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FEDERAL TRANSIT ADMINISTRATION

## Asset Management Guide for Small Providers

*Focusing on the Management of Our Transit Investments*

MARCH 2016

FTA Report No. 0092  
Federal Transit Administration

**PREPARED BY**  
WSP | Parsons Brinckerhoff



U.S. Department of Transportation  
Federal Transit Administration

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**PREPARED BY**

Dr. Christian Roberts, WSP | Parsons Brinckerhoff  
Tiffany Batac, WSP | Parsons Brinckerhoff  
Margaret-Avis Akofio-Sowah, WSP | Parsons Brinckerhoff

WSP | Parsons Brinckerhoff  
1015 Half Street SE, Suite 650  
Washington, DC 20003

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Federal Transit Administration  
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## Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
<b>LENGTH</b>				
<b>in</b>	inches	25.4	millimeters	mm
<b>ft</b>	feet	0.305	meters	m
<b>yd</b>	yards	0.914	meters	m
<b>mi</b>	miles	1.61	kilometers	km
<b>VOLUME</b>				
<b>fl oz</b>	fluid ounces	29.57	milliliters	mL
<b>gal</b>	gallons	3.785	liters	L
<b>ft<sup>3</sup></b>	cubic feet	0.028	cubic meters	m <sup>3</sup>
<b>yd<sup>3</sup></b>	cubic yards	0.765	cubic meters	m <sup>3</sup>
NOTE: volumes greater than 1000 L shall be shown in m <sup>3</sup>				
<b>MASS</b>				
<b>oz</b>	ounces	28.35	grams	g
<b>lb</b>	pounds	0.454	kilograms	kg
<b>T</b>	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
<b>TEMPERATURE (exact degrees)</b>				
<b>°F</b>	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C

REPORT DOCUMENTATION PAGE		Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.			
1. AGENCY USE ONLY	2. REPORT DATE March 2016	3. REPORT TYPE AND DATES COVERED April 2015 – March 2016	
4. TITLE AND SUBTITLE Asset Management Guide for Small Providers: Focusing on the Management of Our Transit Investments		5. FUNDING NUMBERS 2611NY267010	
6. AUTHOR(S) Dr. Christian Roberts, Tiffany Batac, Margaret-Avis Akofio-Sowah			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) WSP   Parsons Brinckerhoff 1015 Half Street SE, Suite 650 Washington, DC 20003		8. PERFORMING ORGANIZATION REPORT NUMBER FTA Report No. 0092	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Department of Transportation Federal Transit Administration East Building 1200 New Jersey Avenue, SE Washington, DC 20590		10. SPONSORING/MONITORING AGENCY REPORT NUMBER FTA Report No. 0092	
11. SUPPLEMENTARY NOTES <a href="http://www.fta.dot.gov/research">http://www.fta.dot.gov/research</a>			
12A. DISTRIBUTION/AVAILABILITY STATEMENT Available from: National Technical Information Service (NTIS), Springfield, VA 22161 Phone 703.605.6000, Fax 703.605.6900, email [orders@ntis.gov]		12B. DISTRIBUTION CODE TRI-20	
13. ABSTRACT The Federal Transit Administration's 2012 <i>Asset Management Guide</i> focuses on the management of our nation's transit investments and provides practical guidance for how individual agencies can apply appropriate asset management business processes to maintain their assets. This <i>Asset Management Guide for Small Providers</i> is a supplemental resource for small transit service providers that have fewer assets and fewer asset classes to maintain than larger agencies and substantially fewer resources to direct towards how their assets are managed. It describes what Transit Asset Management (TAM) means for small providers and is designed to assist in developing TAM plans to improve the management of transit assets while meeting the intent of Federal requirements. The Guide limits descriptions to assets, practices, and requirements that are directly applicable to small providers; allows for tailoring to address inevitable outliers (e.g., rural agencies that maintain sizable fleets) and incorporate related state-level requirements that may differ among states; and provides a master template for small providers to develop TAM plans and offers example strategies and tips that can be applied to increase efficiency of day-to-day operations and maintenance efforts.			
14. SUBJECT TERMS Transit asset management, TAM, state of good repair, small transit providers, MAP-21, FAST Act		15. NUMBER OF PAGES 38	
16. PRICE CODE			
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT None

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## ABSTRACT

The Federal Transit Administration's 2012 *Asset Management Guide* focuses on the management of our nation's transit investments and provides practical guidance for how individual agencies can apply appropriate asset management business processes to maintain their assets. This *Asset Management Guide for Small Providers* is a supplemental resource for small transit service providers that have fewer assets and fewer asset classes to maintain than larger agencies and substantially fewer resources to direct towards how their assets are managed. It describes what Transit Asset Management (TAM) means for small providers and is designed to assist in developing TAM plans to improve the management of transit assets while meeting the intent of Federal requirements. The Guide limits descriptions to assets, practices, and requirements that are directly applicable to small providers; allows for tailoring to address inevitable outliers (e.g., rural agencies that maintain sizable fleets) and incorporate related state-level requirements that may differ among states; and provides a master template for small providers to develop TAM plans and offers example strategies and tips that can be applied to increase efficiency of day-to-day operations and maintenance efforts.



## ACKNOWLEDGMENTS

The authors are appreciative of the time and energy invested by the following industry representatives in supporting the development of this Guide.

### **Providers:**

- Clay County Transportation
- Ki Bois Area Transit System
- Malheur Council on Aging & Community Services
- Roaring Fork Transit Authority
- Sandusky County Public Transportation: TRIPS (A Division of WSOS Communication Action)

### **National Industry Groups/Technical Assistance Centers:**

- National Rural Transit Assistance Program
- National Transit Institute
- American Associate of State Highway Transportation Officials (AASHTO) Standing Committee on Public Transportation (SCOPT) / Multi-State Transit Technical Assistance Program (MTAP)

### **State Departments of Transportation:**

- Illinois Department of Transportation
- Maryland Department of Transportation
- Michigan Department of Transportation
- Mississippi Department of Transportation
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- Ohio Department of Transportation
- Pennsylvania Department of Transportation
- Washington Department of Transportation
- Wisconsin Department of Transportation



## PREFACE

The Federal Transit Administration's (FTA) 2012 *Asset Management Guide* focuses on the management of our nation's transit investments and provides practical guidance for how individual agencies can apply appropriate asset management business processes to maintain their assets. This document, the *Transit Asset Management Guide for Small Providers*, is intended to be a supplemental resource for small transit service providers that have fewer assets and fewer asset classes to maintain than larger agencies and substantially fewer resources to direct towards how their assets are managed.

This Guide describes what Transit Asset Management (TAM) means for small providers and will assist in developing TAM plans to improve the management of transit assets while meeting the intent of Federal requirements originally set forth in *Moving Ahead for Progress in the 21st Century (MAP-21)* and subsequent FTA rulemaking. The Guide is designed to be:

- **Streamlined** – limits description to assets, practices, and requirements that are directly applicable to small providers.
- **Flexible** – allows for tailoring to address inevitable outliers (e.g., rural agencies that maintain sizable fleets) and incorporate related state-level requirements that may differ among states.
- **Practical** – provides a master template for small providers to develop TAM plans and offers example strategies and tips that can be applied to increase efficiency of day-to-day operations and maintenance efforts.

## HOW THE GUIDE IS ORGANIZED

Although this Guide is not intended to be a step-by-step guide for MAP-21 (and its successor, Fixing America's Surface Transportation, FAST) compliance, it does provide guidance for good practice asset management based on a review of industry standards and practices with direct input from a sampling of providers, state departments of transportation, and industry and technical assistance groups.

Part I of the Guide is a primer on TAM and TAM plans for small providers. It includes resources for developing and implementing a TAM plan, including examples of effective practices, answers to frequently asked questions, and web-based resources.

Part II of the Guide includes a link to a menu-driven master template to assist in the development of a MAP 21-compliant TAM Plan for small providers. Options are provided for both a "compliant" TAM plan aligned to minimum requirements of MAP-21 or a "comprehensive" TAM plan. For an Excel template for your Transit Asset Management Plan, [CLICK HERE](#).

## HOW TO USE THE GUIDE

If you are a small provider or state department of transportation (DOT) that will be using this guide to develop a TAM Plan, refer to Sections 1, 2, and 3 of Part I for a comprehensive overview of TAM and key TAM Plan elements and requirements. Sections 4 and 5 include answers to related questions as well as other resources that can be consulted as needed as you work through the master template in Part II to develop your TAM plan. The content of these sections should also be helpful as you implement and update your TAM plan.

It is advisable that the agency personnel who complete the template be those who are most knowledgeable about your agency's fleet, equipment, and facilities, as applicable and responsible for implementing internal maintenance processes. The completed template also should be reviewed by your organization's accountable executive who will have the authority for approving and implementing the TAM Plan to ensure that the necessary resources are available to carry out the plan. During implementation, it is recommended that all staff with a substantial role in asset management review the content.

## WHERE TO GO FOR HELP

There are a number of resources for technical assistance as needed, including, but not limited to, your state DOT, FTA, and the National Rural Transit Assistance Program (RTAP). A comprehensive list of resources is provided in Section 5: Resources. Additionally, FTA technical assistance may be found at <http://www.fta.dot.gov/13248.html>.

# PART I

## Transit Asset Management Plan Primer



SECTION  
**1**

# Transit Asset Management 101

Before reviewing this *Asset Management Guide for Small Providers* in more detail, some key terms and concepts are provided below to “de-mystify” what asset management means for small, rural, and tribal transit agencies. Additional background and concepts may be found in the Federal Transit Administration’s (FTA) 2012 *Asset Management Guide*.

**Table 1-1**  
*Key Transit Asset Management Concepts for Small Providers*

<b>What is a capital asset?</b>	A capital or transit asset is a unit of rolling stock, a facility, a unit of equipment, or an element of infrastructure used in public transportation
<b>What is transit asset management (TAM)?</b>	TAM is a set of strategic and systematic process and practices for managing the performance, risk, and costs of transit capital assets over their lifecycle to provide safe, cost-effective, and reliable service.
<b>What does the lifecycle of an asset include?</b>	The lifecycle of an asset covers procurement, operation, inspection, maintenance, rehabilitation, replacement, and disposal.

**Table 1-1 (cont'd)**

*Key Transit Asset  
Management Concepts  
for Small Providers*

<b>How does TAM link to service delivery?</b>	The condition of transit capital asset is critical to the safety and performance of the public transit system. TAM is about aligning assets with the resources and transit services being provided and the customer expectations for safe, reliable service.
<b>What is the National Transit Asset Management System?</b>	<p>The National Transit Asset Management System is a framework for how transit asset management will be defined and delivered on a federal and agency level. The five elements of this national system are:</p> <ul style="list-style-type: none"> <li>• FTA defines State of Good Repair (SGR)</li> <li>• Recipients and sub-recipients develop.</li> <li>• FTA establishes SGR performance measures; recipients and subrecipients set SGR performance targets.</li> <li>• Recipients and sub-recipients report data to the National Transit Database (NTD).</li> <li>• FTA provides technical assistance.</li> </ul>
<b>What is a TAM Plan?</b>	A TAM Plan establishes the objectives for an asset or group of assets as it relates to delivering service. It sets out the whole life plan for asset maintenance, overhaul, and renewal strategies by specifying capital asset inventories, condition assessments, decision support tools, and investment prioritization.



## SECTION 2

*This section provides context for transit asset management (TAM): What is an asset? What is transit asset management? Why should my agency be doing transit asset management, and what are the outcomes and benefits? What are the TAM requirements for small providers?*

# Introduction

## 2.1 Who is This Guide Intended For?

The *Asset Management Guide for Small Providers* presents a framework for transit asset management tailored to small providers.

Notably, the term “small provider” is not tied to a geographical service area but rather to the size and composition of an agency’s fleet. It is important to note that although most providers that fit the definition of “small” may be located in rural, tribal, or small urbanized areas, this Guide also may be applicable to providers that operate in large urbanized areas and primarily offer bus-only and/or on-demand services.

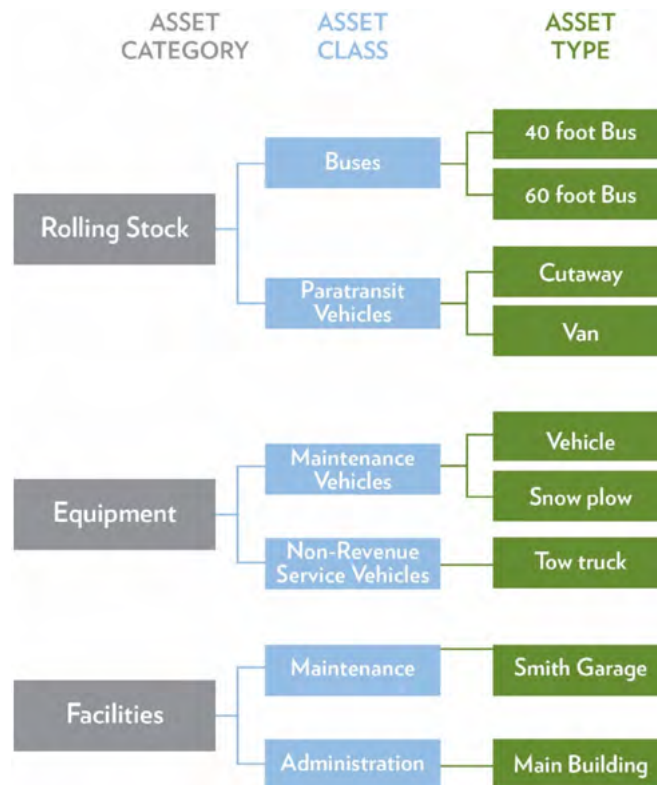
## 2.2 What is a Transit Asset?

Broadly speaking, transit assets include fixed facility assets (e.g., administrative and maintenance facilities), rolling stock (e.g., revenue buses and vans), and equipment (e.g., maintenance equipment, non-revenue service vehicles and trucks, etc.) with a useful life of one year or more.

Small providers typically have assets that fall into one or more of three asset categories defined by Federal legislation: Rolling Stock, Equipment, and Facilities.

Federal legislation also includes a fourth category (Infrastructure), but this is for fixed guideways (e.g., rail), which are generally excluded from the small provider category. Within each asset category, individual assets are grouped into asset classes. Examples of this asset category → asset class → asset type hierarchy is shown in Figure 2-1. The hierarchy can be broken down further at the component level for individual assets.

**Figure 2-1**  
Sample Asset Hierarchy – Example of Asset Categories, Asset Classes, and Asset Types



## 2.3 What is Transit Asset Management?

*Asset management is about doing the right amount of work at the right time for the right cost to deliver the right level of service.*

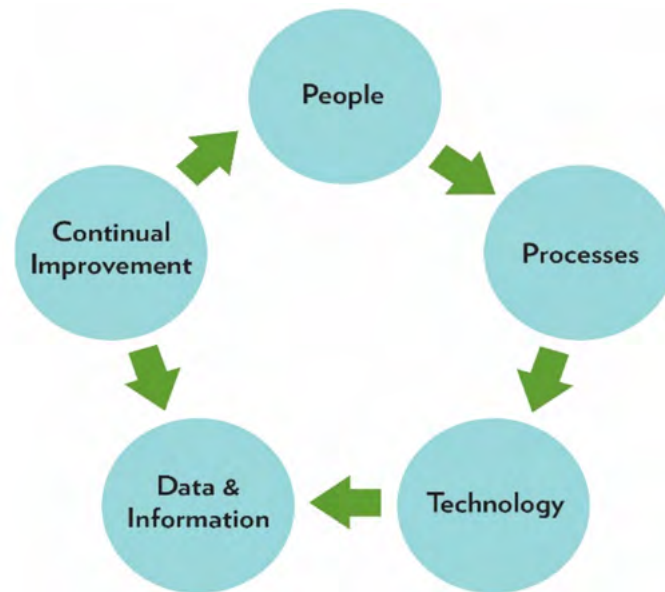
Transit asset management involves a set of strategic and systematic processes and practices for managing the performance, risks, and costs of transit assets across their entire lifecycle to deliver service reliably, safely, and cost effectively.

Asset management is not just about maintenance, and it is more than technology. To be successful, a comprehensive approach to asset management incorporates the people, processes, technology, data & information, and continual improvement needed to support better management of assets over their entire lifecycle (see Figure 2-2).



**Figure 2-2**

*Five Major Areas of Asset Management*



Asset management includes:

- A clear vision and strong leadership
- A framework within which to undertake decisions
- Reliable, accurate asset information
- Technology to support efficient management
- The mindset to monitor, review and continually improve

## 2.4 Why Asset Management?

Particularly for smaller agencies that are constantly challenged to do more with less, ensuring that assets are cost-effectively managed to deliver the service needed becomes critical. The core intent of this Guide is to help you take steps to ultimately maximize the utilization of your capital assets, cost-effectively plan for long-term capital investment needs while balancing service/operational needs and requirements, and, to the extent possible, minimize your lifecycle costs. Although this Guide is focused on managing assets and capital investment, transit agencies are also faced with deciding what services they can sustain over time and allocating available revenues to a combination of operating and capital needs. Balance between sustaining service and maintaining assets can be particularly difficult for agencies that have the option of using their Federal formula funds for both. Having a good asset management plan in place can help you see the long term investment needed to maintain your assets and as such might also assist you in making investment decisions regarding the services you can sustain. This systematic approach to managing assets can add value across your organization, as shown in Table 2-1.

*A capital asset is defined as a unit of rolling stock, a facility, a unit of equipment, or an element of infrastructure used in public transportation.*

**Table 2-1**  
Benefits of Asset  
Management for  
Small Providers

Transit Agency Business Benefits	Asset Management Approach
Improved customer service	<ul style="list-style-type: none"> <li>• Improves on-time performance, service operations, and vehicle and facility cleanliness.</li> <li>• Reduces missed trips, slow orders, and station shutdowns.</li> <li>• Focuses investments around customer-centered goals and metrics.</li> </ul>
Improved productivity, reduced safety risks, and reduced costs	<ul style="list-style-type: none"> <li>• Maintains assets more effectively, using condition-based approaches and predictive and preventive maintenance strategies to reduce costs while improving service delivery.</li> <li>• Reduces chances of maintenance-related safety hazards due to improved asset condition.</li> </ul>
Data for decision-making	<ul style="list-style-type: none"> <li>• Better aligns spending with an agency's goal and objectives to obtain the greatest return from limited funds.</li> <li>• Incorporates lifecycle cost, risk, and performance trade-offs into operations and capital programming.</li> <li>• Improves visibility for budgeting maintenance work and for understanding other costs or financial risks due to major component and/or other replacement needs.</li> <li>• Provides better understanding of the relationships between investments and outcomes (condition, safety, operations) and can lead to more accurate estimates of system needs to meet a target condition.</li> </ul>
Better data for improved stakeholder communications	<ul style="list-style-type: none"> <li>• Improves transparency and accountability leading to improved relationships with stakeholders.</li> <li>• Provides more accurate and timely data to communicate with oversight boards and customers.</li> </ul>

## 2.5 How Does This Guide Align with MAP-21 Requirements for Small Providers?

Per Moving Ahead for Progress in the 21st Century (MAP-21), FTA grant recipients or subrecipients are required to develop a TAM Plan and report data on their capital assets to the National Transit Database (NTD). As noted previously, although this Guide is not intended to be a step-by-step instruction on how to comply with MAP-21 requirements, it does provide guidance on good practice asset management on which MAP-21 TAM requirements are based and aligned. Table 2-2 indicates specific TAM requirements and associated sections of this Guide as a quick reference. Additional risk management requirements under safety plans are required under MAP-21 and are also covered in this Guide under Part I, Section 3.1.5, Management Approach.

**Table 2-2**  
*Reference Guide  
 for Meeting Federal  
 Requirements*

Requirement Reference	Requirement	Part I Guide Reference
49 U.S.C. 5326(b)(2) 5326(a)(2)(A)	Develop TAM Plan that includes capital asset inventories.	Section 3.1.2
49 U.S.C. 5326(b)(2) and 5326(a)(2)(A)	Develop TAM Plan that includes condition assessments.	Section 3.1.4
49 U.S.C. 5326(b)(2) and 5326(a)(2)(A)	Develop TAM Plan that references use of decision support tools.	Section 3.1.5
49 U.S.C. 5326(b)(2) and 5326(a)(2)(A)	Develop TAM Plan that includes investment prioritization.	Section 3.1.6
49 U.S.C. 5326(b)(3)	Report on condition of system.	Sections 3.1.3 and 3.2
49 U.S.C. 5326(b)(3)	Provide description of any change in condition since last report.	Sections 3.1.3 and 3.2
49 U.S.C. 5326(c)(2)	Provide performance targets in relation to SGR performance measures.	Sections 3.1.1 and 3.2
49 U.S.C. 5326(c)(3)(A)	Report on progress toward meeting performance target.	Sections 3.1.1 and 3.2
49 U.S.C. 5326(c)(3)(B)	Provide subsequent fiscal year performance targets.	Sections 3.1.1 and 3.2



## SECTION 3

*This section describes what the Transit Asset Management Plan (TAM Plan) is, what is typically included, and the federal requirements.*

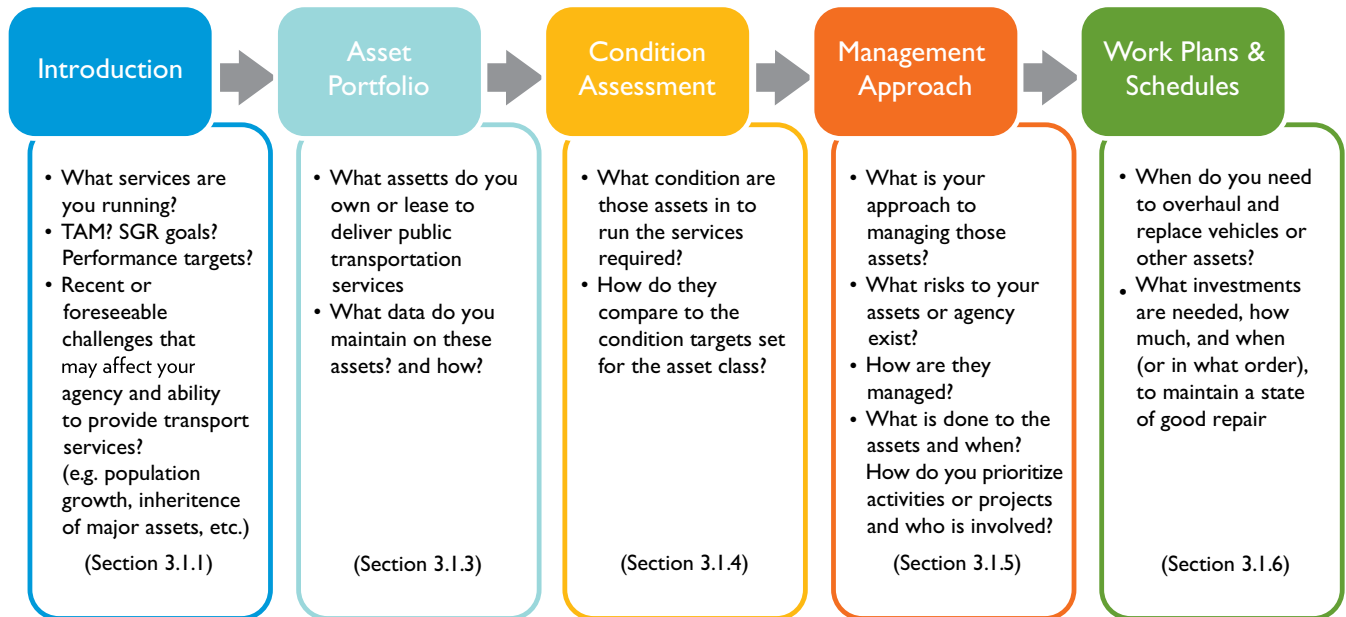
# Transit Asset Management Plans

This section provides a suggested structure for a TAM plan, aligned to Federal requirements and industry best practice. The content is designed to work in tandem with the TAM Plan template provided in Part II of this Guide and is intended to provide useful assistance, whether the plan is prepared by a small provider or prepared by a state DOT for its subrecipients. Ultimately, your TAM Plan will provide an umbrella for bringing together current maintenance and related practices and ensuring an integrated whole-life perspective is applied moving forward. It can address any gaps in current procedures and/or identify opportunities for improvement. Key questions and examples from other transit properties also are included throughout this section to further enhance development and implementation of your plan.

## 3.1 Overview of the TAM Plan and Structure

The purpose of a TAM Plan is to specify the activities (maintenance, overhaul/renewal, replacement, etc.), resources, and timescales required for a group of assets to achieve the agency's service and asset management objectives. To put it simply, a TAM Plan is a living, single source of information to help you better

manage your assets to deliver your target service through the core TAM Plan elements shown in Figure 3-1.



**Figure 3-1** Major Elements of a TAM Plan

### 3.1.1 Introduction

The TAM Plan may begin with an introduction of your agency's approach to asset management. It covers the following elements:

#### Key Questions to Consider

- What are your TAM and/or SGR goals, objectives, vision or policy?
- What services are you running and what are your performance targets and measures?

- Your agency's policy and strategy for Transit Asset Management and achieving or maintaining a State of Good Repair for the system.
- An overview of the TAM Plan structure.
- The time horizon for the plan.
- An outline of roles and responsibilities for developing and implementing the TAM plan.
- A reference list of any other documents related to managing the lifecycle of buses and facilities (such as vehicle maintenance plans) and their relationship to the TAM plan.

(Note: The template in Part II of the Guide includes a starter list of other documents that may support development of your TAM plan.)

You may also wish to include discussions of any interdependencies between asset groups here.

### 3.1.2 Performance Targets and Measures

*For a plan developed by a state department of transportation for a group of small providers, targets are set for the group as a whole, rather than for each individual provider.*

TAM and SGR are interrelated. SGR is defined as the condition at which a capital asset is able to operate at a “full level of performance”—that is, the asset can perform its designed function and does not pose an unacceptable safety risk to users. In defining SGR, one of the reasons FTA chose the aspirational approach of “full level of performance” is based on findings from Transit Cooperative Research Program (TCRP) Report 157, “State of Good Repair: Prioritizing the Rehabilitation and Replacement of Existing Capital Assets and Evaluating the Implications for Transit,” which suggested a straightforward approach to defining SGR as “the point at which all of a transit agency’s assets are in a good condition”—an ideal condition that can be measured by objective standards. Despite the transit industry’s SGR backlog, it has been able to deliver more than 10 billion annual trips and, therefore, should reflect an aspirational condition beyond the status quo.

Assets sufficiently maintained at their full performance level are instrumental to your agency’s ability to provide reliable service and minimize operating and maintenance costs over the lifecycle of buses, equipment, and facilities. TAM provides a process for performance planning and establishing the strategy for transit capital assets to be maintained in a state of good repair. Good TAM practices contribute to achieving SGR for your system.

Under the National TAM System (see Table I-1), FTA is required to set SGR performance measures that provide a basis for agencies to determine whether assets are in a condition sufficient to operate at a full level of performance. FTA’s SGR performance measures are set by asset class, as shown in Table 3-1.

**Table 3-1**  
*FTA Performance Measures for Small Provider Asset Categories*

Asset Class	Performance Measure	Definition
<b>Rolling Stock</b> All revenue vehicles	Age	% of revenue vehicles within a particular asset class that have met or exceeded their Useful Life Benchmark (ULB) <sup>1</sup>
<b>Equipment</b> Maintenance equipment or non-revenue vehicles	Age	% of vehicles that have met or exceeded their ULB
<b>Facilities</b> All buildings or structures	Condition	% of facilities with a condition rating below 3.0 on FTA’s Transit Economic Requirements Model (TERM) Scale <sup>2</sup>

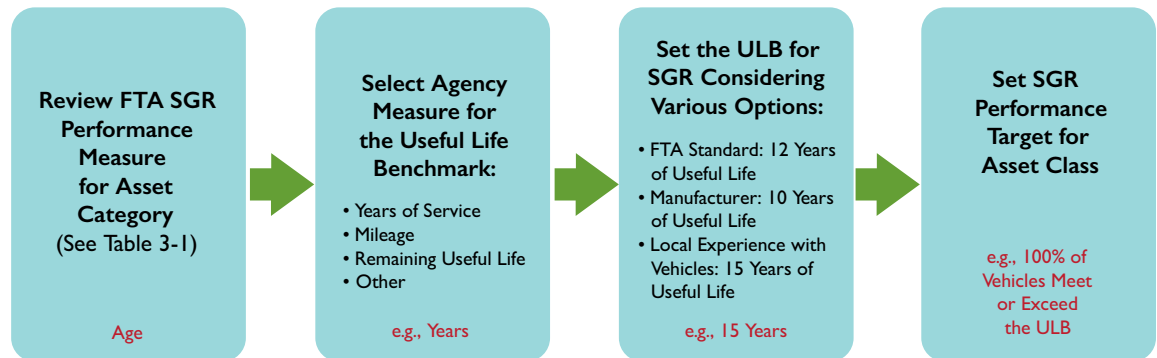
<sup>1</sup> Refer to Section 3.1.4 for more information on Useful Life Benchmark.

<sup>2</sup> Refer to Section 3.1.4 for more information on condition ratings.

It should be noted that these performance measures are primarily “condition” based – utilizing age, visual, or measured condition as a measurement of performance. Good practice asset management, however, will also consider other performance targets and measures related to service, safety, and reliability.

Performance targets should be set annually for each asset class. As a starting point, FTA's proposed performance measures can be used. The best targets are quantifiable and supported by the most recent condition data and reasonable projections of the expected revenue, as well as other external factors that may adversely impact the ability to meet stated targets (e.g., population growth in an area).

An example of how you could set your performance target, using a bus for illustration purposes, is provided in Figure 3-2.



**Figure 3-2** Sample Development of Your Agency's SGR Performance Targets for Buses

In this example, the asset class is revenue buses. As shown in Table 3-1, FTA's SGR performance measure for revenue vehicles is age. The Useful Life Benchmark (ULB) for buses can be set using several types of indicators. Good candidate indicators include years in revenue service, mileage, and remaining useful life, as these are likely consistent with data you are already maintaining on your vehicles and, thus, would impose little to no additional burden on your agency for reporting. In this example, the SGR performance target is to have the average age of the agency's fleet be 15 years, as experience has shown 15 years to be the average useful life of vehicles, i.e., the maximum period that buses can operate at their full level of performance. The SGR performance target set in this example is for, on average, 100% of vehicles to have an age of 15 years or less.

#### Key Questions to Consider

- What assets do you have to deliver public transportation services?
- What information do you have on these assets (e.g., make/model, age, condition, replacement costs, etc.)?

### 3.1.3 Asset Portfolio

The asset portfolio (also known as “asset inventory” in MAP-21 or “asset register” more broadly) is a listing or database of assets—vehicles, equipment, and facilities (if applicable) owned, operated, and/or maintained by your agency that support the delivery of public transportation services. It is the first step in organizing and managing asset information and is intended to provide accessible, consistent, and comprehensive information about an asset. The asset portfolio under a TAM Plan catalogs information similar to what your agency already reports to NTD as a recipient of Section 5311 or Section 5307 funding and/or as a requirement of your state DOT.

Note that your TAM Plan covers all revenue and non-revenue vehicles and facilities acquired with or without FTA funds. In addition to assets you own, the asset portfolio captures leased assets and assets operated under contract as well as all assets that would be included in the program of projects that is contained in your metropolitan area's Transportation Improvement Program (TIP) or State Transportation Improvement Program (STIP).

Although there is no set requirement for what level of information should be included in your asset portfolio, it should contain sufficient data on the numbers and types of assets you own, including vehicle type, year of manufacture, mileage, and replacement cost (if available) to inform future decisions. Circular 5010, Chapter IV calls for the following equipment record information items to be maintained by Federally Assisted Property:

- Description of asset
- Identification number or serial number
- Entity or individual that holds title to asset
- Source of funding (FAIN number under which procured)
- Acquisition date
- Cost of asset
- Percentage of federal participation in cost
- Location
- Use and condition
- Useful life
- Disposition data, including date of disposal and sale price, or, where applicable, method used to determine its fair market value

#### **Key Questions to Consider**

- *How will condition be determined for each asset class?*
- *What condition are your assets in to run the services required?*
- *How does the actual asset condition compare to your condition target?*

#### **3.1.4 Condition Assessment**

The condition assessment is a systematic process of inspecting and evaluating the visual and/or measured condition of your assets. A well-established condition assessment process can help predict failure, identify unacceptable safety risks, initiate an evaluation of their root causes, and integrate directly with proactive planning for the investments required to maintain good performance on your most critical assets. As noted in FTA's 2012 *Asset Management Guide*, condition assessment data can be used to support asset management–related decision-making activities, including capital programming, performance modeling, and day-to-day maintenance.

There is not a prescribed methodology or approach for conducting condition assessments for your buses, equipment, and/or facilities. The only requirement is for your condition assessment and resultant rating to be sufficiently detailed to monitor performance and plan capital investments appropriately. Condition



assessments should be conducted at the individual asset or asset class level. (See Figure 3-3 for an example of a vehicle and component condition rating.)

No.	System	Description of Subsystem Evaluated	2016	2015
1	Engine	Available compression tests, oil usage, oil analysis and noise	5	6
2	Drive-Train	Transmission and rear-end based fluid analysis, shift quality, fluid leaks and noises	10	7
3	Electrical	Lights, switches, gauges, electrical mechanisms, front to back wiring	8	7
4	Suspension/Steering	Springs, shocks, struts, steering wheel "play"	7	7
5	A/C, Heating	Cooling and heating throughout vehicle	8	7
6	Structure	Extent of cracks and rust in frame and structure	7	7
7	Body Interior	Condition of floor, windows, seats, side and modesty panels	6	7
8	Body Exterior	Extent of cracks, dents, and rust	6	6
9	Wheelchair Safety	Ability to load and unload passengers safely	8	6
10	Safety Systems	Bracking system, emergency brake, emergency exit windows and doors	8	8
Vehicle Condition Score			73	68

Vehicle Condition Worksheet - Subsystem Rating Guide			Vehicle Condition Scoring Guide	
Score	Rating	Description	Score	Rating
10	Excellent	Brand new, no major problems exist, only routine PM required	80-100	Excellent
7-9	Good	Elements are in good working order, require on nominal or infrequent minor repairs ( More than 6 months between minor repairs	61-80	Good
4-6	Moderate	Requires frequent minor repairs (<6 months between) or infrequent major repairs (>6 months between)	41-60	Moderate
1-3	Poor	Requires frequent major repairs (<6 months between)	21-40	Poor
0	--	In such poor condition that continued use presents potential problems	<=20	Unusable/Inoperable

**Figure 3-3** Example of Vehicle and Component Condition Rating

As an initial step to developing your condition assessment process, it is recommended that you set a condition target for your asset classes. For the condition assessment, your assets are rated against these condition targets. For example, condition targets can be age, mileage (for revenue or support vehicles), or simply Pass/Fail.

These targets are usually set as standards, which can be derived from laws, equipment manufacturer's recommendations, or industry standards. They serve as indicators of the structural and functional condition of your assets, which relate to their ability to support your level-of-service objectives, and should reflect your local experience with assets. A streamlined approach may involve condition targets aligned with SGR performance targets you set and report on annually.

For each condition target, it often is helpful to establish a minimum tolerable condition of the asset. This refers to a minimum threshold below which a measured condition would result in a mandatory action to remedy the situation, which may lead to identifying and prioritizing your capital investment needs over the horizon of the TAM plan.

This element of the TAM Plan also outlines your data collection procedures for the condition assessment. Selection of an asset class condition inspection approach depends on the costs and risk factors associated with that asset. For example, in many cases, only a sampling of the asset class needs to be inspected. The size of the sample and frequency of inspection and data collection should be directly related to the level of risk associated with the asset. Additionally, the inspection and measurement approach considers industry practice and how the information will be used.

### *Rolling Stock and Facilities Condition Measures*

A key element of the “age” performance measure for rolling stock and equipment is the ULB, the period during which a capital asset can reasonably be expected to be used reliably in your operating environment. It is important to note that this does not automatically equate to FTA’s useful life guidelines found in the Grants Administration Circular. Rather, the ULB should take into account such factors as geography, service frequency, passenger loads, and your historical experience with specific vehicle types. The ULB can be expressed as years, mileage, or other factors that you deem appropriate for your system.

For facilities, condition often is measured using FTA’s Transit Economics Requirements Model (TERM) Scale, as shown in Table 3-2. TERM does not apply only to facilities and is an analysis tool designed to provide an assessment of the current physical conditions of existing transit assets based on the asset type, age, maintenance history, and past utilization (e.g., life-to-date miles for a transit vehicle).

**Table 3-2** *TERM Rating Scale*

Condition	Rating	Description
Excellent	5.0 to 4.8	New asset; no visible defects.
Good	4.7 to 4.0	Asset showing minimal signs of wear; some (slightly) defective or deteriorated component(s).
Adequate	3.9 to 3.0	Asset has reached its mid-life (condition 3.5); some moderately defective or deteriorated component(s).
Marginal	2.9 to 2.0	Asset reaching or just past the end of its use life; increasing number of defective or deteriorated component(s) and increasing maintenance needs.
Poor	1.9 to 1.0	Asset is past its useful life and is in need of immediate repair or replacement may have critically damaged component(s).

**Key Questions to Consider**

- What is your approach to managing your assets?
- What risks to your assets or your agency exist? What are the impacts and what mitigation measures are needed or are already being implemented?
- What is done to the assets and when? How is this determined; what process or tool is used to support these decisions regarding key asset management activities?

The condition assessment will produce a condition rating for your assets and should be assessed against the target set for the asset class. If a gap exists between the target and condition of your assets, activities and strategies required to bring your assets to the targeted condition should then be identified through the following sections of your plan.

**3.1.5 Management Approach**

Your management approach considers the strategies, requirements, processes, and activities needed over the course of the life of your assets—from design/procurement, operation, maintenance, and rehabilitation to replacement and disposal. Your TAM Plan may incorporate or reference already-existing documents to complete this section, such as Fleet Management Plans, Facility Management Plans, maintenance manuals, etc.

- **Design/Procurement.** The TAM Plan covers the activities related to vehicle, equipment, and/or facility acquisition, including all applicable approvals by the state DOT and/or other designated recipient.
- **Maintenance.** The TAM Plan identifies the maintenance and inspection activities and a corresponding schedule (see Table 3-3 for example). This is based on the manufacturer’s requirements/recommendations or regulations and, in more advanced cases, appropriate analysis of the deterioration, unit costs, failure mode, performance, condition, safety and operational risks, obsolescence (of equipment, people and materials), and failure consequences of the asset. It also considers operational, access, and financial constraints in developing the maintenance, inspection, renewal, and improvement strategies. When onboarding new assets, the initial inspection and recording into the asset management system is a critical step that can set the example for consistency going forward for other assets.

**Table 3-3**  
Example  
Bus Preventive  
Maintenance Schedule

Inspection Type	Activity Description	Frequency
A	Air system/break components, exhaust system, frame and underbody, fuel system, steering suspension, engine oil/filter change, heating and air conditioning, WMA assurance	12,000 miles
B	Type A inspection activities + wheels, fasteners, autolube system, transmission oil and filter change, disc brake pads/linings, batteries and charging system, cooling system, driveline, engine transmission and ABS control units	6 months
C	Type B inspection activities + additional activities under categories above (e.g., engine air filter is replaced in Type C, but only inspected in Type B)	12 months
D	Type C inspection activities + additional activities under categories above (e.g., transmission, drain plug torque, replace power steering filter, etc.)	24 months

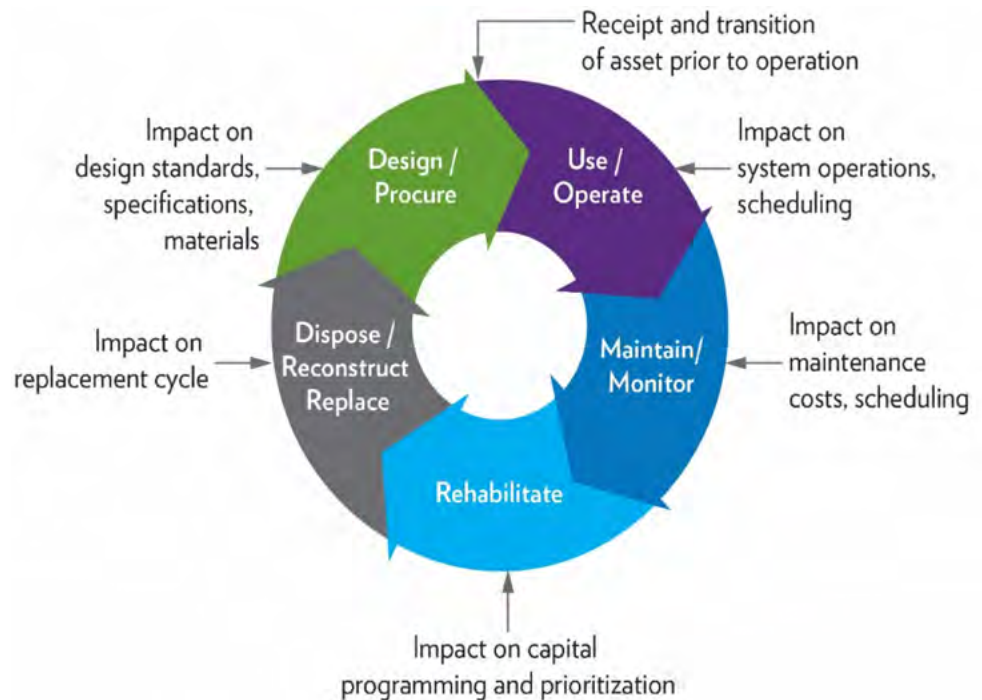
### Key Questions to Consider

- How do you prioritize activities (e.g., maintenance repairs)?
- How do you prioritize investment needs (e.g., SGR enhancements, etc.) and projects?

- **Rehabilitation/Overhaul.** The TAM Plan identifies the overhaul strategy for each asset class. It also references the decision criteria for action, detailing the frequency and identifying the basis on how the interventions are planned.
- **Disposal.** The TAM Plan sets out the process for disposal of vehicles and equipment. This includes the procedures for securing approval within the agency or from your state DOT and/or other designated recipient for disposal of vehicles (where required); selling, transferring or donating the vehicle or equipment; processing and disposition of revenue from sale of the asset; physically removing the asset off your property; and ensuring the asset is removed from your asset management records and information systems (e.g., asset register or asset management system).

Figure 3-4 depicts the stages in the lifecycle management process and how considerations (e.g., risk or other) can impact various activities or decisions to be made. Additional considerations as part of your management approach may include how day-to-day decisions are made during these stages (e.g., balancing scheduled versus corrective maintenance needs, etc.) and how short- or long-term investments are determined and prioritized. This can involve specific decision support tools or processes. (See examples in Table 3-4.)

**Figure 3-4**  
Lifecycle Management Stages



**Table 3-4**

*Examples of Tools that Improve Short- and Long-Term Capital Investment Needs Planning*

#### **Decision-Making Modeling for Rural and Small Urban Transit Asset Management**

A TAM model that can help agencies in their maintenance budget allocation process uses a deterioration process simulated using an Ordered Probit Model (OPM), which predicts the probability of a vehicle's future condition. A correlation analysis determined that maintenance, age, and maintenance expenditures account for 81% of the total variance of vehicle condition. The model can account for interdependencies among variables, and a sensitivity analysis of vehicle condition change in each independent variable can be useful for evaluating maintenance policies or what-if scenarios. The model also contains an optimization module that helps the user determine the optimal maintenance solution.

#### **Alabama DOT Rural TAM System**

The University Transportation Center for Alabama developed a geographic information system (GIS)-based TAM information system and prediction model to support and simplify vehicle management for the Alabama DOT. The system includes a database with about 40 data items on each vehicle, with condition assessed based on on-site inspections on a five-point scale that considers engine starting trouble, running condition, interior condition, air conditioning, wheelchair lift operation, exterior condition, and mileage. The prediction model was developed based on a linear regression using five independent variables of current conditions and future predicted conditions to simulate vehicle replacement given a projected budget. The system provides summaries, vehicle quality predictions, advanced reporting, and agency data reports in digital or paper format.

### 3.1.6 Work Plans and Schedules

It should be noted that small providers have varying degrees of input when it comes to identifying and prioritizing investments for long-term capital needs. For example, some states have pre-defined investment priorities for the Federal or State funds that are distributed to subrecipients, and those priorities may drive investment decisions.

This section identifies needed investments or projects over the horizon period of your TAM Plan to maintain a state of good repair or enhance the condition and performance of your assets. Projects include both SGR and enhancements to occur over the assets' whole life to deliver your service targets.

With resource and funding constraints, selected activities or projects should be prioritized. This section applies the investment prioritization process or strategy as described in your management approach and presents your priorities (activities/projects, costs, and schedule) over the horizon period of your TAM plan. The ranked listing of proposed projects and activities are ordered by implementation of maintenance and/or capital program (see Figure 3-5 for an example).

Priorities are identified locally based on policies and critical needs. Items ranked as high priority reflect unacceptable safety risks identified in the condition assessment as well as needs to meet accessibility requirements. Further, project prioritization also takes into account estimated funding sources available to implement the proposed projects and can be linked to your STIP and/or TIP.

#### **Key Questions to Consider**

- *What investments are needed to maintain a state of good repair?*
- *What are my investment priorities, and in what order?*

Capital and Fleet Costs	Total Cost	METRO Cost	State Contribution	Federal Contribution	2013	2014	2015	2016	2017	2018
<b>Primary Transit Corridors</b>	<b>Total Cost</b>	<b>50%</b>	<b>10%</b>	<b>40%</b>						
Line A - West Market	\$21,689,265	\$10,845,000	\$2,169,000	\$8,676,000	\$0	\$2,820,785	\$2,877,200	\$2,934,744	\$2,993,439	\$0
Line B - Arlington	\$13,286,000	\$6,643,000	\$1,329,000	\$5,315,000	\$0	\$0	\$0	\$0	\$0	\$1,870,274
Line C - Copley	\$16,770,000	\$8,385,000	\$1,677,000	\$6,708,000	\$0	\$0	\$0	\$0	\$0	\$0
Line D - Kenmore	\$29,236,600	\$14,619,000	\$2,924,000	\$11,695,000	\$0	\$0	\$0	\$0	\$0	\$0
Line E - Howard/State	\$8,554,000	\$4,277,000	\$856,000	\$3,422,000	\$0	\$0	\$0	\$0	\$0	\$0
Line F - Twinsburg-Macedonia	\$10,133,000	\$5,067,000	\$1,014,000	\$4,054,000	\$0	\$0	\$0	\$0	\$0	\$0
Copley Extension	\$12,164,500	\$6,083,000	\$1,217,000	\$4,866,000	\$0	\$0	\$0	\$0	\$0	\$0
Norton Extension	\$9,616,500	\$4,809,000	\$962,000	\$3,847,000	\$0	\$0	\$0	\$0	\$0	\$0
Stow Extension	\$11,982,500	\$5,992,000	\$1,199,000	\$4,793,000	\$0	\$0	\$0	\$0	\$0	\$0
Unit cost CNG	\$460,000				\$3,284,400	\$0	\$0	\$0	\$0	\$0
Unit cost MCI	\$600,000				\$0	\$0	\$0	\$0	\$0	\$0
Unit cost Artic	\$850,000				\$0	\$0	\$0	\$0	\$0	\$7,657,904
<b>Total Capital Cost (Infrastructure + Fleet)</b>					<b>\$3,284,400</b>	<b>\$2,820,785</b>	<b>\$2,877,200</b>	<b>\$2,934,744</b>	<b>\$2,993,439</b>	<b>\$9,528,179</b>

Operations Cost	Total Cost	METRO Cost	2013	2014	2015	2016	2017	2018	2019
<b>Primary Transit Corridors</b>		<b>75%</b>							
Route 1 - West Market	\$355,266	\$266,450	\$362,371	\$369,619	\$377,011	\$384,551	\$392,242		
Route 2 - Arlington	\$236,844	\$177,633	\$241,581	\$246,412	\$251,341	\$256,368	\$261,495	\$266,725	\$272,059
Route 3 - Copley	\$236,844	\$177,633							
Route 10 - Howard/Portage Trail	\$473,688	\$355,266							
Route 8 - Kenmore/Barberton	\$473,688	\$355,266							
Line A - West Market	\$2,486,862	\$1,865,147						\$2,800,611	\$2,856,623
Line B - Arlington	\$1,924,358	\$1,443,268							
Line C - Copley	\$1,213,825	\$910,369							
Line D - Kenmore	\$2,427,651	\$1,820,738							
Line E - Howard/State	\$1,902,153	\$1,426,615							
Line F - Twinsburg-Macedonia Improvements	\$532,899	\$399,674							
Copley Extension	\$1,095,403	\$821,553							
Norton Extension	\$547,702	\$410,776							
Stow Extension	\$1,110,206	\$832,655							
<b>Total (in millions)</b>			<b>\$604,000</b>	<b>\$617,000</b>	<b>\$629,000</b>	<b>\$641,000</b>	<b>\$654,000</b>	<b>\$3,068,000</b>	<b>\$3,129,000</b>

Snapshots present only partial schedules; actual schedules in this example are planned through 2032.

**Figure 3-5** Examples of Prioritized Capital Project Implementation and Service Improvement Implementation Schedule (Akron METRO Bus)

## 3.2 Other TAM Plan Considerations: Reporting, Updates, and Continual Improvement

### 3.2.1 Updates and Continual Improvement

TAM plans are living documents that should be regularly reviewed, updated, and incorporated into your agency's capital and budget planning and reporting processes. At a minimum, TAM plans should be revisited and updated at least every four years and particularly at times when significant changes in asset portfolio, capital, or service expansion is expected.

Please keep in mind that this Guide is intended to help you prepare a baseline TAM plan. As TAM Plan development procedures are integrated into your standard business processes and are advanced and as more data are collected, additional tools and information (e.g., failure and root cause data, improvement strategies, etc.) can be included as part of the process and the TAM Plan to support improved condition- or reliability-based decision-making.

### 3.2.2 NTD Reporting

As of the time this Guide was prepared, separate guidelines and requirements were expected to be further detailed on updated NTD reporting. Although the ruling has yet to be finalized, it is anticipated that each entity developing a TAM Plan will be required to report annually to the NTD on the following:

- Projected targets for the next fiscal year
- Condition assessments and performance results
- A narrative on changes in transit system conditions and the progress toward achieving previous performance targets

For 5311 recipients, reporting will be conducted by the state DOT. There are no reporting changes anticipated for revenue vehicle inventories; however, other anticipated changes include:

- Addition of administration or maintenance facilities in inventory report (if applicable)
- Addition of passenger facilities (e.g., bus transfer stations if relevant; basic bus shelters not required for reporting)



## SECTION 4

# Frequently Asked Questions

**My agency already tracks capital assets and vehicle condition for NTD reporting. Can that be used for the TAM Plan?** Yes, much of what is already reported to NTD can be used and is useful in the development of your TAM Plan.

**What assets must be included in the asset portfolio?** Any asset that is critical to the delivery of public transportation services should be included in your asset portfolio. These assets fall under (but are not limited to) the following categories: Rolling Stock (revenue vehicles), Equipment, and Facilities (primarily maintenance and administration).

**How does my routine preventive maintenance and other activities already taking place at my agency fit into the TAM Plan?** Routine preventive maintenance plans and other lifecycle management activities are part of your management approach. See Section 3.1.4, Management Approach for more information.

**How often should my agency's TAM Plan be updated?** At a minimum, it is recommended that your TAM Plan be reviewed and updated every four years.



TAM Plans also should be revisited and updated as appropriate when significant changes such as major fleet procurements and system or service expansions are anticipated.

**What happens if funding is not available when assets are ready for overhaul or replacement?** Sometimes funding will not be available at the time that it is needed, as is the nature of most capital projects. In these cases, prioritization and phasing or bundling of specific projects or activities becomes increasingly important to use resources in the most efficient way possible.

**How do midlife overhauls affect how you manage the lifecycle of a vehicle?** Midlife overhauls often can extend the life of vehicles. However, in some cases, complete overhaul is not always necessary. With limited funds, it is important to note the root causes of failure or wear and tear on your vehicles to pinpoint the components that are in greater need of replacement than others (e.g., tires may need to be rotated seasonally depending on geography to achieve longer life, etc.).

**How do you determine the lifecycle of an asset?** Most assets are designed with a specific life span in mind; however, the actual life of an asset or piece of infrastructure can vary depending on use and other conditions. The TAM Plan can be used and adapted to accommodate changes in the state of the asset(s) and its management approach and, thus, the determination of the actual lifecycle of the asset(s) as well. Circular 5010, Chapter IV states that to determine the minimum useful life for Federally Assisted Property, the recipient should identify the method used to determine the minimum useful life. Acceptable methods to determine minimum useful life include but are not limited to:

- Generally-accepted accounting principles
- Independent evaluation
- Manufacturer’s estimated useful life
- Internal Revenue Service guidelines
- Industry standards
- Recipient experience
- Recipient’s independent auditor who needs to provide his or her concurrence that the useful life assigned to the property is reasonable for depreciation purposes
- Proven useful life developed at a federal test facility

How should assets managed by a third party be addressed within the TAM Plan? Outsourcing maintenance or other management activities for assets owned by your agency is part of your management approach or strategy. It is suggested that assets that are owned by your agency but managed externally be clearly documented. Known information (e.g., condition, maintenance activities, reports,

associated costs, etc.) from your third-party vendor or contractor should be included to the extent practical in your TAM Plan; however, for contractor-owned assets, the contractor may wish to maintain responsibility of asset condition and/or performance and such arrangements can be detailed in the contractual agreement.



## SECTION 5

# Resources

Additional information on SGR, asset management, and asset management plans can be found through the following resources.

## Web Resources

American Association of State Highway and Transportation Officials, “AASHTO Transportation Asset Management Plans (TAMP) Builder,” <http://www.tamplate.org/>

Federal Transit Administration, “State of Good Repair & Asset Management,” <http://www.fta.dot.gov/13248.html>

National Rural Transit Assistance Program, “MAP-21 Program Changes,” <http://nationalrtap.org/Resource-Library/Topic-Guides/MAP-21-Program-Changes>

## Reports

Federal Transit Administration Report 0027, *Asset Management Guide: Focusing on the Management of Our Transit Investments*, 2012, [http://www.fta.dot.gov/documents/FTA\\_Report\\_No.\\_0027.pdf](http://www.fta.dot.gov/documents/FTA_Report_No._0027.pdf)

National Cooperative Research Program 20-65, Task 48, “Condition of State and Federally Funded Transit Assets, 2014,” <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3520>

Transit Cooperative Research Program, Report 157, “State of Good Repair: Prioritizing the Rehabilitation and Replacement of Existing Capital Assets and Evaluating the Implications for Transit, 2012,” [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rpt\\_157.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_157.pdf)

Transit Cooperative Research Program, Report 172, “Guidance for Developing a Transit Asset Management Plan, 2014,” [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rpt\\_172.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_172.pdf)

# PART II

## TAM Plan Template

Part II of the Guide includes a link to a menu-driven master template to assist in the development of a MAP 21-compliant TAM Plan for small providers. Options are provided for both a “compliant” TAM plan aligned to minimum requirements of MAP-21 or a “comprehensive” TAM plan. For an Excel template for your Transit Asset Management Plan, [CLICK HERE](#).



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U.S. Department of Transportation  
Federal Transit Administration  
East Building  
1200 New Jersey Avenue, SE  
Washington, DC 20590  
<http://www.fta.dot.gov/research>