Transit Asset Management Plan

October 2022-2026

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

From the General Manager

WMATA's first compliant Transit Asset Management (TAM) Plan was completed in October 2018 to outline our policy, approach, and targeted actions to improve Metro's asset management practices. Agencies are required to update their TAM plan in its entirety at least once every four years. The TAM Plan 2022 was created through a collaborative and data-driven approach, engaging staff throughout the agency who work directly with assets, advance the capital budget, and develop the strategic plan. It complies with the Federal Transit Administration (FTA) Moving Ahead for Progress in the 21st Century (MAP-21) TAM Final Rule that took effect on October 1, 2016.

This Asset Management Plan describes WMATA's Asset Management Policy, which is informed by our strategic plan and identifies specific actions to advance asset management in line with agency goals. We identified opportunities for improvement by comparing our current asset management practices to industry best practices and international standards. The resulting list of activities represents our commitment to improving asset management practices during the four-year horizon of this plan.

This plan communicates the steps we will take to deliver improvements in asset information to support decision-making and lifecycle planning processes. The plan also describes our efforts to continue improving communication and training programs related to asset management.

I approve and endorse this Transit Asset Management Plan as WMATA's Accountable Executive.

Approval:

I, Randy Clarke, WMATA General Manager, and Chief Executive Officer, do fully authorize and endorse WMATA's Transit Asset Management Plan, dated October 1, 2022.

Executive Summary

Background

The Washington Metropolitan Area Transit Authority (Metro) operates a complex transportation system of rail, bus, and paratransit modes. Metro owns, operates, and maintains more than $42 billion in transportation-related physical assets to ensure the safe and reliable provision of these services. Metro is implementing best asset management practices to maximize these assets' safety, reliability, and efficiency and deliver improved service to customers while managing risks and extracting the highest value associated with the region's transit assets.

In 2015, FTA established a strategic and systematic process for grantees to operate, maintain, and improve public transportation capital assets effectively throughout their life cycle. Implementing a structured asset management process – a Transit Asset Management (TAM) plan – is one key aspect of identifiable solutions to this issue.[1]

In July 2016, the FTA issued its Final Rule regarding TAM. This rule required grantees to:

- Develop a Transit Asset Management (TAM) plan that is updated at least once every four years,
- Define State of Good Repair (SGR),
- Establish performance measures and targets for SGR, and
- Comply with annual reporting requirements to the National Transit Database (NTD).

Metro established an Office of Transit Asset Management in 2011 and began building a comprehensive asset inventory. The first edition of the TAM plan was published in 2018 and completed in accordance with the standards and timeline set by the FTA TAM Rule. Over the past four years, Metro has continuously focused on opportunities for improvement of asset management practices throughout the Authority to provide safe, reliable, and effective service to customers. Capital investments have successfully been implemented over the last several years for safety, security, SGR, and the reliability of Metrorail, Metrobus, MetroAccess, facilities, infrastructure, and systems that support our transit network. The ongoing capital improvement and periodic investments in rehabilitation and replacement reduce the SGR backlog and improve performance and reliability. This second edition of the TAM plan includes our current TAM practices. It recommends continuous improvement of the asset management strategies and actions that ensure our system provides safe, reliable, and high-quality service.

This document consists of seven sections: this Introduction plus Sections 2 through 7, as follows:

Section 1: Introduction – Provides an overview and context for asset management and its importance to the industry and the Authority

Section 2: Asset Management Policy – Presents Metro's approach to asset management, including documentation of asset management policy, asset management principles, and asset management governance.

Section 3: Asset Inventory and Conditions – Summarizes our current asset inventory as well as the methodology by which the inventory is maintained. This section also presents a snapshot of asset conditions and targets for SGR measures.

Section 4: Prioritization and Reinvestment – Presents Metro's process for capital project prioritization and identifies how we publicly communicate those projects and programs. The section also identifies how we track the SGR backlog and the Authority's unconstrained 10-year capital investment need projections.

[1] U.S. DOT 2008 Transit State of Good Repair

Section 5: Asset Management Maturity Baseline – Presents an evaluation of Metro's current asset management practices and identifies gaps in those practices against industry asset management standards and our TAM policy.

Section 6: Implementation Program – Describes Metro's implementation program for asset management. This section includes an action plan, an implementation timeline, and a list of key annual activities. It also identifies required resources.

Section 7: Evaluation and Continual Improvement – Details a structure for the evaluation of progress against the plan to ensure continual improvement, as well as criteria and a process by which the plan can be revised periodically during its four-year horizon.

Appendices – Glossary, completed action items from TAM Plan 2018, and information on TAM Maturity Self-Assessment Survey

Required Transit Asset Management Plan Elements

The Fixing America's Surface Transportation (FAST) Act requires that recipients and sub-recipients of federal financial assistance develop TAM plans. Transit providers may be required to either develop their own TAM plan or participate in a Group TAM plan, depending on whether they are Tier I or Tier II organizations. In 49 CFR 625.5, the Federal Transit Administration (FTA) defines Tier I and Tier II providers as follows:

- Tier I provider means a recipient that owns, operates, or manages either (a) one hundred and one (101) or more vehicles in revenue service during regular peak service across all fixed route modes or in any one non-fixed route mode, or (b) rail transit.
- Tier II provider means a recipient that owns, operates, or manages (a) one hundred (100) or fewer vehicles in revenue service during regular peak service across all non-rail fixed route modes or in any one non-fixed route mode, (b) a sub-recipient under the 5311 Rural Area Formula Program, (c) or any American Indian tribe.

A Tier I TAM plan must include all the nine elements, while a Group plan must include only elements one through four. Metro is considered a Tier 1 agency, so the TAM plan addresses all nine essential elements.

Table ES-1 lists and describes these elements with cross-references to where each FTA element is addressed in Metro's TAM plan.

Table ES-1. FTA TAM Plan Requirements

TAM Plan Elements		Description	Metro TAM Plan Section
1	Asset Inventory	A register of capital assets and information about those assets	Section 3
2	Transit Asset Conditions Assessment	A rating of the assets' physical state; to be completed for assets for which an agency has direct capital responsibility; should be at a level of detail sufficient to monitor and predict the performance of inventoried assets	Section 3
3	Decision Support Tools	Analytic processes or tools that (a) assist in capital asset investment prioritization and/or (b) estimate capital needs over time	Section 4

Table ES-1. FTA TAM Plan Requirements

TAM Plan Elements		Description	Metro TAM Plan Section
4	Prioritization	A prioritized list of projects or programs to manage or improve the SGR of capital assets	Section 4
5	TAM and SGR Policy	Executive-level direction regarding expectations for transit asset management; a TAM strategy consists of the actions that support the implementation of the TAM policy	Section 2
6	Implementation Plan	A series of action steps for an agency to take to obtain and maintain an SGR. Addresses not only capital projects but also process and program capability improvements	Section 6
7	List of Annual Activities	The actions needed to implement a TAM plan for each year of the plan's horizon	Section 6
8	Resources	A summary or list of the resources that a provider needs to develop and carry out the TAM plan	Section 6
9	Monitoring, Evaluation, and Updates	An outline of how a provider will monitor, update, and evaluate, as needed, its TAM plan and related business practices, to ensure continuous improvement	Section 7

Sources: 49 CFR 625.25 Parts C and D

Summary of Metro's TAM Plan Recommendations and Implementation Program

Metro's TAM plan summarizes and outlines how people, processes, and tools come together to support the Authority's asset management effort. It provides information about near-term tactical actions and longer-term strategic initiatives that we will execute. These will provide actions on and visibility for integrating asset management into decision-making and other practices regarding maintenance, capital reinvestment, service delivery, lifecycle cost management, and resilience. Additionally, it provides helpful information on how we will integrate and communicate asset management activities across and beyond the organization.

As an umbrella document, this TAM plan also includes as a key component a detailed TAM policy that supports and aligns with the organization's strategic plan, principles, and objectives. Both recognize that asset management is inherently cross-functional and empower our GM/CEO and the Senior Executive Team to enable each department to implement this plan, with the Transit Asset Management Office providing leadership and coordination.

Metro's TAM plan includes an implementation program noting the actions needed to seize high-priority opportunities and elevate ongoing asset management practices. The resulting list of activities summarized below and in Chapter 6 represent our commitment to improving asset management during the four-year horizon of this plan.

This TAM plan will:

- Outline how people, processes, and tools come together to address asset management policy and goals;

- Define the importance of asset management roles and responsibilities;
- Include asset management policy key principles and the current asset management practices at Metro;
- Meet the FTA reporting requirements; and
- Consolidate responsibilities, governance, and asset inventory information.

The outcome of this TAM plan key actions/initiatives will:

- Improve the coordinated use of asset management-related software applications;
- Support opportunities for more consistent internal communications;
- Improve opportunities for consistent and connected business processes for all asset management practices;
- Improve the connection between the materials procurement process and the materials needed;
- Improve opportunities for consistent use of the Enterprise Asset Management (EAM) system for maintenance management and other asset management activities;
- Develop strategic asset management lifecycle plans for all critical asset classes and improve maintenance practices and replacement/renewals cycles;
- Develop, support, and reinforce an asset management culture of continuous improvement;
- Provide accountability and visibility for further understanding of asset management practices; and
- Support planning, budgeting, and communications with internal and external stakeholders.

Metro will focus on critical improvements in existing asset information to support decision-making and implementation of improved lifecycle planning processes. Additionally, we will improve communication and asset management training to improve our competency and continuous-improvement culture. Finally – and most important- we will continue improving fundamental business processes and develop asset management lifecycle plans and conditions-assessment methodologies necessary for the stewardship of a safe and reliable transit system.

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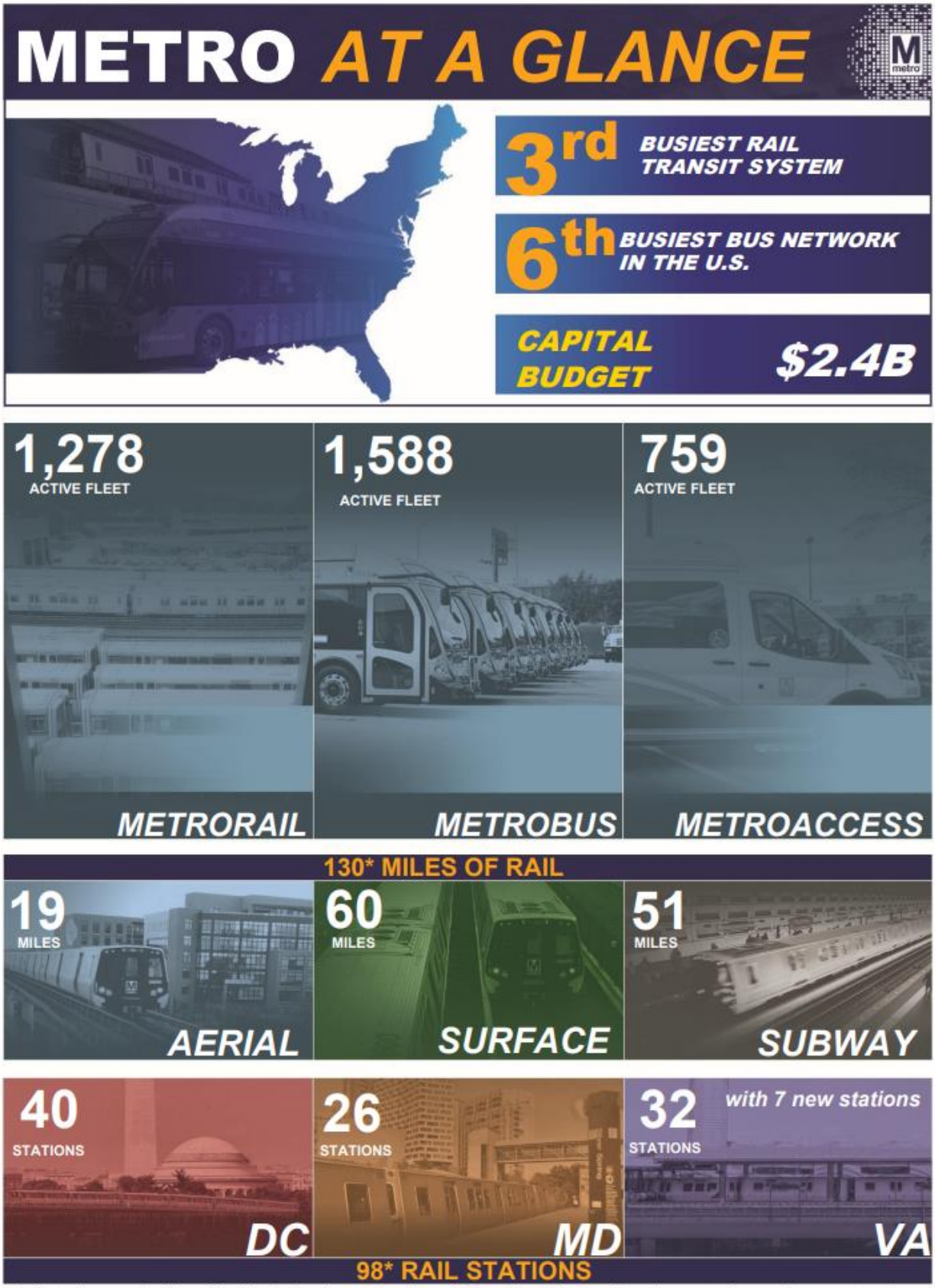
Acronyms and Abbreviations

ADA	Americans with Disabilities Act
AIM	Asset Inventory Module of the National Transit Database
AM	Asset Management (generally)
AMLP	Asset Management Lifecycle Plans
APTA	American Public Transportation Association
ASP	Agency Safety Plan
CAPD	Capital Delivery Office
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CFR	Code of Federal Regulation
CIP	Capital Improvement Program
CMMS	Computerized Maintenance Management System
CNI	Capital Needs Inventory
CNG	Compressed Natural Gas
CNF	Capital Needs Forecast
COO	Chief Operating Officer
CY	Calendar Year
EASI	Enterprise Asset Systems Improvement Initiatives
EAM	Enterprise Asset Management
ELES	Office of Elevators and Escalators
ENGA	Engineering and Architecture Office
EVP	Executive Vice President
EOC	Executive Oversight Committee
EPA	Environmental Protection Agency
FAMO	Facility Asset Management Office
FAST	Fixing America's Surface Transportation Act, 2015
FCA	Facility Condition Assessment
FTA	Federal Transit Administration
FSVT	Facilities, Systems, and Vertical Transportation Maintenance Office
FY	Fiscal Year
GM	General Manager
IBOP	Internal Business Operations Office
ISO	International Organization for Standardization
KFA	Key Focus Areas (for asset management practice)

LAND	Real Estate and Parking Office
LOS	Level of Service
MAP-21	Moving Ahead for Progress in the 21st Century
MARC	Management Audits Risk and Compliance Office
MOWE	Maintenance of Way Engineering Office
MPLN	Maintenance Planning and Scheduling
MPO	Metropolitan Planning Organization
MWCOG	Metropolitan Washington Council of Governments
NTD	National Transit Database
NTSB	National Transportation Safety Board
OSHA	Occupational Safety and Health Administration
PA	Public Address
RCM	Reliability Centered Maintenance Training
RCMP	Reliability Centered Maintenance Planning Office
REAM	Reliability Engineering Asset Management Office
REPA	Reliability Engineering and Performance Analysis Office
SAFE	Department of Safety
SCM	Supply Chain Management Office
SET	Senior Executive Team
SGR	State of Good Repair
SLPH2	Silver Line Phase 2
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SPDR	Speed Restrictions
SPPM	Strategy, Planning and Program Management Office
TAICA	Transit Asset Inventory and Condition Assessment
TAM	Transit Asset Management
TAMO	Transit Asset Management Office
TERM	FTA's Transit Economic Requirements Model
TERM Lite	Local/State Version of TERM
TPB	Transportation Planning Board of MWCOG
TRB	Transportation Research Board
ULB	Useful Life Benchmark
WMATA	Washington Metropolitan Area Transit Authority, also referred to as "Metro" or "the agency."
WMSC	Washington Metrorail Safety Commission



*Rail stations and miles of rail include six new stations (Silver Line Phase 2) and one station under construction (Potomac Yard) with planned openings in FY2023

1. Introduction

As the primary transit service provider for the National Capital Region, the Washington Metropolitan Area Transit Authority (Metro) operates a complex transit system of rail, bus, and paratransit. Across a multi-jurisdictional service area of approximately 1,500 square miles, our system delivers around a half-million passenger trips each weekday, with an approximate 44/56 ratio between rail and bus, respectively. The paratransit service provides another 4,500-weekday trip. We operate and maintain more than $42 billion in physical assets to ensure the safe and reliable provision of these services.

To provide the region with safe, reliable, equitable, and cost-effective transportation, we allocate resources to maintenance and periodic reinvestments in rehabilitation and replacements of assets. Simultaneously, we respond to changes in safety and other regulatory requirements, technology, and support of near-term system enhancements.

Asset Management is a set of policies and business processes that help Metro and our customers to achieve maximum value from the system's assets and ensure we can deliver safe and reliable service to the region. This Transit Asset Management (TAM) plan describes the current state of Asset Management at Metro. It makes recommendations for improvements to allow us to continue providing safe, reliable, and high-quality service to the National Capital Region.

1.1 Brief History of Metro

Metro was created in 1967 by the Interstate Compact to plan, develop, build, finance, and operate a balanced regional transit system in the Metro Compact Transit Zone. The jurisdictions in the Transit Zone are depicted in Figure 1-1. Construction began on the Metrorail system in 1969, and the first segment opened to operation in 1976. The Silver Line Phase 1 opened in 2014 with 11.6 miles and five new stations, extending service to Tyson Corner and Reston. The Silver Line Phase 2 will include six additional stations, extending service to Dulles International Airport and Loudon County and the future Potomac Yard Station expected to open in late October 2022. The Metrobus system began in 1973 when four area bus systems were acquired and consolidated by Metro. Metro began its paratransit service, MetroAccess, in 1994.

Figure 1-1. Metro Compact Transit Zone

1.2 Metro's Area of Influence

Today, Metro's service area covers approximately 1,500 square miles with a population of approximately four million people. While customers from beyond the Compact and from around the nation use the system regularly, the system provides transportation services within the following jurisdictions: the District of Columbia, the Maryland counties of Prince George's and Montgomery, and the Northern Virginia counties of Arlington, Fairfax, and Loudoun, as well as the cities of Alexandria, Fairfax and Falls Church.

Before the pandemic, ridership averaged approximately 300 million trips per year. At the onset of the pandemic in March 2020, ridership and revenue declined roughly 90 percent. The FY2023 total ridership is forecast to be 166.6 million trips, or 53 percent of pre-Covid-19 levels. Ridership is projected to improve in FY2024 but is not estimated to reach pre-pandemic levels.

1.2.1 Metrorail

Metrorail, Metro's heavy rail system, delivers approximately 230,000 passenger trips per weekday; our FY2023 Budget anticipates that we will provide more than 41 million passenger trips this fiscal year. Metro owns and operates six color-coded rail lines: Red, Orange, Silver, Blue, Yellow, and Green. Metrorail consists of approximately 118 route miles and 91 passenger stations in the revenue service (excluding SLPH2 & Potomac Yard Station). Metro has eight major rail yards to provide maintenance service to more than 1,200 railcars.

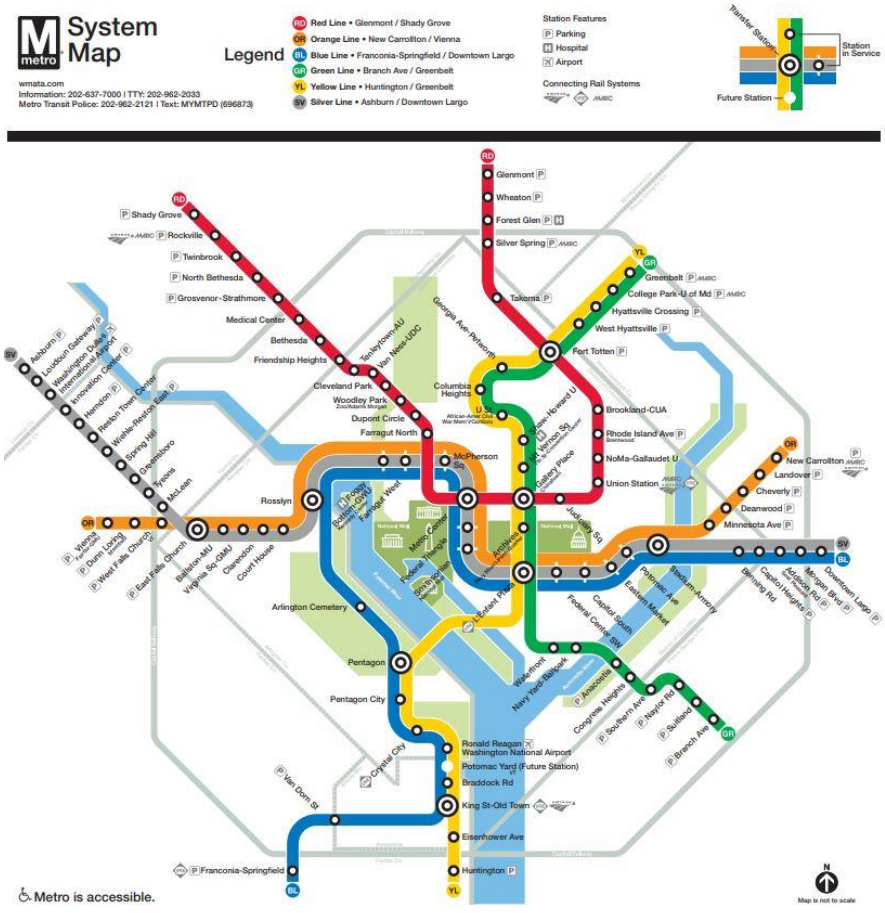


Figure 1-2. Metrorail Network

With the opening of the Silver Line Phase 2, an additional 11.4 miles with six new stations and Dulles Rail Yard will provide service to Dulles International Airport and Loudoun County. We're actively ramping up to launch revenue service in 2022. In addition, we anticipate opening a new Potomac Yard Station on the Blue and Yellow lines in Alexandria, Virginia in late 2022. Metrorail will then consist of approximately 130 route miles and 98 stations, as shown in Figure 1-2, with Silver Line Phase 2 and Potomac Yard Station opening. The asset inventory section of this document provides a more detailed listing of other infrastructure systems (e.g., signals, power, and communications systems) that support this mode of transportation.

Metrorail has three types of guideways: underground, at-grade (surface), and elevated. Table 1-1 summarizes the system's three types of structures, including the current revenue operation guideway (excluding SLPH2 & Potomac Yard Station). Due to the significant depth of many of our tunnels and the need to support the provision of Americans with Disabilities Act (ADA)-compliant services, we also operate more than 900 vertical transportation assets, as shown in Table 1-2.

Table 1-1. Metrorail Fixed Guideway Infrastructure

Types of Structures	Route miles	Stations
Underground	51	47
At-grade	58	36
Elevated	9	8
Total	**118**	**91**

Table 1-2. Metrorail Vertical Transportation

Vertical Transportation	Units
Escalators	615
Elevators	326
Total	**941**

1.2.2 Metrobus

Metrobus delivers approximately 290,000 passenger trips per weekday and is expected to provide 79 million passenger trips in FY2023. The bus system has a fleet of 1,588 buses to meet a peak service requirement of 1,299 buses. To maintain these vehicles, Metrobus operates 10 bus garages. In addition, while Metro does not maintain streets or individual bus stops, the agency owns and maintains several bus passenger facilities, such as bus shelters and other amenities at the Pentagon Metrorail Station. Metro's Board of Directors has adopted zero-emission bus goals, including phased conversion to a 100% zero-emission fleet by 2045.

1.2.3 MetroAccess

MetroAccess provides shared-ride, door-to-door service for people with disabilities for whom using Metrorail or Metrobus may not be an option. MetroAccess serves locations within the WMATA Compact area with a fare structure based on a comparison to the fastest comparable fixed-route transit service. It operates during the same hours as fixed-route transit with a fleet of 766 vehicles (FY2022) and delivers approximately 4,500 passenger trips per weekday. MetroAccess service is provided by contractors that operate the vehicles, manage the operations control center, and fulfill the quality assurance functions of the system, including vehicle maintenance.

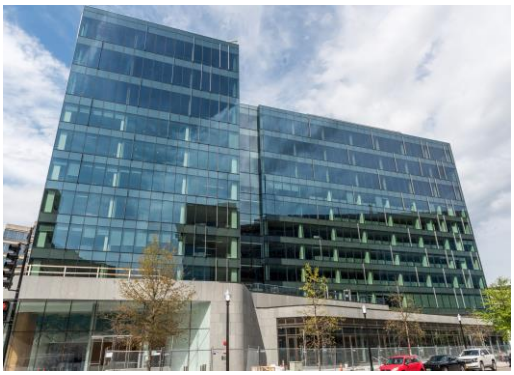
1.2.4 Facilities

A facility is an entity, or a structure/building used to provide public transportation, business activities, and management while meeting the Americans with Disabilities Act (ADA) compliance to serve the populace. Transit

Facilities are divided into four major sub-categories, as shown in Figure 1-3. Facilities used and owned or operated by Metro include administrative buildings, maintenance and operations buildings, and passenger and parking facilities.

Passenger Station Facilities

Passenger Parking Facilities



Administrative Facilities

Maintenance Facilities

Figure 1-3. Metro's Facilities

1.3 What is Transit Asset Management?

Asset Management is the set of practices, policies, and procedures that ensure that we achieve maximum value from our assets for our customers. While this description can be applied to asset management in any industry, the Federal Transit Administration (FTA) specifically defines transit asset management (TAM) as:

> *"[T]he 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 to provide safe, cost-effective, and reliable public transportation. TAM uses transit asset condition to guide how to manage capital assets and prioritize funding to improve or maintain a state of good repair."*[2]

According to the FTA, "asset" refers to physical equipment and infrastructure, including rolling stock, right-of-way, passenger stations and surface parking, facilities (e.g., administrative and operations maintenance buildings and parking structures), systems, tools, etc., that make up a transit system. The benefits of Asset Management activities described in this plan are listed in Table 1-3.

[2] https://www.transit.dot.gov/TAM/gettingstarted/htmlFAQs

Table 1-3. Benefits of Transit Asset Management

Agency Business Benefits	Results
Improved customer service	• Improves reliability, on-time performance, and service operations; greater vehicle and facility cleanliness; reduces missed trips and speed restrictions • Strengthens customer confidence in system safety and reliability • Avoids or minimizes repair or replacement failure scenarios, which often result in unplanned reactive maintenance and replacements • Focuses investments around customer-centered goals/metrics
Improved productivity and focused, optimized, and planned investments	• Maintains assets more efficiently, using condition-based approaches and predictive and preventive maintenance strategies (where these can be employed) to focus and optimize investments with sufficient lead times to avoid costly repairs/replacement on failure or crisis repairs
Optimized resource allocation	• Helps implement the SGR commitments in Long-Range and Short-Range Transportation Plans • Better aligns spending with an agency's goals and objectives to obtain the greatest return from constrained funds • Incorporates lifecycle cost, risk, and performance trade-offs into capital programming and operations and maintenance budgeting
Improved stakeholder communication	• Provides stakeholders with timely, accurate, and transparent SGR assessments and commensurate needs • Allows SGR to be implemented in an organized, methodical manner • Provides stakeholders with more accurate and timelier customer-centered performance indicators • Provides tools to communicate forecasted performance metrics (including the level of service, LOS) based on different levels of funding

Source: USDOT, FTA. Asset Management Guide: Focusing on the Management of our Transit Investments, 2013 and Paterson, L. and Vautin, D. Evaluating User Benefits and Cost-Effectiveness for Public Transit State of Good Repair Investments, Paper submitted to the Transportation Research Board (TRB) 94th Annual Meeting, Washington, D.C. November 14, 2014.

1.4 Asset Management Background at Metro

Since 2011, we have experienced increased activity associated with Asset Management-related practices. Metro began working on Asset Management improvements before the FTA's rulemaking. This included business process improvements and the creation of an Asset Management Strategy, which was developed and approved by our General Manager in 2013. The document provided an overall direction and approach for coordinating activities to deliver our goals in line with our TAM policy. The Asset Management Strategy document was a critical building block for our TAM practices and guided the development of Metro's first TAM plan.

In late 2019, the Reliability Engineering and Asset Management (REAM) office formed to provide elements of maintenance planning, reliability, and Asset Management centralized under one office. The Reliability Centered Maintenance Planning (RCMP) group supports the Office of the Chief Operating Officer (COO) to ensure that

every asset, fixed or rolling stock, is maintained properly through an effective maintenance program. RCMP includes planning and scheduling the maintenance of assets and reporting on the reliability and performance of COO equipment. The Office of Transit Asset Management (TAMO) is responsible for the development, governance, implementation, and maintenance of an EAM framework for the Authority.

To track progress, the agency has completed four asset management maturity assessments over the past decade (the latest assessment results are included in Section 5). In parallel, several key documents released (by the FTA and others) since 2011 have gradually increased the level of guidance related to Asset Management practices and aligned with the latest FTA TAM requirements. Table 1-4 lists some of Metro's key Asset Management-related documents that have increased our awareness level and provided increased Asset Management guidance.

Table 1-4. Selected Documents Related to Asset Management Practice at Metro

Date	Document
2011	First Asset Management Maturity Assessment
2013	Asset Management Strategy Document, including second Maturity Assessment
2016	Capital Needs Inventory (CNI) and Prioritization Methodology for CY 2017 through 2026
2018	Transit Asset Management Plan
2019	Strategic Plan "Keeping Metro Safe, Reliable and Affordable (FY2019 – FY2028)" released
2019	10-Year Capital Needs Forecast (CNF)-FY2019-2028

1.5 The Transit Asset Management Plan

In July 2016, the FTA issued its Final Rule regarding TAM. This rule:

1. Requires grantees to develop a TAM Plan by October 2018 and update it at least every four years;
2. Defines SGR;
3. Establishes performance measures;
4. Establishes annual reporting requirements to the National Transit Database (NTD); and
5. Requires FTA to provide technical assistance.

Metro implemented an agency-wide effort to develop this TAM plan which was completed per the standards and timeline set by the FTA TAM Rule.

1.5.1 Purpose

Metro engaged in several initiatives to fulfill our mission of providing safe, equitable, reliable, and cost-effective public transit service to customers. The FTA TAM requirements create an opportunity to continue and enhance ongoing efforts to better maintain the system in a State of Good Repair. This TAM plan allows Metro to align our asset management objectives and strategies with each other. Further, the TAM plan serves as an impetus for internal and external stakeholders to better understand the organizational, technical, and financial challenges and risks ahead and better prepare Metro and stakeholders to meet future needs and demands.

The TAM plan has the following main objectives:

- Elevate the importance of TAM to the entire organization: The process of developing and updating the plan involves collaboration with employees across a horizontal and vertical cross-section of the organization, including executives, asset owners, and Subject Matter Experts (SMEs). The update of this plan encompassed collaboration with various stakeholders and ongoing dialogue with asset owners throughout the process, as well as with the wide range of staff supporting the management of physical assets.
- Compliance with all requirements of FTA TAM Final Rule 49 Code of Federal Regulations (CFR) 625.
- Development of TAM initiatives: This plan contains activities that will guide our short- and long-term efforts. Improved asset management practices and procedures will result in optimized resource allocation, reduced lifecycle costs, and improved customer service, productivity, and stakeholder communications.
- Continuous review and improvement plan for our approach related to asset management activities.

1.5.2 Period Covered by the TAM Plan

The TAM plan is a living document that provides a strategy to continually improve business processes and the activities and tools necessary to enable us to manage our assets effectively and sustainably. While this TAM plan covers four years after its release date, as stipulated by the TAM Rule, it may be updated at any time during the four years, based on the process detailed in Section 7. The FTA suggests that the document be amended if there is a substantial change to the asset inventory or the condition of assets or if there is a significant modification to investment prioritization processes.

1.5.3 Metro's TAM Plan Contents

Metro's TAM plan examines current asset management practices, considers FTA guidance and best asset management practices, and recommends a set of actions to help ensure that our system provides safe, reliable, and high-quality service. The TAM Plan consists of seven sections: this Introduction plus Sections 2 through 7, as follows:

Section 2: Asset Management Policy – Presents our vision for asset management, including documentation of asset management policy, asset management principles, and asset management governance.

Section 3: Asset Inventory and Conditions – Summarizes our asset inventory as well as the methodology by which the inventory is maintained. This section also presents a snapshot of asset conditions and targets for SGR measures.

Section 4: Prioritization and Reinvestment – Presents the process for the State of Good Repair needs prioritization and identifies how we communicate this information publicly. The section also identifies how we track the SGR backlog and our unconstrained 10-year capital investment needs.

Section 5: Asset Management Maturity Baseline – Presents an evaluation of our current asset management practices and identifies gaps in those practices against industry asset management standards and our TAM policy.

Section 6: Implementation Program – Describes our implementation program for asset management. This includes an action plan, an implementation timeline, a list of key annual activities, and identifying required resources.

Section 7: Evaluation and Continual Improvement – Details a structure for the evaluation of progress against the plan to ensure continual improvement, as well as criteria and a process by which the plan can be revised periodically during its four-year horizon.

Appendices – Glossary, completed action items from TAM plan 2018, and TAM Maturity Self-Assessment Survey information.

1.5.4 Relationship between This Document and FTA TAM Requirements

FTA's Final Rule for TAM requires that the TAM plan address nine essential elements. Table 1-5 lists and describes these elements with cross-references to where each FTA element is addressed in Metro's TAM plan.

Table 1-5. FTA TAM Plan Requirements

TAM Plan Elements		Description	TAM Plan Section
1	Asset Inventory	A register of capital assets and information about those assets	Section 3
2	Transit Asset Conditions Assessment	A rating of the assets' physical state; to be completed for assets an agency has direct capital responsibility for; should be at a level of detail sufficient to monitor and predict the performance of inventoried assets	Section 3
3	Decision Support Tools	Analytic processes or tools that (a) assist in capital asset investment prioritization and/or (b) estimate capital needs over time	Section 4
4	Prioritization	A prioritized list of projects or programs to manage or improve the SGR of capital assets	Section 4
5	TAM and SGR Policy	Executive-level direction regarding expectations for transit asset management; a TAM strategy consists of the actions that support the implementation of the TAM policy	Section 2
6	Implementation Plan	A series of action steps for an agency to take to obtain and maintain an SGR. Addresses not only capital projects but also process and program capability improvements	Section 6
7	List of Annual Activities	The actions needed to implement a TAM plan for each year of the plan's horizon	Section 6
8	Resources	A summary or list of the resources that a provider needs to develop and carry out the TAM plan	Section 6
9	Monitoring, Evaluation, and Updates	An outline of how a provider will monitor, update, and evaluate, as needed, its TAM plan and related business practices to ensure continuous improvement	Section 7

Sources: 49 CFR 625.25 Parts C and D

2. Transit Asset Management Policy

As indicated in this section, Metro's TAM policy is the high-level document that defines the key principles underpinning the TAM plan. It states the principles and mandated requirements derived from, and consistent with, the organizational strategic plan, as expressed by our leadership. It guides the provision of the framework, the development of the asset management strategy, and the setting of goals and objectives (including achieving and maintaining SGR) and defines and assigns the roles and responsibilities for meeting those objectives.

2.1.1 Asset Management Policy Key Principles

An integral component of our TAM policy is the statement of the principles by which we will apply asset management practices and procedures to achieve our organizational strategic goals. The plan established the following Asset Management Principles, as listed below, which align with our strategic goals/principles:

1) Maintain assets in a State of Good Repair to ensure a safe, reliable, and resilient system.
2) Develop and implement policies, plans, and procedures for operating and maintaining assets cost-effectively and meeting customer demand.
3) Assess and implement tools to support data-driven asset management decisions and activities across departments.
4) Asset management decisions will be based on evaluations of alternatives, when feasible, that consider lifecycle costs, benefits, and risks associated with the asset.
5) Implement regular and standardized asset condition assessments that enable us to consolidate a comprehensive inventory of asset conditions and useful lives.
6) Promote asset management best practices throughout the organization.
7) Ensure compliance with Federal TAM requirements.

Table 2-1. Alignment of Metro's Strategic Principles/Goals with Metro's TAM Principles

Asset Management Principles		Metro's Strategic Principles		
		Safety	Reliable	Affordable
1	Maintain assets in a State of Good Repair	✓	✓	✓
2	Integrated strategic policies and procedures	✓		✓
3	Implement tools to support data-driven asset management decisions	✓	✓	
4	Decisions take into account full lifecycle costs, benefits, and risks associated with the asset	✓	✓	✓
5	Consolidate a comprehensive inventory of asset conditions and useful lives within a database	✓	✓	✓
6	Integrated Metro-wide asset management framework			✓
7	Federal Requirement	✓	✓	

2.1.2 Roles and Responsibilities

Metro's Asset Management policy aims to build lifecycle asset planning. This requires balancing costs, opportunities, and risks against the performance of the asset. Therefore, the policy states that our Asset Management activities must be coordinated and communicated across multiple departments and functional boundaries, as depicted in Figure 2-1.

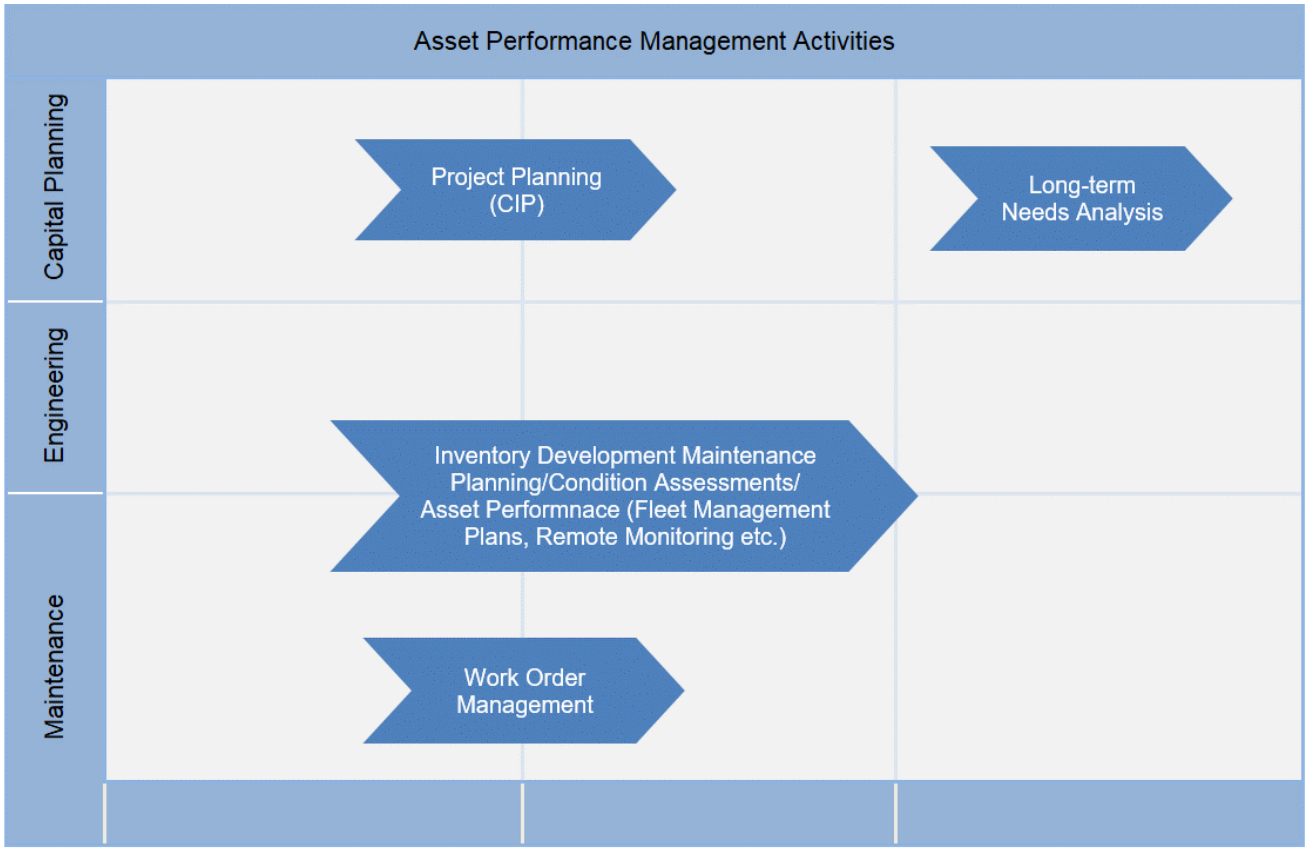


Figure 2-1. Asset Management Activities Process

As asset management is inherently cross-functional and works together with all Metro departments. It requires an integrated and coordinated effort to succeed. This TAM policy defines asset management roles and responsibilities across the organization to provide direction and support in the development and delivery of the asset management program as follows:

A. **Accountable Executive** – According to 49 CFR 625, WMATA's Accountable Executive with ultimate responsibility for carrying out the TAM plan and its related activities is the General Manager and Chief Executive Officer.

B. The **Chief Operating Officer (COO)** is responsible for the operation, supply management, vehicle delivery, performance and planning, reliability, inspection, and maintenance of the majority of Metro's (non-IT) transit assets (BUS, RAIL, Facilities, Vertical Transportation Systems, and Metro Access).

C. Under the COO, the office of **Reliability Engineering and Asset Management (REAM)** centralizes the Office of Reliability Centered Maintenance Planning (RCMP) and Transit Asset Management Office (TAMO) under a single functional group. The RCMP office includes Reliability Engineering and

Performance Analysis (REPA) as the central office for reporting on reliability performance and facilitating Reliability Centered Maintenance analyses. Maintenance Planning and Scheduling (MPLN) is the central office providing maintenance planning and scheduling services.

D. **Transit Asset Management Office (TAMO)** responsibilities include maintaining this policy; establishing Enterprise Asset Management (EAM) systems and software application governance standards; assisting asset owners with complying with asset management data requirements; reporting asset data quality compliance; establishing information strategy and standards and authoring the TAM plan. TAMO also collaborates with asset owners to deliver Asset Management Lifecycle Plans, codifying and making available information from the EAM as needed and developing the asset inventory and condition assessment process. In addition, TAMO is responsible for establishing and reporting on TAM performance measures toward meeting strategic goals and FTA-mandated TAM target setting.

E. The Office of **Supply Chain Management (SCM)** provides advanced acquisition planning, contract management, and procurement compliance services for all inventory materials/supplies across the Authority, enhancing asset availability and service delivery. SCM provides timely and quality warehousing and logistical solutions to ensure that the correct parts are in the right place at the right time, enhancing asset availability and service delivery.

F. The **Facilities Asset Management Office (FAMO)**, founded in 2019, is responsible for supporting owned and leased Metro facilities. FAMO ensures that processes and procedures under the facilities asset management framework are effectively operationalized throughout the facility's whole life. FAMO also coordinates the review and scheduling of equipment overhaul/rehabilitation projects.

G. The Office of **Strategy, Planning, and Program Management (SPPM)** build the agency's prioritized capital program and is the lead organization responsible for Needs Identification, Capital Programming, Capital Financial Management, Strategic Planning, Business Transformation, and Sustainability. SPPM ensures that the capital program aligns with identified needs and priorities.

H. The Office of **Capital Delivery (CAPD)** delivers on the major capital investment sets by the Board-Approved Capital Budget. CAPD serves as Metro's internal "design-builder," executing projects on behalf of the asset owners, specifically on major infrastructure projects that require new/updated designs, multi-discipline coordination, or significant construction/rehabilitation work.

I. The Office of **Engineering and Architecture (ENGA)** is responsible for providing Authority-wide engineering and project management services and developing design criteria and standards. ENGA works closely with maintenance and operations departments to ensure that the transit system assets are maintained and that any engineering issues on existing systems are correctly evaluated and remediated.

J. The Office of the **Chief Financial Officer (CFO)** is responsible for the financial integrity and the administrative functions of Metro, including the collection of revenues and other income, purchasing all goods and services required by Metro, accounting for the financial transactions of assets and liabilities, and planning and development.

K. The Office of **Real Estate and Parking (LAND)** manages Metro's real estate portfolio, administers the Joint Development Program, and executes real estate and station area planning and coordination with the local jurisdictions to maximize transit-oriented development around Metro stations. In addition, LAND is responsible for the acquisition, management, and disposition of property.

L. The Office of **Safety (SAFE)** is responsible for partnering with the COO to establish and maintain a safe environment for our assets, employees, and customers through the direction, oversight, development, and implementation of a safety program utilizing a Safety Management System (SMS) approach. SAFE works with REAM on the continual evaluation of assets to determine their safety performance and ensure appropriate mitigating action is taken and effective to provide safe and reliable public transit services. SAFE is also responsible for safety and security certification to ensure that all new or

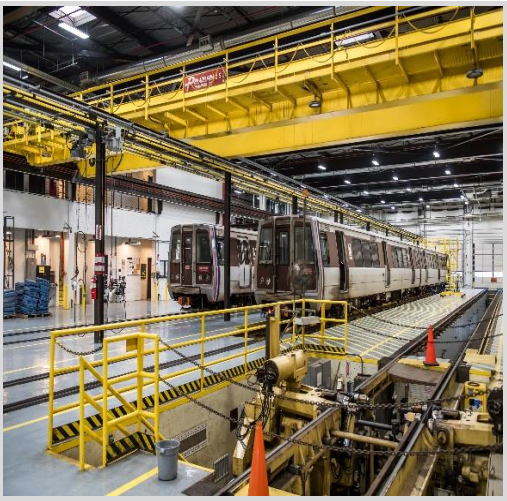
decommissioned assets comply with Federal and Metro requirements. SAFE is responsible for leading the development and implementation of the Agency Safety Plan (ASP).

M. The Office of **Internal Business Operations (IBOP)** is responsible for Metro's internal business operations, providing leadership, direction, and support to offices throughout the Authority. IBOP delivers high-quality services consistent with all laws and regulations/policies and promotes principles of fairness and merit. Additionally, IBOP provides asset acquisition support based on Metro standards and aligns procurement strategies to ensure required assets, materials, and services are provided to support transit service needs.

Metro's Asset Inventory

Passenger Stations

Non-Revenue Fleets and Equipment



Maintenance Facilities

Elevators & Escalators

Track

Bridges

Signals

Electrical

Telecommunications

3. Asset Inventory and Conditions

This section documents Metro's transit assets, including the types of assets used to provide and support transit service and their quantities and condition. The inventory and condition data included in the TAM plan is the most comprehensive snapshot of our assets to date. However, we recognize that further data improvements are needed, and these efforts are included as part of our Implementation Plan in Section 6. Our ongoing efforts to improve the comprehensiveness and quality of this data will drive changes in the resulting inventory and condition reports.

3.1 Metro's Asset Inventory

The asset inventory summarized in this section consolidates the detailed list of assets in Appendix A.2 of the publicly available 2019 Capital Needs Forecast and adds quantities and unit types. We produce a capital needs report at an established interval that captures the most current information on asset inventory, condition, valuation, and projected SGR needs. The 2019 Capital Needs Forecast and subsequent capital needs reports can be found on our website on the Capital Program Document page at https://wmata.com/initiatives/capital-improvement-program/Capital-Program-Documents.cfm.

3.1.1 Overview of Metro's Major Assets

As one of the nation's largest transit operators, Metro is the:

1. Second-largest heavy rail operator in terms of track miles and subway alignment length;
2. Third-largest heavy rail operator in terms of rail car fleet size, number of stations, and number of maintenance facilities;
3. Fourth-largest bus operator in terms of fleet size and number of maintenance facilities; and
4. Fifth-largest paratransit operator in terms of fleet size.

The inventory captured in Table 3.1 reflects Metro's assets, cross-checked with asset owners in 2022. The FTA suggests amending the document if there is a substantial change to the asset inventory or the condition of assets or if there is a significant modification to investment prioritization processes. We expect to start revenue service of the Silver Line Phase 2 Extension and the Potomac Yard Metrorail Station in late 2022.

Table 3-1. Metro's Key Asset Inventory

Asset Type	Quantity	Date Built	Unit Type
Revenue Track	1,231,308 track feet (233 track miles) – main route and pocket tracks	1974-2015	Track Feet
Yard Track	305,318 track feet (58 miles)	1977-1988	Track Feet
Aerials	133,952.686 linear feet (25 miles)	1974-2021	Linear Feet
Tunnels	475,200 linear feet (90 miles)	1974-2014	Linear Feet
Retaining Walls	216,952 linear feet (41 miles)	1976-2014	Linear Feet
Fencing	533,572 linear feet (101 miles)	1986-2015	Linear Feet
Rail Revenue Vehicles	1,236 railcars	1983-2018	Each
Bus Revenue Vehicles, Non-Articulated	2,038 buses (includes contingency fleet)	1997-2022	Each

Asset Type	Quantity	Date Built	Unit Type
Bus Revenue Vehicles, Articulated Buses	75 buses	2021	Each
MetroAccess Revenue Vehicles	766 vehicles	2014-2021	Each
Non-Revenue Vehicles	1,525 rubber-wheel service vehicles and 184 steel-wheel service vehicles	1986-2021	Each
Ticket Vending Machines	1,015 TVMs	1990-2014	Each
Fareboxes	1,782 fareboxes	2003-2004	Each
Fare vendors	537 Vendors	1990-2022	Each
Computer Hardware	10,323 units	2007-2016	Each
Rail Stations	91 stations	1976-2016	Each
Canopies	82 canopies	1978-2022	Each
Bridges	143,692 linear feet	1974-2021	Linear Feet
Bus Stop Shelters	450 shelters	1997-2006	Each
Parking Garages	27 garages	1980-2013	Each
Elevators	326 elevators	1976-2022	Each
Escalators	615 escalators	1976-2019	Each
Signals & Train Control	5,200 miles of Train Control cable	1976-2014	Miles
	148 Train Control Rooms	1976-2014	Each
	3,127 Track Circuits	1976-2016	Each
	659 Switch Machines	1986-2021	Each
	1,149 Signals	1977-2022	Each
	103 Station PA System Units	1990-2022	Each
Communications	Fiber-Optic Cable Transmission System: 534 units	1990-2022	Each
	624 Passenger Information Display Systems	2000-2022	Each
	PROTECT Chemical/Bio-Detection System~20 Stations	2016	Each
	Fire/Intrusion Detection System: 215 units	1998-2022	Each

Asset Type	Quantity	Date Built	Unit Type
	Intercom System 95	2004-2020	Each
	Kiosk Informational Display Systems (KIDS)- 100	2022	Each
	CNG Gas Detection System 607	2014	Each
Third Rail	1,249,713 feet (237 miles)	2003-2014	Linear Feet
Traction Power Substations	115 Substations	1976-2019	Each
Tie Breaker Station	104	1976-2016	Each
Facilities: Major Rail Yards	8 rail yards	1972-2016	Each
Facilities: Bus Garages	10 bus garages	1962-2018	Each
Facilities: Administrative	17 administrative facilities	1978-2022	Each
	8 police facilities	1982-2007	Each

3.1.2 Asset Inventory Development and Improvement

Metro's current asset inventory has been developed over a multi-year period and from diverse data sources. The primary data for establishing inventory include our primary asset management system (Maximo), our fixed asset ledger accounting system (PeopleSoft); project cost records from engineering; data from our tracking system for linear assets (Optram); and department-specific records systems. To a large extent, these data have been validated to ensure the records are comprehensive (cover all major asset types) and that unit quantities are correct. This inventory's output can provide a reliable baseline picture of our asset holdings' types, quantities, and unit types and a solid foundation for use in long-term needs analysis.

We have completed several efforts to continually improve the depth and quality of our asset inventory and related data. Many of these improvements were part of our initiation of the TAM plan 2018 program, which included delineating roles, responsibilities, training, and standards development related to conducting detailed on-site inspections of assets for identification and documentation (inventorying). We implemented the Parts Action Form (PAF) automated process to leverage workflow functionality within the Maximo Item Master application to ensure data governance and improved data integrity. We successfully implemented the WMATA Configuration Management (WCM), a custom-built Maximo application that improved asset maintenance, management, and integrity of asset hierarchies.

We're currently working on several efforts to modernize the EAM system and simultaneously improve accuracy, reliability, performance, and safety. The results of the following efforts will enhance the comprehensiveness and reliability of our inventory data.

- Creation of a more streamlined and structured alignment of systems from which to draw asset inventory data. We're undertaking steps to consolidate the data sources from which asset data is maintained and easily accessible for future updates. This limits data collection costs and helps control the consistency and quality of the data utilized for asset inventory maintenance.
- Continuous improvement of data standards for asset and work order records created within multiple applications in Maximo. We've enhanced the EAM to enforce compliance with the data standards for

each item and asset type and quickly identify non-conformance for responsible parties to apply corrective actions.

3.2 Condition Assessment Methodologies

We employ the following Transit Asset Condition Assessment Methodology to assess the condition and monitor the performance of assets. We use four different types of condition assessment methodologies as of the writing of this plan:

1. **Onsite visual, physical condition assessments, using the FTA 1-5 Scale**: The asset physical condition method refers to developing a score based on the observed condition of the asset, by visual assessment of the asset that may include exterior and interior condition, defects, etc. Existing periodic inspections may perform such inspections; where feasible, condition scores may be derived from such inspection reports or depending on the asset types.

   In 2020, FAMO began its first internal condition assessment effort where facilities were visited; FAMO's facility engineers conducted condition assessments based on the FTA facility condition assessment (FCA) guidebook and obtained asset datasets. FAMO used the FTA Median Value (MV) aggregation methodology for transit assets to calculate the SGR scores per facility.

2. **Modeled condition using inspection data and/or age, using the FTA 1-5 scale:** The condition uses age, useful life, and other inputs to arrive at a condition score when applicable. We also leverage maintenance inspection data for some asset classes to model asset conditions. Asset age is one of the primary variables typically used for determining remaining useful life because, based on the age of an overall asset, metrics are used to determine the percentage of the age that has been consumed.

3. **Fleet Management Planning, using Useful Life Benchmark (ULB)**: We use fleet management planning to manage vehicle forecasts. Metrobus, Metrorail, and MetroAccess fleet plans are regularly updated with the FTA's guidelines established for fleet management plans in their 1999 Dear Colleague letter and FTA's Oversight Procedure 37 – Fleet Management Plan Review.

4. **Track Segment Under Performance Restriction**: Per the FTA, a performance restriction is defined as a segment of track where trains are ordered to operate below the maximum speed due to issues with the track, power, signal systems, or other operating limitations like work zones.

Facilities and other asset classes use different systems or process tools to assess conditions. We've used the common 5-point condition rating scale that runs from excellent (5) through good (4), adequate (3), marginal (2), and poor (1) (see Table 3-2) to provide ease of understanding and alignment.

Table 3-2. FTA's Five-Point Condition Scale

Rating	Condition	Description
5	Excellent	No visible defects, near new condition
4	Good	Some (slightly) defective or deteriorated component(s)
3	Fair	Moderately defective or deteriorated component(s)
2	Marginal	Defective or deteriorated component(s) in need of replacement Note: Condition 2 indicates an asset (or significant portion of an asset) is close to, or in need of, rehab/replacement and should be considered a pending investment need. An asset at 2.5 is at the end of its useful life.
1	Poor	Asset is past its useful life and in need of prioritized repair or replacement

3.2.1 Condition Performance

Metro reports asset condition information to the National Transit Database per FTA requirements. The FTA established four performance measures to help transit agencies to quantify the condition of major assets, as outlined in Table 3-3. We set performance projections for each of those measures and consistently tracked actual versus projected performance over time as each measure became required by the FTA.

Table 3-3. Performance Measure Definitions

Asset Type	Definition
Rolling Stock	The percentage of revenue vehicles within a particular asset class that have either met or exceeded their Useful Life Benchmark (ULB)
Equipment	The percentage of non-revenue, support-service, and maintenance vehicles that have either met or exceeded their ULB
Facilities	The percentage of facilities within an asset class that is rated below condition three (3) on the FTA TERM scale
Infrastructure	The percentage of track segments with performance restrictions

Our revenue vehicles have fluctuated over the past four years due to vehicle acquisition and replacement timing. FY2022 trends show improvements in the percent of Metrobus revenue fleet within their ULB. Our revenue railcar fleet has consistently been entirely within its ULB for the past four fiscal years; however, we project that there will be a short period due to the arrival of the 8000-series railcars where the condition performance of railcars worsens. MetroAccess condition performance is projected to worsen in FY2022 due to schedule delays in the planned arrival of replacement vehicles. Table 3-4 shows our actual condition performance per the measures required by the FTA.

Table 3-4. Metro's Actual Condition Performance

	Asset Measures	FY2019 Actual	FY2020 Actual	FY 2021 Actual	FYTD 2022 Projection
TRANSIT ASSET MANAGEMENT	**TAM Vehicles** % of vehicles met or exceeded Useful Life Benchmark (ULB)				
	Bus: Revenue Fleet I Standard	3%	7%	8%	5%
	Bus: Revenue Fleet I Articulated	0%	16%	5%	0%
	Rail: Revenue Fleet	0%	0%	0%	0%
	MetroAccess: Revenue Fleet	20%	8%	1%	21%
	TAM Equipment % of equipment met or exceeded Useful Life Benchmark (ULB)				
	Service Vehicles: Automobiles [Sedans]	35%	29%	59%	41%
	Service Vehicles: Trucks & Other Rubber Tired Vehicles	31%	40%	46%	40%
	Service Fleet: Steel Wheel Service Vehicles [CTEM]	12%	23%	19%	27%
	TAM Guideway % of track segments with performance restrictions (% of Directional Route Miles)				
	FTA Guideway Condition	1.7%	4.5%	5%	4.27%
	TAM Facilities % of facilities with a condition below a 3.0 out of FTA's 5.0 scale				
	Passenger + Parking	7%	7%	2%	5%
	Passenger				
	Parking				
	Administrative + Maintenance	15%	11%	3%	12%
	Maintenance				
	Administrative				

The condition of our service vehicles has similarly fluctuated over the past four years. We're working to improve the rubber and tire service vehicle fleet and planning to better track utilization to ensure we maintain the right sized fleet of the appropriate vehicle types. Steel wheel service vehicle procurement is approximately one year behind schedule, impacting the percentage of the fleet meeting their ULB.

The percentage of revenue track operating under speed restrictions increased over the past three years and was projected to level off in FY2022. Although the number of speed restrictions has been increasing, it is worth noting that our planned speed restrictions, generally due to planned maintenance or capital work or the arrival of fall leaves, make up the lion's share of the speed restrictions. Unplanned speed restrictions, generally caused by a track incident such as a track fire, rail break, or equipment failure, are a much smaller driver. Table 3-5 shows the planned and unplanned percentages for the guideway speed restrictions.

Table 3-5. Planned and Unplanned Guideway Speed Restrictions

Driver	FY2021 Actual	FY2022 Projection
Unplanned SPDR	0.3%	1%
Planned SPDR (Confirmed)	5.3%	3.27%
Total	**5.6%**	**4.27%**

Our facility's condition has fluctuated as we've improved our processes to evaluate facility conditions. The FTA requires transit agencies to evaluate all facilities on a four-year cycle. In FY2019, we launched the Facilities Asset Management Office, which brought a new experience to the facility assessment process.

3.2.2 SGR Performance Measures and Targets

Metro monitors and reports quarterly on a suite of safety and service quality key performance indicators (KPIs) in the Metro Performance Report, including the percentage of track segments with performance restrictions. Annually, we produce a report assessing performance against the targets set on the FTA-defined SGR performance measure. We share this report with the FTA, our MPO, and other Metro stakeholders. We use the same process for setting targets for SGR measures as all other KPIs, incorporating them into our ongoing performance management framework.

TAMO coordinates efforts each year to set targets for the SGR measures for the following fiscal year. The annual process starts in March, ends in June, and engages Metro Subject Matter Experts (SMEs) and asset owners to set realistic targets based on:

- Historical trends in performance;
- Known capital or operating plans for the next fiscal year; and
- Identified risks to achieving the targets and mitigation plans.

We follow these steps in target setting:

1) In March and April of each year, set parameters for what assets are included in each measure based on FTA guidance and regulations, including FTA Guidebooks on Facility and Infrastructure Performance, NTD Asset Inventory Module Guidance, and FTA webinar materials. Identify Useful Life Benchmarks for rolling stock based on Fleet Plans, WMATA Board Resolutions, and WMATA policies and procedures. Identify Asset Owners and SMEs.
2) Starting in early April, gather data on current inventory (including age and condition), and verify the accuracy of the inventory with Metro's SMEs, including anticipated changes to the inventory between April and June 30, when the fiscal year ends.
3) Calculate the baseline performance for the current fiscal year based on the projected inventory of assets and age/condition as of June 30. Analyze the speed restriction performance.
4) Calculate future targets based on the final capital budget for the following fiscal year (Capital Improvement Program, CIP, completed in March) by accounting for any planned investments up to June 30, including planned capital work.
5) Adjust targets based on general trends, risks, and constraints — provided by SMEs and other stakeholders from capital budgeting, safety, planning, and government relations.
6) Approval by the COO.
7) Confirmation by GM/CEO by June 30.
8) Transmit to Metropolitan Washington Council of Government and Metro's Metropolitan Planning Organization (MPO).

In addition, TAMO plans to set internal four- and six-year targets to better inform the prioritization of future targets. Based on the FTA-defined SGR measures, we have assessed the current performance against each measure and established related performance targets (for FY2023) as outlined in Table 3-6.

Table 3-6. Current Performance Targets

Asset Class	Performance Measure	FY2023 Targets
Rolling Stock (Revenue Vehicles)	Percentage of vehicles that have met or exceeded their ULB	Railcars: 0% Standard Buses: 4% Articulated Buses:0% (MetroAccess) Vans: 7%
Equipment (Non-Revenue Vehicles)	Percentage of vehicles that have met or exceeded their ULB	Automobiles: 51% Truck & Rubber Tired: 33% Steel Wheeled: 29%
Facility	Percentage of facilities rated below three (3) on the FTA TERM scale	Admin & Maintenance: 8% Passenger & Parking: 5%
Infrastructure	Percentage of track segments, signal, and systems with performance restrictions	5.2%

3.3 Asset Management Lifecycle Plan Strategies

Lifecycle management strategies are being developed and implemented as part of the TAM plan program to capture the capital and maintenance activities and identify resources necessary to maintain Metro's assets in a State of Good Repair. An Asset Management Lifecycle Plan (AMLP) is the documentation of a strategic and systematic process of operating, maintaining, and improving physical assets. The AMLP identifies and explains the structured sequence of maintenance, repair, rehabilitation, and replacement actions that will determine the current condition of the assets. We have published Track & Structures and TRPM AMLPs, and other mission-critical programs are in progress.

Each asset has a lifecycle that can be processed into four key stages, as shown in Figure 3-1, from first identifying the need for an asset, then continuing through an asset's useful life through to disposal.

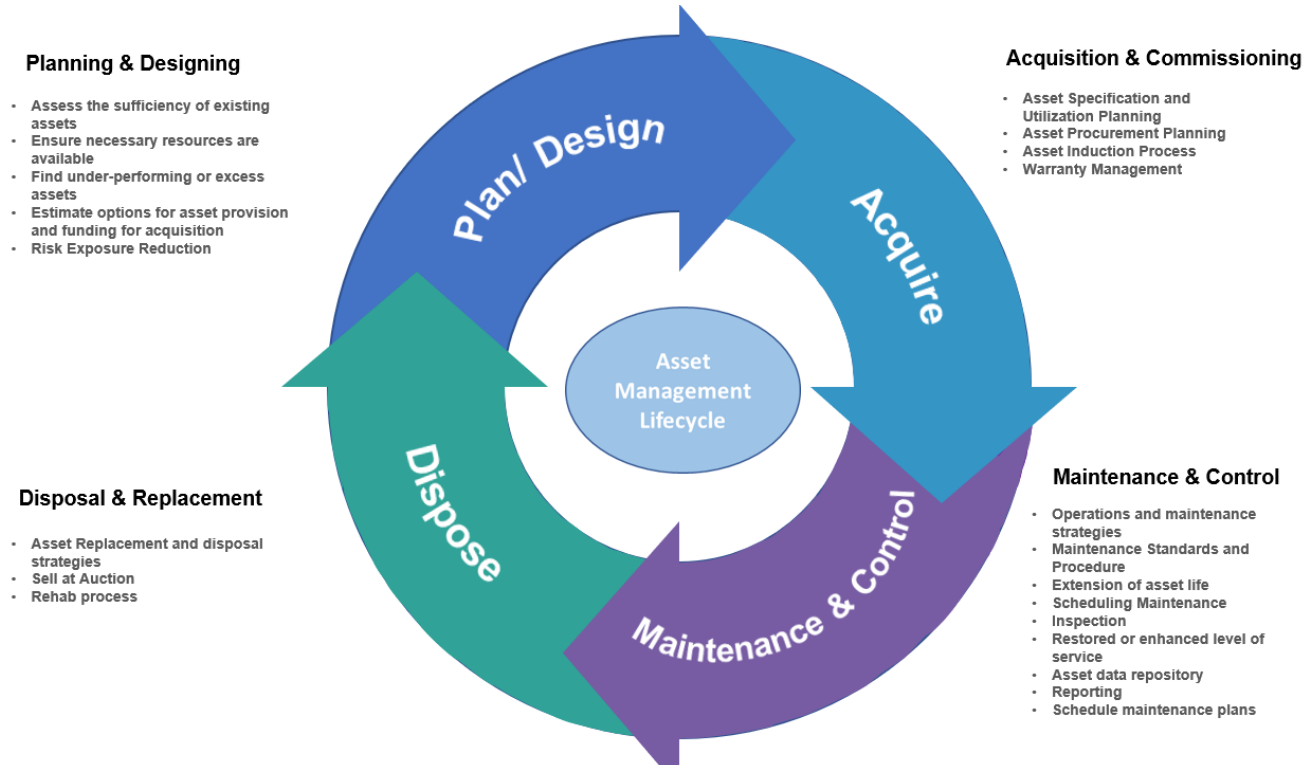


Figure 3-1. Asset Management Lifecycle Plan

3.3.1 Asset Planning: The planning stage in the AMLP describes the approach to maintaining an asset from construction to disposal. Asset planning helps establish an asset requirement based on evaluating existing assets. Asset Planning initiatives streamline and centralize asset requirements within programs across the organization, focusing on financial accounting, materials management, asset inventory management, contract administration, and maintenance management.

3.3.2 Asset Acquisition: Once an asset requirement is identified, the next stage is to purchase the asset. This means that an asset has been adequately analyzed and recognized as a much-needed resource to improve transit operations. This stage will also focus on the financial side of acquiring an asset within a specific budget set during the planning stage. When the asset is eventually acquired and deployed, it can be tracked using an asset management system.

3.3.3 Maintenance and Control: With the asset installed, the next stage is operation and maintenance, the most prolonged phase of an asset life cycle. This stage indicates the application and management of the asset, including any maintenance and repair needed. An asset will be regularly monitored and checked for any performance issues that could unexpectedly develop during operation. This is when maintenance and repairs start to become a common occurrence. As asset ages and wear and tear increase, regular maintenance is needed to help prolong the life and value of the asset. Repairs, modifications, and upgrades must keep assets functioning correctly.

3.3.4 Disposal: This stage addresses the disposal strategy of the assets and (or) components that are obsolete, unneeded, outdated, and meet the end of useful life criteria or are no longer needed for the originally authorized purpose. Such assets are identified and removed from service and either sold, re-purposed, thrown away, or recycled. Although an asset has no business value at this stage, it may still need to be disposed of efficiently to ensure it does not harm the environment. This process could even involve dismantling the asset piece by piece or wiping it clear of data.

4. Prioritization and Reinvestment

This section describes the policies and documents that guide and communicate Metro's Capital Program and prioritization process.

4.1 Investment Prioritization

We evaluate new capital investment needs by reviewing their impact on safety, security, and reliability. This evaluation includes a combination of high-level quantitative and qualitative strategic measures based on Subject Matter Expert input, available asset priority score data (detailed in the 2019 Capital Needs Forecast in chapter Appendix A1), and agency commitments. Our capital program emphasizes the State of Good Repair work. SGR needs are advanced based upon overall priority and are constrained by the following:

1. Feasibility to execute while providing service to customers (example: cannot take all bus garages out of service at the same time) and
2. Ability to execute complex projects (example: new signaling system). Our SGR capital investment needs are primarily programmed within the Six-Year Capital Improvement Plan (CIP), with exceptions where the ability to execute is constrained.

The replacement cycle for selecting assets may be extended beyond the Six-Year CIP based on their criticality, as outlined in the 2019 Capital Needs Forecast.

4.2 Six- and 10-Year Investment Strategy

Metro's capital strategy is to:

- Invest in the system to provide safe and reliable service,
- Address the backlog of overdue SGR,
- Sustain safety and reliability through recurring maintenance, rehabilitation, and replacement programs,
- Modernize the system for customers and employees,
- Maintain financial accountability,
- Support a sustainable and more equitable future for the region, and
- Foster equity in the identification of investments.

Figure 4-1. Snapshot of Approved CIP & 10-Year Plan

Metro's investment strategy, program development process, and list of funded projects, programs, and future needs are outlined in the publicly available Capital Budget documents, the most current of which is the Approved FY2023 Budget, CIP, and 10-year Plan found on Metro's Capital Program Documents Page here: https://www.wmata.com/about/records/upload/Approved-FY23_Budget-CIP-and-10-Year-Plan_508_reverted.pdf

5. Asset Management Maturity Baseline

In 2018, Metro deployed two efforts to establish a maturity level regarding asset management and to identify focus areas for future improvement. The first step was a series of executive interviews with key managers whose functional responsibilities included aspects of asset management. The second exercise was a series of workshops that focused on the characteristics of asset management derived from the ISO international standard for "Overview of Asset Management and Asset Management Systems" (ISO 55000). The results of these exercises were an examination and comparison against the agency's policy goals to identify the highest-priority gaps to be addressed. This assessment then developed the Implementation Program in TAM Plan 2018-Section 6, Table 6-1- Action Plan and Implementation Timeframe.

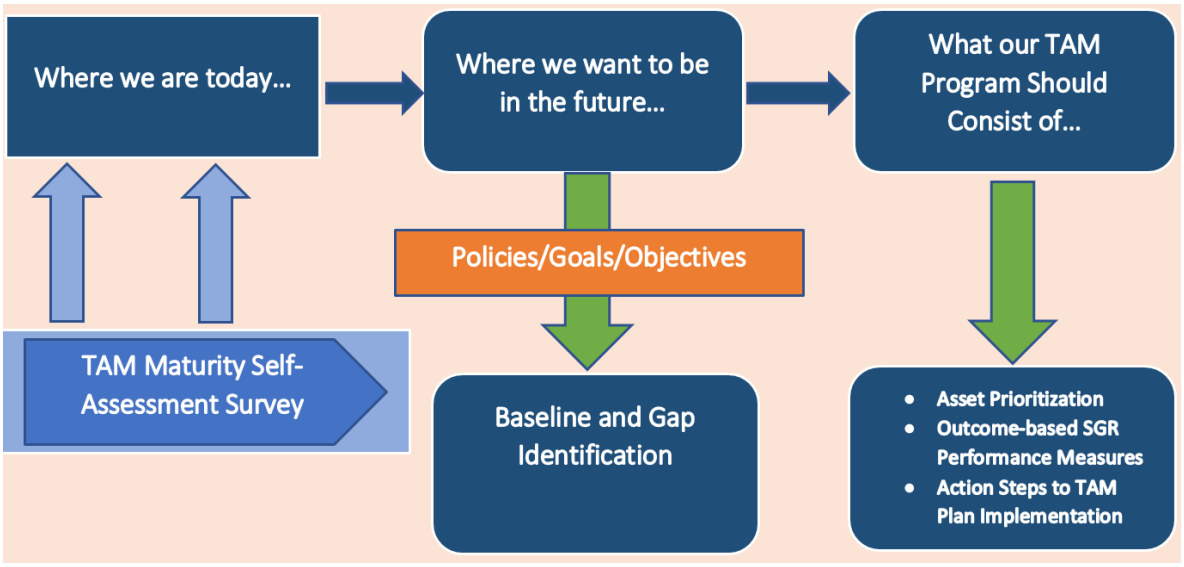
Recently, we conducted another TAM maturity self-assessment to consider a baseline guide to continual improvement in asset management practices. Many areas for improvement listed in this recognize asset management best practices now emerging in the highway, transportation, and transit industries. Examples of best practices include making better use of emerging information technology tools (e.g., integrated EAM systems) and better methods to link capital needs to capital forecasting.

5.1 Metro's Asset Management Maturity Self-Assessment

Asset management maturity refers to an agency's level of asset management practice. Understanding the level of asset management maturity within Metro is necessary to build the AM improvement program.

We conducted the TAM maturity self-assessment to determine the agency's development in various asset management competencies or practice areas. The information acquired was used to analyze our asset management capabilities considering the FTA TAM Business Processes Framework and the seven AM principles outlined in this document. Figure 5-1 illustrates the methodology used at Metro.

Figure 5-1. Process for Asset Management Gaps Identification



This assessment served many equally essential goals:

- Raising awareness of TAM at all levels and further engaging our staff;
- Setting a baseline of our current operating practices;
- Identifying existing leading practices currently in place at Metro that can be leveraged moving forward with the TAM program; and

- Identifying shortcomings and areas of improvement for TAM that can be incorporated into this TAM plan; and
- Develop a common language and definition regarding asset management.

5.2 Transit Asset Management Maturity Self-Assessment Tool

Metro created two sets of survey questions for the TAM maturity self-assessment. The first set of survey questions, 'Enterprise Level,' focused on our understanding of MAP-21 TAM requirements, policies and strategies, lifecycle management, information systems, and business processes. The second set of survey questions, 'Asset Class Level,' targeted our asset classes. Thirty-six stakeholders, including Senior Managers and Executives, General Superintendent, Asset Owners, and SMEs representing more than ten offices across the agency, participated in the TAM maturity self-assessment survey. The offices represented a broad spectrum of departments with asset-related responsibilities, including Strategic Planning and Program Management (SPPM), the Chief Operating Officer (COO), Internal Business Operations (IBOP), FAMO and Safety (SAFE).

We used the FTA's TAM maturity agency self-assessment (an Excel-based tool) to create the survey questions. This tool assesses current asset practices for a series of questions against a predefined score of one (1) to five (5). The maturity assessment obtained stakeholders' views of our current maturity level and offered insights to improve the asset maturity level score continuously.

FTA characterizes an agency's asset management maturity into five levels, each with a set of unique assets element capabilities. A complete asset management program will have all levels functioning well. However, it is not unusual for an agency to conduct asset management activities that span all these maturity levels at one time or to have skipped some levels while performing activities at another level. For example, many agencies have one or more asset inventories without asset management policies or strategies. Figure 5-2 provides more detail about each AM maturity level.

TAM maturity assessment tool helps participants evaluate organizational maturity levels using the following Key Focus Areas (KFAs) of asset management:

1) **TAM Organizational Context:** How well have we defined organizational objectives and the needs of internal and external stakeholders, and how do these shape the scope of the TAM system?

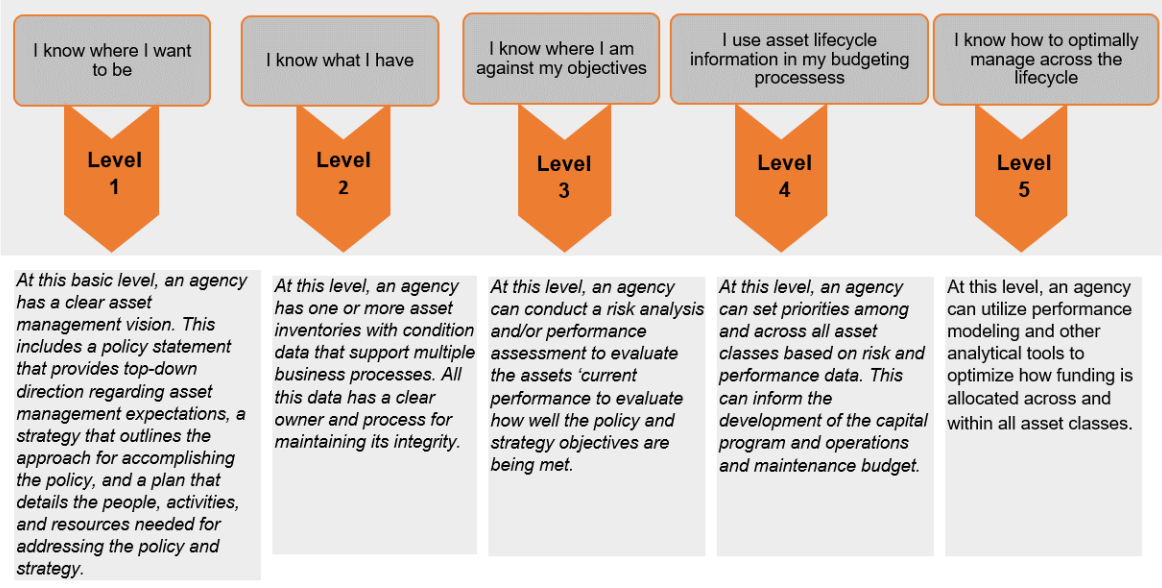


Figure 5-2. Asset Management Maturity Levels

2) **TAM Vision & Direction:** Do our existing policy, and strategic planning processes provide the mechanisms to establish an asset management vision and direction? Creating an asset management policy and strategy helps to focus management and business processes on the agency's business objectives.

3) **TAM Lifecycle Management:** How have we defined asset inventory, condition assessment, and performance monitoring to provide accessible, consistent, and comprehensive information for each class of transit asset? How is this information used to improve reliability through an agency's ability to predict failure, address root causes, and proactively plan for the investments required to maintain good performance on the most critical assets?

4) **TAM Information System:** How well do we define, record, analyze and control required TAM data and information?

5) **Operational Planning and Control:** What processes are in place to ensure that plans are implemented, necessary day-to-day maintenance requirements are defined and undertaken effectively and efficiently, and to ensure that any failures are promptly repaired and restored?

6) **TAM Enablers:** How well does Metro support the ongoing implementation, application, and continual improvement of its TAM system through staff development, communications, and change management processes?

In reviewing the results of the TAM maturity self-assessment survey, it is crucial to remember that while we reached a consensus on maturity levels for many practice areas, the survey's participants included stakeholders from several offices with differing methods for managing their assets. Nevertheless, because participants responded to score the maturity levels based on Metro as a whole, there was consensus among the surveys, with generally minimal variability in scoring.

5.3 TAM Maturity Self-Assessment Survey Results

The TAM maturity assessment tool obtained stakeholders' views of Metro's current maturity level and offered insights to build a more mature capability in the future. These insights help us better understand the current state of our asset management but are not a technical analysis. TAM maturity self-assessment survey results show the asset management's current maturity levels calculated by averaging the practice areas within each element, shown in Figure 5-3.

The graph plot in Figure 5-3 depicts a simplified approach to characterizing an agency's asset management maturity progress with a maturity score for each asset management element. A score of at least 80% for any level indicates substantial progress for that level. A score of less than 80% implies an area of improvement. The graph demonstrates that we operate at all levels of asset management elements and identifies that each element at all levels has room for improvement. We will continue improving the maturity scores for each asset management level in the future.

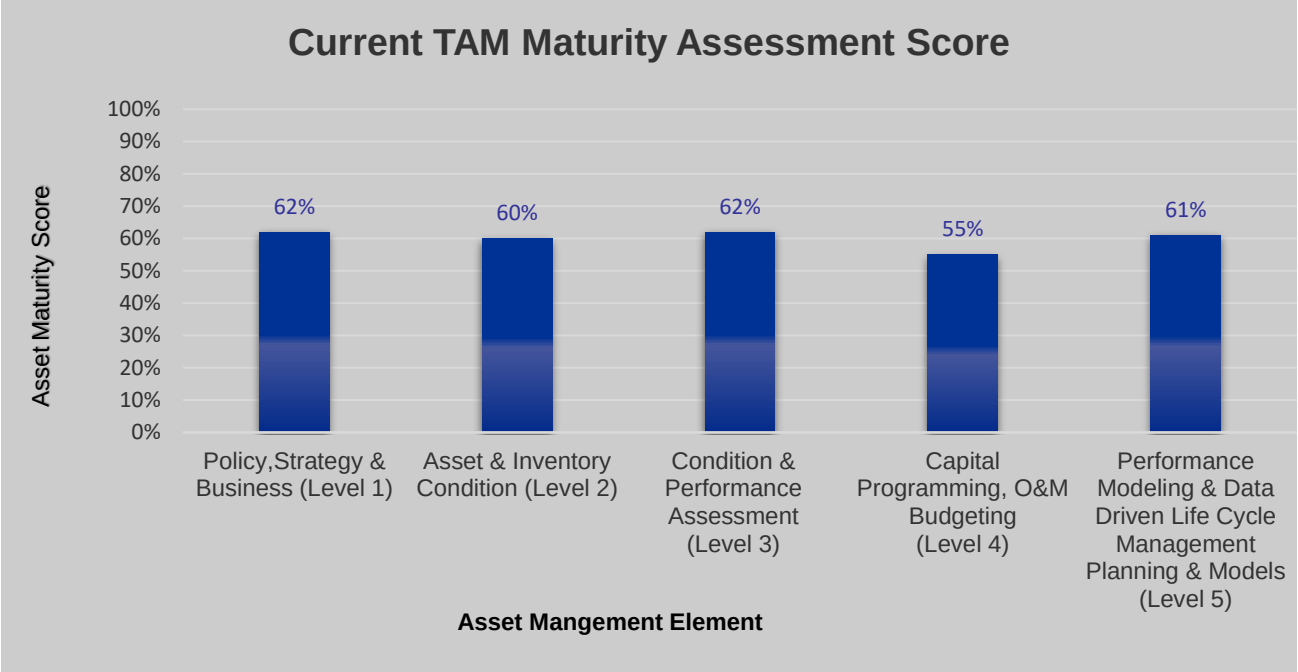


Figure 5-3. Current Maturity Level of Asset Elements

- Metro shows a low asset management maturity score (Level 4) for capital programming performance and O & M Budgeting modeling. The development of the capital program, operations, and maintenance budget will continue to mature as the agency further identifies asset conditions and priorities across all asset classes. We created action items for the next four years to continue improving the measuring performance of major capital investments.

- We have a fair asset management maturity score (Levels 2 & 5) for asset and inventory conditions, performance modeling, and other data-driven life cycle management planning and models. At these levels, an agency has asset inventory with condition data, optimized asset inventory, asset data owners, processes for maintaining data integrity, and performance modeling tools to optimize how funding is allocated across and within all asset classes. To improve the maturity score at these levels, we created action items for the asset inventory processes. We will use a capital program tool to identify the specific capital-level assets associated with each capital project.

- We show the highest asset management maturity score (Levels 1 & 3) for policy, strategy, business plans, and condition and performance assessment. At these levels, an agency has a clear asset management vision and how well the policy and strategy objectives are met. To improve the asset management maturity score at these levels, we created TAM action items to continuously review and update the policies, procedures, and condition assessment process to evaluate the current asset's performance.

6. Implementation Plan

This section provides a general overview of our asset management improvement program. It further describes the main drivers that are the foundation of the program, the resources needed to implement it, and the overall expected outcomes. The asset management improvement program encompasses an Action Plan with 16 improvement actions (e.g., policy and strategy, lifecycle management, cross-asset planning, and management, etc.) that will be implemented during the four-year horizon of this plan.

All actions listed in this section aim to advance our asset management practices. Some entail organizational, cultural, and process changes. The fundamental concepts of asset management are straightforward; however, implementing changes and improvements within a large organization such as ours requires careful planning and higher levels of coordination. The asset management improvement program is directed at further institutionalizing our asset management and moving us toward a more results-driven environment. It focused on reliability, optimized lifecycle management, and reduced risk while achieving better performance and delivering higher service levels aligned with our strategic goals.

6.1 Implementation Approach

The FTA defines the Implementation Strategy (or approach) as the operational actions a transit provider decides to conduct to achieve its TAM goals. The four steps below describe our application of the FTA's approach.

Step 1 – Alignment with TAM Principles and Metro's Strategic Goals: The asset management improvement program is designed to align with our strategic plan and TAM principles.

Step 2 - Assess Agency Maturity: A critical second step in the process was assessing Metro's asset management maturity against industry standards described in Section 5.

Step 3 - Develop Plan: The Action Plan for our TAM plan for the next four years is assembled by putting together three groups of asset management-related activities:

- Asset management-related activities that we have already initiated;
- Activities to meet the TAM requirements established in the FTA TAM Rule; and
- New activities that address the highest-priority opportunities identified in the asset management self-assessment.

Step 4 – Work the Plan: After establishing the Action Plan for the next four years and ensuring adequate resources are in place (i.e., funding, staff, and contracts), we will institute the appropriate mechanisms to track and communicate asset management progress as detailed in Section 7.

6.2 Plan Development

The following Action Plan addresses the key gaps identified in Metro's TAM practices and prioritizes the critical actions to deliver on our strategic goals.

6.2.1 Asset Management Action Plan

This section provides a summary of ongoing and future asset management activities that will directly or indirectly impact the organization's overall performance. The prioritized listing of asset management practice areas of continuous improvement is the main driver in selecting these activities. Specifically, the prioritization of asset management practice areas considered the following factors:

- Regulatory requirements;
- Alignment with our strategic goals;
- Continuous improvement to other practice areas, and
- Opportunities for improving maturity based on TAM Maturity Self-Assessment framework.

The activities listed in Table 6-1 represent our commitment to improving asset management practice during the four-year horizon of this plan. The table lists 16 critical asset management activities that address the highest priority asset management areas of improvement (Column 1). Further, the table provided an overview of the activity scope and expected outcomes, the department responsible for implementing the action, and an expected timeline for completion. Although this plan has a four-year horizon, the timeframe for some of the activities extends beyond five years.

Table 6-1. Action Plan and Implementation Timeframe

Asset Management Element/ Category	Action #	Proposed Actions	Metro Key Action Owner	Outcome or Deliverable	Short-Term years (0-2)	Med-Term years (3-5)	Long-Term years (5+)
Policy, Strategy & Business Plan	1.	Review and update the existing EAM data governance policies and identify gaps where policies must be developed and implemented across departments.	TAMO	Consistent policies and procedures for data governance requirements. Assets acquired during capital improvement projects are onboarded with all required data collection and input upon induction.			
	2.	Develop and implement EAM process improvement.	TAMO/IT	Improved processes that lead to consistent EAM use across departments ensure the agency's data requirements can be met.			
	3.	Review and update "as-is" asset management business process Authority-wide.	TAMO/COO	As-is business processes for maintenance departments reflect the current practices.			
Lifecycle Management	4.	Develop and maintain asset management Lifecycle Plans in coordination with asset owners.	TAMO/COO	Completed AMLPs with regular update cycles. AMPL will also identify the critical assets and will be reflected in the EAM system to ensure assets are managed as such.			
	5.	Expand the use of reliability-centered maintenance.	RCMP	Additional completed RCM3 analysis and implemented recommendations.			
	6.	Develop and implement consistent reliability reporting across all maintenance groups.	RCMP	Expanded reliability reporting and improvements in reporting standardization.			

Table 6-1. Action Plan and Implementation Timeframe

Asset Management Element/ Category	Action #	Proposed Actions	Metro Key Action Owner	Outcome or Deliverable	Short-Term years (0-2)	Med-Term years (3-5)	Long-Term years (5+)
	7.	Investigate procurement methods to mitigate risk by implementing a reliability-based supply chain.	SCM	Metro will work to identify and mitigate safety and financial risks within the supply chain.			
Cross-Asset Planning and Management	8.	Use the Capital Program Tool to identify the specific capital-level assets associated with each capital project.	SPPM	Improved reporting on Capital Program impact on Metro's SGR needs.			
	9.	Produce a 10-year capital needs report on an established cycle.	SPPM	Capital needs a report that communicates internally and externally the full breadth of the agency's SGR needs over a 10-year horizon.			
	10.	Define and create a process to measure the performance of major capital investments.	SPPM	Improved reporting on major Capital Program project performance.			
Information Systems	11.	Improve the process for assessing asset conditions.	TAMO	Consistent and automated condition assessment tool available.			
	12.	Review and update EAM asset hierarchies in coordination with asset owners.	TAMO	Metro will complete asset hierarchies in the EAM system.			
Enablers and Change Management	13.	Develop To-Be processes incorporating data governance standards and authority-wide consistent business processes.	TAMO/COO	Completed to-be processes that incorporated data standards and updated EAM policies.			

Table 6-1. Action Plan and Implementation Timeframe

Asset Management Element/ Category	Action #	Proposed Actions	Metro Key Action Owner	Outcome or Deliverable	Short-Term years (0-2)	Med-Term years (3-5)	Long-Term years (5+)
	14.	Improve parts forecasting through business process improvement and third-party support.	SCM	Metro will Improve management and maintenance of demand planning for the supply chain.			
	15.	TAM plan-monitor and update.	TAMO	Metro will maintain the TAM plan with current data and update it as needed.			
	16.	Ensure asset management plans and policies are communicated to senior leadership and all agency personnel.	REAM/TAMO	Communications with senior leadership and agency personnel about asset management activities.			

6.3 Implement Action Plan

Metro's asset management improvement program encompasses existing and new actions expected to be active during the four-year horizon of this TAM plan. In addition, the TAM Rule has established that the TAM plan delineates the resources necessary to carry out the Action Plan.

6.3.1 Resources Required to Implement Plan

Successfully reaching this improvement program's goals requires our commitment to making available the human and financial resources necessary for the entire duration of the plan's period. Table 6-2 shows the list of activities, the department responsible for their implementation, and the type of resources needed to support each activity. In most cases, we will rely on a combination of in-house personnel and contractors. Several program initiatives are in the development stages, and the resources necessary for implementation are yet to be determined. Resource estimates are preliminary and are subject to Metro's budgeting processes, timelines, and other factors. Additional refinements to these preliminary estimations will be necessary for actions that have not been fully scoped once they are ready for deployment and implementation.

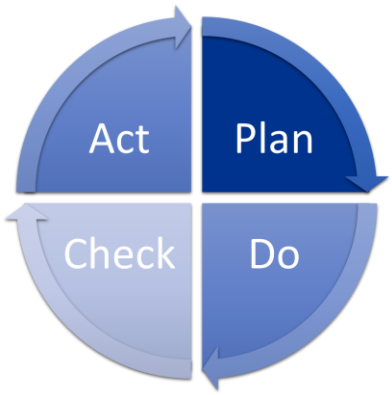
Table 6-2. List of Resources Required to Implement Plan

Action #	Proposed Action	Key Action Owner(s)	Comments/Other Support Required
1.	Review and update the existing EAM data governance policies and identify gaps where policies must be developed and implemented across departments.	TAMO	TAMO will lead this effort and require a level of commitment by asset owners/end-user groups as well as support and edge functional groups.
2.	Develop and implement EAM process improvement.	TAMO/IT	This effort will be based on international standards and processes (ISO 55000) to align for future certification of processes.
3.	Review and update "as-is" asset management Business Process Authority-wide.	TAMO	TAMO will lead this effort and require a level of commitment by asset owners/end-user groups as well as support and edge functional groups.
4.	Develop and maintain asset management Lifecycle Plans in coordination with asset owners.	TAMO	TAMO will lead this effort with the additional support of consultants due to the number of lines of business to be captured.
5.	Expand the use of reliability-centered maintenance.	RCMP	RCMP will lead this effort and require a level of commitment by asset owners/end-user groups and support and edge functional groups. A formal RCM event currently requires support from a consultant.
6.	Develop and implement consistent reliability reporting across all maintenance groups.	RCMP	RCMP will lead this effort and require a level of commitment by asset owners/end-user groups by providing additional personnel.

Action #	Proposed Action	Key Action Owner(s)	Comments/Other Support Required
7.	Investigate procurement methods to mitigate risk by implementing a reliability-based supply chain.	SCM	This effort will utilize in-house, cross-functional staff and rely on asset owners for implementation.
8.	Use the Capital Program Tool to identify the specific capital-level assets associated with each capital project.	SPPM	SPPM will lead this ongoing effort and require a level of commitment by asset owners/end-user groups.
9.	Produce a 10-year capital needs report on an established cycle.	SPPM	SPPM will lead this ongoing effort and require a level of commitment by asset owners/end-user groups.
10.	Define and create a process to measure the performance of major capital investments.	SPPM	SPPM will lead this ongoing effort and require a level of commitment by asset owners/end-user groups.
11.	Develop and implement a consistent, automated process for assessing Asset conditions.	TAMO	TAMO will lead this effort and require a level of commitment by asset owners/end-user groups as well as support and edge functional groups.
12.	Review and update EAM asset hierarchies in coordination with asset owners.	TAMO	Support by consultants/vendors as needed for interface with existing systems of improved processes and output data to enable recordation and analysis.
13.	Develop To-Be processes incorporating data governance standards and authority-wide consistent business processes.	TAMO/ COO	TAMO will lead this effort and require a level of commitment by asset owners/end-user groups as well as support and edge functional groups.
14.	Improve parts forecasting through business process improvement and third-party support.	SCM	Support by consultants/vendors as needed for interface with existing systems of improved processes and output data to enable recordation and analysis.
15.	TAM plan-monitor and update.	REAM/TAMO	TAMO will lead this effort and require a level of commitment by asset owners/end-user groups.
16.	Ensure asset management plans and policies are communicated to senior leadership and all agency personnel.	REAM/TAMO	TAMO will lead this effort and require a level of commitment by asset owners/end-user groups.

7. Evaluation and Continual Improvement

Metro's TAM plan sets principles, strategies, and performance measures for continually improving how we manage our assets. An annual progress and performance measures review will be conducted to successfully implement this TAM plan and advance the agency's TAM maturity. It will revise these documents and develop new projects to further our progress toward industry best practices. Our annual approach to reviewing and updating TAM documents and performance measures will follow the continual improvement approach of:



1) **Plan** – plan for improvement activities and set performance targets, as in this TAM plan;
2) **Do** – execute the annual TAM activities;
3) **Check** – review and update the progress of the TAM activities; and
4) **Act** – capture improvements and document the new baselines for these activities

This approach to continual improvement is already implemented in Metro's Office of Transit Asset Management under REAM, with the annual process of monitoring performance and setting targets described in detail below.

The GM/CEO and SET lead the shaping of strategic objectives and performance targets for the agency. In the future, revisions to this TAM plan will be reviewed and approved by our staff and SET to ensure alignment with other strategic planning documents.

This TAM plan will be reviewed and revised at least every four years, as required by the FTA. Any revisions will require input from various internal and external stakeholders. TAMO will seek and review internal and external information as needed.

7.1 Stakeholders

The ability to efficiently manage our transit assets depends on Metro employees and various external stakeholders, partner jurisdictions, elected officials, customers/community, regulators, and contractors, who all have expectations from the system.

- **Customers/Community**: Metro's reason for existing is the customers who use its services. Our customers depend on transit to access employment, education, healthcare, shopping, and entertainment. Our customers must also trust that the equipment and operators will safely get them to their destinations. We risk losing our most important stakeholder when a customer is delayed or injured due to infrastructure or equipment failure.
- **Partner Jurisdictions**: Metro's operating and capital budgets are funded through various sources, including system-generated revenues, state and local support, and federal funding sources. Therefore, we must collaborate closely with all of our partner jurisdictions to communicate current and future reinvestment needs.
- **Planning Partner**: The Transportation Planning Board (TPB) of the Metropolitan Washington Council of Governments (MWCOG) is the regional metropolitan planning organization (MPO) for transportation. TPB is legislatively empowered to authorize the use of federal funds on transit projects. Since the institution of MAP-21, it is also required to coordinate its State of Good Repair performance measures with Metro and all other regional local operators.

- **Regulators**: Through rulemaking and oversight, the FTA, Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), Washington Metrorail Safety Commission (WMSC), and other agencies all directly influence how our assets are managed.
- **Vendors**: The performance and pricing of service providers, contractors, consultants, material suppliers, and other vendors directly affect our ability to deliver projects on time and within budget. Contract performance and/or pricing issues profoundly impact the transit system's performance at large.

This TAM plan was reviewed and updated to understand what each stakeholder expects from the transit system and is designed to help meet those expectations while balancing our priorities.

7.2 Performance Monitoring

As part of the annual review process, we will review associated performance reporting and measures to identify progress against the Plan's Key Activities. This review also will deliver insight into possible improvements in objectives, strategies, and projects/actions for future iterations of this TAM plan. This does not preclude mid-year review of performance reporting and interim adjustments to TAM objectives, strategies, and projects/actions as needed. Monitoring activities to be carried out regularly include the following:

- **Annual Review of Progress Against Key Activities**: In 2020, TAMO created a template to conduct a yearly review of the TAM plan 2018 action items progress update as specified in Table 6-1-Action Plan and Implementation Timeframe. Please refer to Appendix C for the previous TAM plan-2018 action items progress update for more detail. At a minimum, on at least an annual basis, TAMO will present a report to the stakeholders detailing progress made (or not yet made) against each of the Key Activities detailed in the Plan.
- **NTD Asset Inventory**: As required by FTA, Metro shall submit an updated Asset Inventory Module (AIM) to the NTD by October 30 each year. As Metro better utilizes and improves its EAM system, the quality and robustness of the Asset Inventory it generates will also improve.
- **Communications Activities:** Successful asset management implementation requires good communication, allowing people to understand changing processes, and bridging the many departments and offices in the organization. This includes ongoing dialogue and progress updates related to asset management. We have been collaborating with asset owners quarterly to provide an update on asset management activities. We will continue assessing and reporting on the implementation and effectiveness of the communications activities about asset management practices.
- **Performance Measures**: The outcomes of a robust asset management program are improved customer service, focused, more efficient, and productive maintenance, optimized resource allocation, and improved stakeholder communication. We currently measure and report on many of these outcomes and will continue to use its KPI framework to evaluate the impact of the asset management program. Quarterly and annual results/progress are published in our Performance Report, available on Metro's website. Asset management-related indicators reported by Metro are listed below, with those required by FTA depicted in ***bold italics***:

  - **Improved Customer Service**
    - Ridership
    - MyTripTime (Rail Customer On-Time Performance)
    - Bus On-Time Performance
    - MetroAccess On-Time Performance
    - ***FTA Reportable Speed Restrictions***
    - Escalator Availability
    - Elevator Availability

- **More Efficient and Productive Maintenance**
  - Bus Fleet Reliability (Bus Mean Distance Between Failures, overall and by fleet type)
  - Rail Fleet Reliability (Rail Mean Distance Between Failures, overall and by railcar series)
- **Safety Focus**
  - Rail Collisions
  - Derailments
  - Bus Collisions
  - MetroAccess Collisions
  - Rail Customer Injuries
  - Bus Customer Injuries
  - MetroAccess Customer Injuries
  - Rail Employee Injuries
  - Bus Employee Injuries
  - Fire and Smoke Incidents
  - Red Signal Overruns
- **Optimized Resource Allocation**
  - Capital Funds Invested
  - ***Percent of rolling stock that has met or exceeded their ULB for all asset classes of revenue vehicles***
  - ***Percent of equipment (non-revenue vehicles) that have met or exceeded their ULB***
  - ***Percent of facilities with a condition rating of less than 3.0 on the FTA TERM scale***

7.3 Training

Integrating asset management principles into our larger culture will require training staff in multiple roles and at many levels in different aspects of asset management. As part of its commitment to accomplishing the actions detailed in this plan and to continually improving our asset management implementation. We will train the appropriate personnel in the necessary aspects of asset management, including the theory behind it, the benefits and value for the individual and agency regarding the creation and implementation of asset management plans, and the use of the asset Management Software Applications. We have provided asset management training to TAMO and FAMO staff through the Institute of Asset Management (IAM). TAMO has developed and implemented various types of training in our EAM system for a broad group of individuals on the current EAM system. Additionally, we provided the RCM training to the appropriate personnel throughout the organization. Future training requirements will align with the system identification and capabilities analysis.

7.4 Future TAM Plan Revisions

We operate in a challenging environment regarding physical conditions and service requirements. As such, we will make appropriate adjustments to the projects and expectations throughout the life of the Plan. In the event of unexpected circumstances that significantly affect either asset conditions (e.g., catastrophic weather damage to multiple facilities) or our capacity to implement its plans (e.g., dramatic funding reductions/shortfalls), TAMO may recommend to the SET that the plan be amended prior to the end of its four-year life. If the SET agrees, then TAMO will revise the TAM plan and present it to the SET for review and concurrence with the final determination and approval made by the GM/CEO.

7.5 Conclusion

Through this TAM plan, we have established asset management fundamentals and laid out supporting processes and systems that integrate into the broader governance framework contributing tangible benefits and leveraging opportunities now and in the future. Our effort will enable the organization to realize value from its assets in achieving our organizational objectives and meeting our stakeholders' needs and expectations while balancing financial, environmental, and social costs, risk, quality of service, and performance related to assets.

Metro’s TAM plan will improve financial performance, risk management, services, and outputs informed asset investment decisions. It will also demonstrate social responsibility, transparent conformity with compliance requirements, and enhanced sustainability, efficiency, and effectiveness.

Appendix A
Glossary

Accountable Executive — means a single, identifiable person who has ultimate responsibility for carrying out the Public Transportation Agency Safety Plan of a public transportation agency; responsibility for carrying out the agency's **Transit Asset Management Plan**; 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**."

Annual Capital Maintenance — Yearly investment to preserve an asset in good working order.

Asset Class-Level — Any management or decision-making activities that occur for individual asset classes. For example, the condition monitoring approach for stations is an asset class-level business process and establishing an agency-wide policy is an enterprise-level business process.

Asset Hierarchy — The system organization of an asset group that shows the relationship ("parent-child") between the highest level of the asset down to its different components.

Asset Management — A strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based on information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain the desired state of good repair during the lifecycle of the assets at a minimum practical cost.

Asset Owners — Asset owners at Metro are those staff members responsible for the operations and maintenance of an asset. At the same time, SMEs tend to represent engineering, finance, or other support functions.

Capital Asset — Includes equipment, rolling stock, infrastructure, and facilities for use in public transportation and owned or leased by a recipient or sub-recipient of federal financial assistance.

Capital Need — Represents a capital request to rehabilitate, replace, or add a group of assets to the system. Each capital need consists of a group of similar or interdependent assets.

Decay Curves — Decay or deterioration curves refer to a graph that shows the condition of an asset against its age. Such curves help to predict the future condition of an asset effectively. Different assets have different deterioration curves based on location, weather, usage pattern, and other factors.

Deferred Capital Needs — Scheduled capital investment postponed or put off until a later time, equivalent to FTA's definition of backlog.

Enterprise-Level— Any management or decision-making activities that need to occur at higher levels of an organization and apply to the entire organization. Transit asset management integrates activities across functions in a transit agency to optimize resource allocation by providing quality information and well-defined business objectives to support decision-making within and between asset classes.

Facilities — Public transit assets are divided into four sub-categories: passenger stations and surface parking lots, parking structures, administrative and operations maintenance facilities. Buildings (excluding stations), major shops, storage yards, central control, and equipment necessary for operating the system.

Guideway Elements — Trackwork and related structures, including tunnels, tubes, aerials, retaining walls, and fences.

Level of Service — Service quality the agency and its assets are expected to deliver and be measured against. Levels of service usually relate to the quality, quantity, reliability, responsiveness, sustainability, cost, and cost efficiency of service. It applies at the enterprise level and for asset classes (for example, buses and elevators). Generally, the level of service should be driven by what is important to the customer.

Moving Ahead for Progress in the 21st Century (MAP-21) — The transportation and reauthorization bill was signed into law on July 6, 2012. It is a policy and programmatic framework designed to create a performance-based surface transportation program for highways, transit, bike, and pedestrian.

New Need — Assets that: 1. provide a completely new function, one that neither replaces nor expands existing assets; 2. replace an existing asset with a new asset that provides a new function or enhances an existing asset by demonstrably impacting safety, security, ridership, and/or service delivery; or 3. expand the existing system.

Rehabilitation — Act of restoring an asset to its original state or a condition close to its original state.

Reliability — Probability that a system will perform its intended functions without failure, within design parameters, under specific operating conditions, and in a particular period (IEEE Standard 1474.1).

Soft Costs — Capital expenditures that are required to complete a project but not spent directly on construction or procurement. These expenses are incurred on professional services necessary to complete the project, including, but not limited to, project design, project management, legal work, and testing.

State of Good Repair (FTA/MAP-21 Final Rule, July 2016) — The condition in which an asset can operate at a full level of performance. Three objective standards define "full level of performance":

- The asset can perform its manufactured design function.
- The use of the asset in its current condition does not pose a known unacceptable safety risk.
- The asset's lifecycle investment needs have been met or recovered, including all scheduled rehabilitation and replacements.

Stations — Includes bus shelters, passenger parking facilities, and assets related to rail stations. Rail station assets include station buildings, elevators, escalators, station-specific electrification assets, and other related components. Passenger parking facilities include both surface parking lots, Park & Ride/Kiss & Ride, and garages.

Systems — Includes hardware and software assets necessary to operate the system. Types include communications systems, electrification, revenue collection, train control, and utilities.

TERM Lite (Transit Economic Requirements Model) — Local/state version of analysis tool designed to help transit agencies assets their SGR deferred capital needs.

(total dollar value and by asset type), level of annual investment to attain SGR or another investment objective, the impact of variations in funding on future asset conditions and reinvestment needs, and investment priorities (by mode and asset type).

Useful Life Benchmark — The estimated lifespan of a capital asset, during which it can be expected to contribute to operations.

Vehicles include revenue vehicles (rail cars, buses, and vans) and non-revenue vehicles.

Appendix B
TAM Maturity Self-Assessment Survey

TAM Maturity Self-Assessment Survey:

The survey questions were created utilizing the TAM maturity agency self-assessment excel based tool available on the FTA website. The following is a summary of the TAM Maturity Self-Assessment Survey, including participating departments and survey types:

TAM Survey	Offices participated	
Enterprise Level-52 Questions 17 Participants Asset Class Level Survey 20 Participants	Reliability Engineering Asset Management Access Engineering Facilities and System Maintenance Performance Bus Maintenance Information Technology Rail – Automatic Train Control Rail – Power	Safety and Environment Management Supply Chain Rail Car Maintenance Strategy, Planning, and Program Management Management Audits, Risk and Compliance

Appendix C
TAM Plan 2018 Completed Action Items

TAM PLAN 2018- ACTION ITEMS STATUS UPDATE

The following action items were completed from the TAM Plan- 2018.

Identified Areas of Improvement	Action #	Proposed Actions	WMATA Key Action Owner	Outcome or Deliverable	Short-Term years (0-2)	Med-Term years (3-5)	Long-Term years (5+)	Review & Comments
Asset information management needs to be centralized at the Authority with clear ownerships and information roles and responsibilities	1	Identify all asset owners/define responsibilities at each classification and hierarchy	TAMO	Improved stewardship of assets by designated asset owners				Completed TAMO completed SOP COO-DP-100-23: *Asset Inspection and Maintenance Division of Responsibility*, which outlines the inspection and maintenance roles for departments and offices that are involved in the inspection and maintenance of WMATA facilities and structures. This procedure also establishes the procedure for updating or modifying the Division of Responsibility (DOR) Matrix. REAM/TAMO reviews and updates the DOR Matrix periodically with the AMSC member's coordination.
Asset management requires clear leadership and management roles and responsibilities	6	Elevate the recognition of Asset Management by periodic reports to the Executive Sponsor and EMT	TAMO	Institutionalize importance of & progress towards Asset Management excellence at all levels of Metro decision-making; supported by quarterly presentations on asset management activities and progress				Completed REAM created and published the first Business Process Development (BPDV) asset management newsletter in Q1 - FY22 to update the Executive sponsor and EMT. AMSC meets periodically to review asset management roles and responsibilities.
Asset performance information should be consistently incorporated into maintenance planning actions	9	Improve use of asset condition assessments for rail maintenance planning	MOWE/ TAMO/RCMP	Metro will reduce the percentage of track with restrictions and drive progress toward and beyond State of Good Repair targets				Completed TRST developed an OAP-121-01-Track asset Condition Data Management that includes procedures within the Office of Maintenance of Way Engineering (MOWE) and the Office of Track and Structures (TRST) regarding track asset condition data collection and management. TRST significantly reduced the percentage of track with restrictions in FY20.
Metro should deploy a continuous improvement culture, executive support, and reinforcement of organizational discipline around asset management	15	TAM plan-monitor and update	TAMO	Metro will maintain the TAM plan with current data and updates as needed				Completed In 2020, TAMO created a TAM plan review template to conduct a yearly review of the TAM plan to evaluate progress of each action item.
	16	Create TAM Continuous Improvement Committee	TAMO	Metro will conduct quarterly meetings (or as needed) with AM stakeholders to review and improve TAM Action Plan				Completed TAM action plan is reviewed quarterly with the respective stakeholders.

Appendix D
Sustainability at Metro

Sustainability and Asset Management at Metro

Sustainability is a fundamental business approach at Metro that advances regional goals, supports social equity, and delivers economic and environmental benefits to the communities served.

As a vital transportation link that occupies and connects communities, a major employer and purchaser of goods and services, and one of the region's largest energy consumers, Metro's investments and operational decisions have immediate and significant impacts on health, racial equity, economic prosperity, and the overall social and economic wellbeing of the region.

WMATA's sustainability program is described yearly in the WMATA Budget Book, which can be found on Metro's Capital Program Documents website.

Sustainability Framework

In 2021, the Metro Board of Directors adopted a new Sustainability Vision and eight sustainability Principles, recognizing sustainability as a core value of Metro and a cost-effective way to improve performance, achieve climate and environmental goals, and contribute to livable and equitable communities. Metro's sustainability framework aligns the agency with jurisdictional partners who are advancing sustainability and resiliency policies and goals. It commits Metro to planning, partnering, designing, building, operating, and maintaining transit infrastructure to meet current needs without compromising the region's future needs.

In CY2022, Metro is developing a sustainability action plan in support of the Vision and Principles that include specific priorities and strategies and draft targets and performance measures. Visit Metro's Sustainability Initiative website for more information and updates on these efforts.

Energy Action Plan

The Energy Action Plan is helping Metro reach environmental goals through increased energy efficiency and is generating long-term cost savings to support responsible stewardship of its capital funding. This Plan has three main pillars:

1. Implementation of energy audit identified capital investments.
2. Modernize design, construction, and operations; and
3. Engage dynamically in the energy market.

The Energy Action Plan includes capital investments in energy efficiency projects continuing through FY2025 to realize cost savings for energy and operations/maintenance. For annual progress updates, visit Metro's Energy Action Plan website.

Zero-Emission Vehicle

Metro's Board of Directors has adopted zero-emission bus goals, including phased conversion to a 100% zero-emission bus fleet by 2045. This transition will improve regional air quality, reduce greenhouse gas emissions, and provide customers with a cleaner, quieter ride.

These zero-emission bus goals set out a phased conversion that will begin with purchasing only lower-emission buses in 2023 so that all new buses entering service by 2030 will be electric or other zero-emission technology. Metro is also investing in facility and infrastructure upgrades over the coming years to support the transition to zero-emission buses. To find the most current information, visit Metro's Zero-Emission Buses website.

Appendix E
Asset Inventory, including Silver Line Phase 2

Metro will review, update, and verify the inventory with the new SLPH2 assets as needed.

Asset Type	Quantity including SLPH2	Date Built	Unit Type
Revenue Track	1,383,360 track feet (~262 track miles)	1974-2015	Track Feet
Yard Track	369,600 track feet (~70 miles)	1977-2015	Track Feet
Tunnels	475,200 linear feet (90 miles)	1974-2014	Linear Feet
Rail Revenue Vehicles	1,236 railcars	1983-2018	Each
Bus Revenue Vehicles, Non-Articulated	2,038 buses (includes contingency fleet)	1997-2022	Each
Bus Revenue Vehicles, Articulated Buses	75 buses	2021	Each
MetroAccess Revenue Vehicles	759 vehicles	2014-2021	Each
Non-Revenue Vehicles	1,536 rubber-wheel service vehicles and 184 steel-wheel service vehicles	1986-2021	Each
Ticket Vending Machines	109 TVMs	1990-2014	Each
Fareboxes	1,782 fareboxes	2003-2004	Each
Fare vendors	537	1990-1991	
Rail Stations	97 stations	1976-2016	Each
Canopies	98 canopies	1978-2022	Each
Bus Stop Shelters	450 shelters	1997-2006	Each
Parking Garages	27 garages	1980-2013	Each
Elevators	409 elevators	1976-2022	Each
Escalators	653 escalators	1976-2019	Each
Signals & Train Control	5,820 miles of Train Control cable	1976-2014	Miles
	165 Train Control Rooms	1976-2014	Each
	3,380 Track Circuits	1976-2016	Each
	659 Switch Machines	1986-2021	Each

Communications	1,149 Signals	1977-2022	
	109 Station PA System Units	1990-2022	Each
	Fiber-Optic Cable Transmission System: 534 units	1990-2022	Each
	678 Passenger Information Display Systems	2000-2022	Each
	PROTECT Chemical/Bio-Detection System~20 Stations	2016	Each
	Fire/Intrusion Detection System: 251 units	1998-2022	Each
	Intercom System 101	2004-2020	Each
	KIDS- 106	2022	Each
	CNG Gas Detection System 607	2014	Each
Traction Power Substations	127 Substations	1976-2019	Each
Tie Breaker Station	114	1976-2016	Each
Facilities: Major Rail Yards	9 rail yards	1972-2016	Each
Facilities: Bus Garages	10 bus garages	1962-2018	Each
Facilities: Administrative	17 administrative facilities	1978-2022	Each
	8 police facilities	1982-2007	Each