Capital Investment Projects for FY 2023

LOTS	Project
Allegany	Preventive Maintenance
City of Annapolis	2 Medium Duty Buses
	Automatic Vehicle Location System
	Preventive Maintenance
Anne Arundel County	Rideshare Program
	5 Small Cutaway Buses
Baltimore City	Rideshare Program
	Passenger Ferry
Baltimore County	Rideshare Program
	2 Small Cutaway Buses
	2 Medium Duty Buses
Calvert County	Rideshare Program
	Preventive Maintenance
	2 Small Cutaway Buses
	Transfer Station Needs Assessment
	Fuel Depot
Carroll County	Rideshare Program
	2 Small Cutaway Buses
	1 Minivan
	Preventive Maintenance
Cecil County	Preventive Maintenance
	Phase 2 Design and Engineering
Charles County	Preventive Maintenance
	Facility Construction & Oversight
Dorchester County	Preventive Maintenance
	Parking Lot Improvements
	Fencing
	1 Small Cutaway Bus
	1 Transit Sedan

LOTS	Project
Frederick County	Preventive Maintenance
	2 Heavy Duty Buses
	1 Small Cutaway Bus
Garrett County	Preventive Maintenance
Harford County	Rideshare Program
	Support Vehicle
	Preventive Maintenance
Howard County	Rideshare Program
	3 Heavy Duty Buses
Queen Anne's County	Preventive Maintenance
St. Mary's County	Preventive Maintenance
	2 Small Cutaway Buses
	1 Medium Duty Bus
Talbot/ Caroline/ Kent Counties *(Delmarva Community Services)*	Preventive Maintenance
	1 Small Cutaway Bus
	1 Support Vehicle
	1 Van
Town of Ocean City	Preventive Maintenance
	2 Articulated Buses
Washington County	Forklift
	Vehicle Wash Machine
	WCT Facility Roof Replacement
Wicomico/ Worcester/ Somerset Counties *(Shore Transit/TCCLES)*	Preventive Maintenance
	3 Small Cutaway Buses
	2 Medium Duty Buses
	Mobility Management

9. Asset Management Enablers

9.1 RESOURCE AND ACCESS PLAN

Generally, most of the Tier II LOTS included in this Group TAMP have a very small staff that supports their operations and all other functions. Selected staff (one or two per LOTS) represent each provider participating in the Group TAMP in asset management discussions which are centrally coordinated by OLTS at MDOT MTA. OLTS has an organizational structure that identifies Regional Planners (RP) responsible for coordinating with assigned LOTS throughout the year on all aspects of the planning process. Figure 25 shows the overall organizational structure at OLTS. Within the group, one RP is appointed as the asset management lead and point of contact; however, almost all the OLTS staff are engaged in asset management activities from the asset inventory process through the ATP process.

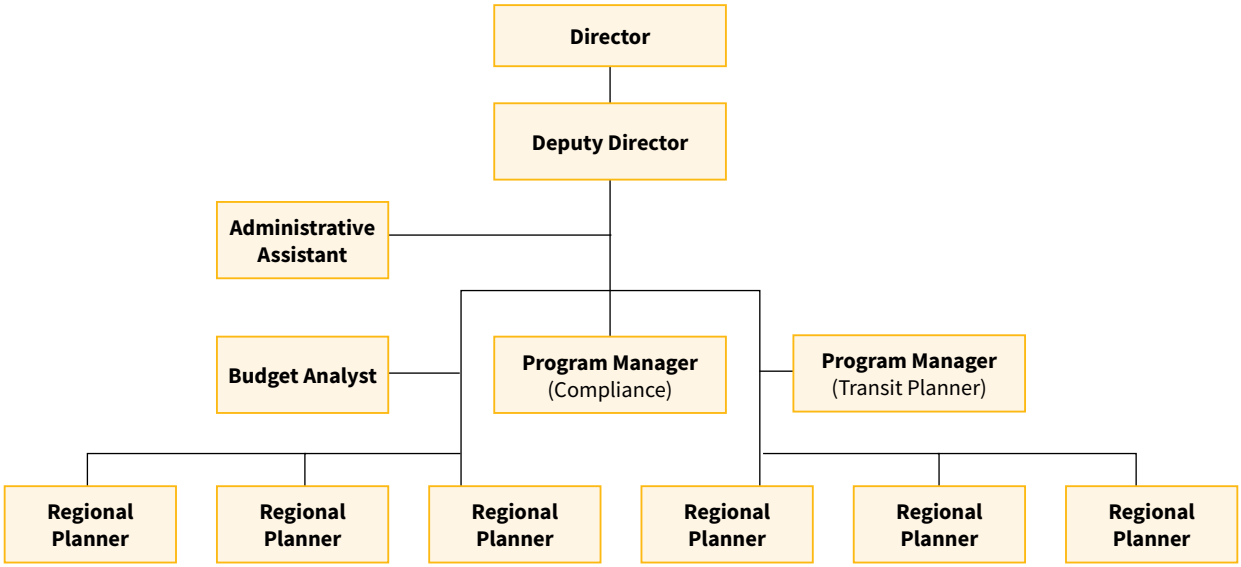

Figure 25. OLTS Organizational Structure

9.2 CORE BUSINESS PROCESSES

Federal regulations require the LOTS to collect and analyze asset inventory information to determine asset condition and establish performance measurement targets, inform capital investment prioritization strategies, and ultimately develop and update a plan (this TAMP) to meet asset performance targets. This asset management process provides strategies to plan for and coordinate all activities related to asset maintenance, rehabilitation, and replacement, from procurement through decommissioning, to ensure that the asset reaches its optimal useful life without sacrificing safety, reliability, or cost-efficiency. The asset management planning process must be implemented to feed into the existing core business processes that MDOT MTA and the LOTS use, improving processes as needed. This section describes those processes that inform or are informed by the asset management planning process.

9.2.1 ASSET INVENTORY AND CONDITION ASSESSMENT

Throughout the year, LOTS closely monitor their inventory to track the number of assets they own, asset replacement value, and asset condition. On an annual basis, LOTS are expected to submit their current inventory through Microsoft Excel based forms (referred to as Form 6, 6A, and 6B) which document all assets used in revenue service and the condition of those assets.

9.2.2 PERFORMANCE MEASUREMENT AND CONDITION ASSESSMENT

MDOT MTA monitors LOTS operational performance to ensure that resources are being used to efficiently deliver service, comply with federal and state requirements, assess service quality, and inform performance improvement initiatives. LOTS submit performance indicators to MDOT MTA using Form 2a, on a monthly, bimonthly, and/or quarterly basis. MDOT MTA has established operating performance standards based on service type which are updated as needed and based on a composite of peer agency performance nationwide.

Asset condition is primarily tracked based on the information provided by the LOTS in the inventory forms (Forms 6, 6A, and 6B) but projected using TERM Lite. For facilities, MDOT MTA is conducting the first round of physical facility condition assessments following the guidance provided in the FTA Facility Condition Assessment Guidebook, as well as MDOT MTA's Facility Condition Assessment Guidebook for LOTS.

9.2.3 TRANSPORTATION DEVELOPMENT PLAN

LOTS are required to develop and update TDP every five years to identify transportation needs of their service area, analyze the performance of their system, and recommend an implementation plan. The TDP is a critical document as it heavily influences the ATP each year and the budget produced in the TDP is used to comply with FTA requirements to maintain a financial plan. The TDP must be endorsed by local elected officials for the plan to be approved by MDOT MTA. Stakeholders in development of the TDP include: the LOTS, the local transportation advisory committee, the local planning department, and MDOT MTA. This group of stakeholders ensure that the TDP is well-coordinated with other local and state plans and feasible given current funding levels.

9.2.4 COUNTY MASTER PLAN

County Master Plans typically have a transportation component which includes transit. LOTS should engage in the development of their respective County Master Plans to ensure that transportation and transit are included and well-integrated with land use plans, that the transit component is compatible with the current TDP, and that the plan includes both local and regional opportunities. The Maryland Department of Planning (MDP) is the lead agency responsible for reviewing local plans such as the County Master Plan. Ultimately, MDOT is the lead agency responsible for reviewing the transportation element. Once MDOT's review is complete, the plan is forwarded to MDOT MTA through the RPs within OLTS for review of the transit element.

9.2.5 SAFETY PLAN

The federal transportation authorization bill MAP-21 (June 2012) established new transit safety programs under the oversight of FTA. MAP-21 required that public transportation agencies develop a Public Transportation Agency Safety Plan (PTASP) that complies with federal requirements and is organized and managed under a Safety Management System (SMS) framework as defined and described by FTA. Applicability of the regulation implementing this requirement (49 CFR Part 673) is limited to transit agencies that receive FTA Section 5307 Urbanized Area Formula Grant funds. However, MDOT MTA has requested that all LOTS agencies that receive either Section 5307 Urbanized Area Formula Grants or Section 5311 Rural Area Formula Grants complete a PTASP in the interest of having a consistent statewide approach to transit safety. The deadline for development and certification of the first PTASP was December 31, 2020; agencies are required to update their PTASPs on an annual basis thereafter. OLTS has provided several workshop trainings to help LOTS understand the new regulatory requirements and to assist them in developing customized PTASPs that reflect the unique size, operating characteristics, and organizational management of each LOTS agency. Under 49 CFR Part 673, agencies are required to designate an Accountable Executive, who is the same person who is authorized to approve and implement the TAMP. Each agency must also have a designated Chief Safety Officer. Other PTASP requirements include developing a Safety Management Policy Statement, establishing a nonpunitive employee safety reporting program for reporting hazards and safety concerns to executive management, and using a risk-based assessment method to prioritize how safety risks are controlled or mitigated. OLTS will monitor the initial PTASP approval and certification process and the annual updates for all Maryland LOTS agencies. The Bipartisan Infrastructure Law signed on November 15, 2021 (P.L. 117-58) established additional PTASP-related requirements for transit agencies serving urbanized areas regarding minimizing exposure to infectious diseases, developing updates to the PTASP in cooperation with frontline employee representatives, and extending safety training to maintenance personnel as well as operators and personnel directly responsible for safety. As FTA provides additional guidance on how agencies should comply with these new requirements, OLTS will provide additional training to assist the affected LOTS agencies.

9.3 DECISION SUPPORT PROCESSES/TOOLS

To support the asset management process, MDOT MTA and the LOTS utilize several processes and tools to support decision making. Table 24 provides a summary of the tools and processes used to inform these critical decisions.

Table 24. Decision Support Processes and Tools Used in TAM Planning

Process/Tool	Description/Configuration	Owner
Inventory Forms	Forms in Microsoft Excel with VBA-enabled functionality. The LOTS use these forms to track asset inventory and condition.	MDOT MTA OLTS
Annual Transportation Plan Process	Forms in Microsoft Excel, not VBA-enabled. The LOTS use this form to make capital funding requests.	MDOT MTA OLTS
Project Prioritization Tool	Microsoft Excel tool that supports capital investment decision-making.	MDOT MTA OLTS
Transportation Development Plan (TDP) Process	A strategic plan to determine future needs. This plan is revised annually.	All LOTS
TERM Lite	Microsoft Access application used to forecast estimated capital funding needs for transit assets over an extended forecast period.	FTA-owned; made freely available to transit agencies
Facility Inspection Form & Process	This form documents repair items and is completed by supervisors on a monthly to quarterly basis (depending on the LOTS).	Ocean City, Shore Transit
Local Transportation Committee	This committee has monthly meetings to gain input from elected officials on transportation priorities.	Ocean City
Internal Budgeting Process	Budgeting process is used to determine what funds are available for transportation projects.	Harford County Calvert County Allegany County Baltimore City DOT
Transit Coordinating Council	Community Partners meet quarterly to discuss community transit needs.	Harford Transit LINK
First Vehicle Maintenance System Software	This software provides reports to track fleet maintenance costs.	Utilized by Howard County, owned by a third party Utilized by Harford County, owned by a third party
Vehicle Plan	This plan reports miles, condition, and use of fleet to inform adjustments to replacement cycles. These factors are updated annually, and the plan is reassessed every 5 years at a minimum.	Harford Transit LINK

Process/Tool	Description/Configuration	Owner
Shore Transit Advisory Board	This committee includes members of the community who meet quarterly to provide input to the agency.	Shore Transit
Trapeze	Route configuration and reporting software.	Carroll County Shore Transit
Fleet Dynamics	This product is for PM scheduling and reporting, as well as tracking asset inventory.	Carroll County
Mileage and PM Spreadsheet	Microsoft Excel spreadsheet used to track mileage and PM intervals.	Calvert County Cecil County Harford County-used daily with FVS
Repair and Condition Spreadsheet	Microsoft Excel spreadsheet used to track the cost of repairs and continually assess the condition of rolling stock.	Calvert County Cecil County
Fleet Management Plan	An extensive spreadsheet that projects annual mileage, forecasts powertrain replacements, and eventual bus replacement. The plan covers a 10-year horizon.	Charles County Government
Farebox Replacement Plan	This plan tracks the replacement schedule for GFI GenFare equipment.	Charles County Government
Capital Improvement Program	Programming of capital items that need to be constructed and/or replaced. Departments submit programs or projects to one Capital Improvement Plan team, who will discuss and score based on approved criteria.	City of Annapolis Allegany County Baltimore MPO
Shah Transportation Software	This software is used to ensure efficient use of bus fleet.	DCS Inc.
Maintenance Inspection of Vehicle Disposal	An assessment to determine if any bus parts can be used in the spare parts inventory.	DCS Inc.
City Performance Measures	Performance measures used by the city to track system performance.	Baltimore City
AssetWorks FleetFocus	A fleet Management software that provides technology and tools to track maintenance and more.	Shore Transit

10. Continuous Improvement

MDOT MTA's existing process for LOTS' asset inventory and condition review, and capital investment project prioritization follows an annual cycle (i.e. the ATP cycle). Accordingly, this Group TAMP will undergo minor revisions on an annual basis to reflect updates to the asset inventory and condition, and to reflect the next set of annual capital investments towards SGR. Following FTA regulations, the entire Plan will continue to undergo a complete overhaul every four years to reflect the updated state of the assets, and to capture other key initiatives whose goal is to improve the overall asset management process towards an increased state of good repair.

In the years since the initial TAMP was published in 2018, several key improvement initiatives have been accomplished. This includes:

- **Asset Inventory Standard Operating Procedures**: An inventory user guide was developed to document the asset inventory process, especially use of the LOTS inventory forms, to alleviate challenges related to knowledge transfer between old and new staff and maintain the integrity of the inventory process.
- **Refining Existing Asset Inventory:** The LOTS asset inventory data (except facilities) has undergone intense reviews over the last four years to remove duplicates and outdated assets, correct all errors, and improve the overall data quality.
- **Facility Physical Condition Assessment**: By the end of FY2022, all of the LOTS facilities would have undergone physical condition assessments maintaining compliance with FTA regulations.
- **Facility Asset Verification:** Several efforts to generate a more accurate inventory of LOTS facilities, ownership and capital responsibility, and the equipment housed at each facility have been completed. After the initial round of physical facility condition assessments, this information has been further verified.

KEY IMPROVEMENT INITIATIVES

MDOT MTA is exploring the feasibility of the following initiatives and actions to be taken over the next four-year time horizon to continue to improve TAM for the LOTS.

Table 25. Key Initiatives to Improve LOTS Asset Management

Initiative	Description
Automated/Cloud-Based Asset Inventory Collection and ATP Process	Conduct a feasibility study to migrate the manual, Excel-based ATP application forms, the project prioritization tool, and the data collection process to an automated, cloud-based system that will streamline the tracking process between FEMP, TAMP, ATP, and NTD forms and allow automatic linking between the forms to reduce the man-hours required to review the applications.
LOTS Asset Management Dashboard Improvements	Refining the LOTS Asset Management Dashboard and migrating the tool to a web-based platform that provides stakeholders with a view of asset inventory, condition, and performance on-demand. This could incorporate use of Microsoft PowerBI with external-facing components.
LOTS Risk Management Process Improvements	Updating the ATP forms to include risk management and safety questions that will allow the incorporation of these factors in ATP grant award decisions and providing training for the LOTS on more mature risk monitoring and management.
Multi-Year Budgeting	Developing a process to allow MDOT MTA to budget for capital investment projects multiple years in advance. There are ongoing funding-related studies that could inform or shape the direction of this initiative.
OLTS Asset Management Manual	Developing a manual for MDOT MTA OLTS that documents all the steps involved in the annual asset management planning process, including the necessary processes to produce this asset management plan.
LOTS Asset Management Training Manual	Producing a manual that memorializes the training workshops and material provided to LOTS during the development of this Group TAMP to alleviate challenges related to LOTS staff turnover. This will include training videos.
Asset Management Resource and Competency Improvements	Exploring potential methods of providing additional resources at the MDOT MTA level, to improve asset management capabilities and competencies. Continue to provide training and technical assistance for the LOTS to expand their asset management capabilities and competencies.
Prioritization Tool Improvements	Updating the decision prioritization tool to account for risk and safety. This will include updates to the forms submitted by LOTS to provide data to support the prioritization process.

Appendix A:
Key Definitions

Accountable Executive

Defined by 49 U.S.C. Chapter 53 as a "single, identifiable person who has ultimate responsibility for carrying out the safety management systems of a public transportation agency; responsibility for carrying out transit asset management practices; and control or direction over the human and capital resources needed to develop and maintain both the agency's public transportation agency safety plan, in accordance with 49 U.S.C. 5329(d), and the agency's transit asset management plan in accordance with 49 U.S.C. 5326.

Asset (Definition Used by MDOT MTA Office of Finance: 2015)

Land, land improvements, buildings, building improvements, and capital equipment typically greater than $250 in value. Any high theft item or easily concealable item having a value under $250 may also be capitalized for their sensitive nature or issues. The term does not include materials, supplies, and non-capital equipment. *See definitions of Land Asset, Transit Asset, Safety-Critical Asset, and Systems Asset below for disambiguation.*

Transit Asset or Transit Capital Asset

A subset of the term "Asset." A depreciable physical Asset required to support transit service either directly or indirectly, including vehicles, stations, facilities, guideway and systems Assets, whether mobile or fixed. MDOT MTA's definition of Transit Asset can be aligned to the asset categories defined by 49 U.S.C. Chapter 53 for a Capital Asset as "a unit of rolling stock, a facility, a unit of equipment [that is nonexpendable, tangible property with a useful life of at least one year], or an element of infrastructure used for providing public transportation." Transit Assets do not include land, spare parts, or office furniture. *See definitions of Asset, Land Asset, and Safety-Critical Asset for disambiguation.*

Lifecycle

The time interval that begins with the acquisition of a Transit Asset or Land Asset and ends with the disposal of the Transit Asset or Land Asset. Lifecycle phases may include planning, design, procurement, construction, operations, maintenance, rehabilitation, and asset replacement/disposal.

State of Good Repair (SGR)

Defined by 49 U.S.C. Chapter 53 as the "condition in which a [transit asset or] capital asset is able to [safely] operate at a full level of performance." The State of Good Repair is further defined by an asset's Useful Life Benchmark (for rolling stock and equipment) or physical condition (for facilities). Assets are considered in a State of Good Repair when they do not meet or exceed their ULB or physical condition threshold. Vehicle and equipment assets, for example, are considered in a State of Good Repair, when rated as a 2.5 or above on FTA's TERM Lite scale, where 2.5 is equivalent to the ULB set for an asset class. Additionally, facilities, are considered in a State of Good Repair when rated as a 3 or above on FTA's TERM scale. *Also, see definition for Useful Life Benchmark.*

State of Good Repair (SGR) Backlog

The cumulative dollar value of deferred capital maintenance and replacement needs.

TERM Scale

The five-category rating system used in the FTA's Transit Economic Requirement Model (TERM) to describe the condition of an asset, where 5 is excellent condition and 1 is poor condition.

TERM Lite

An MS Access-based decision tool provided by the FTA for estimating SGR Backlog, annual capital investment needs, current and future asset conditions, and capital investment priorities over a 20 to 30-year time horizon. TERM Lite produces these analyses for MDOT MTA based on the most complete and comprehensive Transit Asset inventory to-date.

Tier I Transit Provider

An entity that receives federal financial assistance under 49 U.S.C. Chapter 53, either directly from FTA or as a subrecipient, that owns, operates, or manages either (1) one hundred and one (101) or more vehicles in revenue service during peak regular service across all fixed route modes or in any one non-fixed route mode, or (2) rail transit.

Tier II Transit Provider

An entity that receives federal financial assistance under 49 U.S.C. Chapter 53, either directly from FTA or as a subrecipient that owns, operates, or manages (1) one hundred (100) or fewer vehicles in revenue service during peak regular service across all non-rail fixed route modes or in any one non-fixed route mode, (2) a subrecipient under the 5311 Rural Area Formula Program, (3) or any American Indian tribe.

Transit Asset Management (TAM)

Defined by 49 U.S.C. Chapter 53 as "the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their lifecycles, for the purpose of providing safe, cost-effective, and reliable public transportation."

Transit Asset Management Plan (TAMP)

This document, which describes: the capital asset inventory; condition of inventoried assets; TAM performance measures, targets, and prioritization of investments aligned with the agency's TAM and SGR policy, strategic goals and objectives; as well as the strategies, activities, and resources required for delivering this plan (including decision support tools and processes); and other agency-wide approaches to continually improve TAM practices. While this TAMP exists as a standalone document, LMPs may be considered an extension of the TAMP by reference.

Useful Life

Defined by 49 U.S.C. Chapter 53 as "either the expected lifecycle of a capital asset or the acceptable period of use in service determined by FTA." It generally defines the minimum eligibility for retirement, replacement, or disposal of an asset.

Useful Life Benchmark (ULB)

Defined by 49 U.S.C. Chapter 53 as "the expected lifecycle or the acceptable period of use in service for a capital asset, as determined by a transit provider, or the default benchmark provided by FTA." The ULB is the realistic expectation for when an asset would be disposed or replaced based on operating environment and procurement timelines. It is not the same as "Useful Life" in FTA grant programs, is reported by age (in years), and usually only pertains to rolling stock or equipment. It is a single number shared for or within specified asset classes, although may vary across different asset classes and providers.

Appendix B: Signed Accountable Executive Approval Forms