



APTA STANDARDS DEVELOPMENT PROGRAM
RECOMMENDED PRACTICE

American Public Transportation Association
1666 K Street, NW, Washington, DC, 20006-1215

APTA SGR-TAM-RP-002-
13

Approved August 28, 2013
Working Group: Transit Asset
Management

Defining a Transit Asset Management Framework to Achieve a State of Good Repair

Abstract: This *Recommended Practice* is intended as an introduction to the high-level requirements for building a transit asset management framework to achieve a state of good repair, including definitional issues and resources for further study.

Keywords: asset management, asset inventory, state of good repair, organizational change

Summary: With more and more emphasis being placed on the State of Good Repair initiative coming out of the Federal Transit Administration (FTA), agencies are finding themselves in the position of uneasiness and possible confusion. Transit leaders may ask, “How am I going to get this going?” or “Where do I even begin?” This guide is meant to serve as a starting point that can be read quickly but provide a solid base and a high level of confidence on where to begin. Much has been written on asset management and the state of good repair. This guide will point to currently available materials, as well as provide some examples of real-world experience in implementing such initiatives.

Scope and purpose: This *Recommended Practice* is not meant to be a step-by-step guide. It is meant to document the experience of agencies that have found measures that work in a real-world setting. Keeping in mind that asset management is a journey, not a destination, these experiences may assist other agencies beginning down their own path.

This *Recommended Practice* represents a common viewpoint of those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a transit system’s operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual transit agencies, may be either more or less restrictive than those given in this document.



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The American Public Transportation Association greatly appreciates the contributions of the **State of Good Repair Working Group**, which provided the primary effort in the drafting of this *Recommended Practice*.

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Defining a Transit Asset Management Framework to Achieve a State of Good Repair

1. Keys to building an asset management plan

1.1 Standards

Many agencies are aware of the recently enacted legislation Moving Ahead for Progress in the 21st Century or MAP-21. One of the main elements of this new legislation is the concept of State of Good Repair. This legislation requires public transportation agencies receiving federal assistance or grant money to develop an asset management plan. This plan needs to touch on several elements. At minimum, it needs to address an agency's inventory, condition assessment and investment prioritization.

Transit agency leaders may feel overwhelmed about where to even begin to attempt this potentially massive undertaking. The purpose of this section is to provide individuals or agencies with existing standards or guides that can provide direction to move forward—and, more importantly, provide the necessary confidence to move down the chosen route.

Below is a list of resources agencies can reference when building their asset management plans (see References for more information):

- International Infrastructure Management Manual
- PAS 55 (British Standards Institution)
- TCRP Report 157: State of Good Repair: Prioritizing the Rehabilitation and Replacement of Existing Capital Assets and Evaluating the Implications for Transit
- FTA Transit Asset Management Guide
- ISO 55000 Draft International Standard for Asset Management

Agencies are encouraged to study the requirements of MAP-21 and also to spend time becoming familiar with the material mentioned above. Different approaches may work for different agencies. It is not required for agencies to become certified in any of the above-listed standards. What is required is for an agency to develop a plan addressing the requirements of MAP-21, and the reference material listed above can provide insight into how an agency can follow best practices in developing its own comprehensive asset management plan.

1.2 Definitions

The APTA SGR Standards Committee has developed a simple and straightforward definition of a state of good repair: “SGR is a condition in which assets are fit for the purpose for which they were intended.” The benefit of a simple definition is that it is easier for an agency and its stakeholders (internal and external) to agree on and accept it. The more detailed the definition, the more opportunities there are to find fault with or to disagree with various elements.

The second critical definition for an agency, then, is to determine what it considers an asset to be. The APTA SGR Committee has borrowed the definition from the Asset Management Guide commissioned by FTA,

which refers to transit assets as rolling stock, right-of-way, stations, facilities, systems and equipment. It goes on to define both “asset category” and “asset class.” An asset category is defined as a primary grouping of asset classes. For example, “vehicles” is the asset category for two asset classes (rail and rubber-wheeled vehicles.) The term “asset” can be confusing, as it has different meanings to different audiences. In this subject matter, an asset does not refer to financial assets typically documented in accounting statements, nor does it refer to non-physical assets such as trademarks and intellectual property. More detail on this can be found in the Asset Management Guide supplement.

Additionally, the FTA’s Asset Management Guide defines transit asset management as a strategic and systematic process through which an organization procures, operates, maintains, rehabilitates and replaces transit assets to manage their performance, risks and costs over their lifecycle to provide safe, cost-effective, reliable service to current and future customers. It defines an asset management business plan as a document that outlines the implementing activities, roles, responsibilities, resources and timelines needed to address an agency’s asset management policy and strategy.

SGR is important as a tracking tool for measuring progress towards a better system. Further guidance on linking asset management to recognized and defined numerical SGR goals will be addressed in upcoming APTA Standards publications.

1.3 Asset management plan (AMP)

As defined in the FTA’s Asset Management Guide, the AMP is a living document that incorporates a number of processes, activities and tools necessary to give an organization the ability to manage the efficient use of its transit assets. Organizations implementing an AMP must have a clear understanding of the interdependence of all elements involved, considering how they fit together in a comprehensive, systematic and cohesive way. The AMP outlines how people, processes and tools come together to address asset management policy and goals. The plan should outline the agency’s asset management goals, objectives, activities, roles, responsibilities and timelines, all of which should be guided by an overarching strategy that defines an expected level of service the agency is expected to deliver. The implementation of an asset management plan should be part of a dynamic process that has the capability to change and fine-tune to reflect the changes in the organization as well as the influence of external factors, such as changes in federal policies, fiscal and economic conditions, and the impact of major natural disasters.

1.4 Asset inventory

The asset inventory is the structured foundation from which an agency documents baseline data and conditions and develops its performance plan. It is important that the inventory be accurate and have identifying attributes tailored to the system from which all data is collected and manipulated.

The inventory hierarchy common to most all transit organizations is comprised of five major elements (see **Figure 1**): vehicles, facilities, stations, guideway elements, and systems. These groups are the building blocks from which a solid asset inventory is derived. Agencies will add their own organization’s assets under each major category. For example, the vehicles category can be broken into rail vehicles and buses. From there, the agency can decide how to break it down further until every vehicle is classified. For more information, see Chapter 3 of the FTA’s Asset Management Guide.

The asset inventory should constantly be maintained and added to as the agency completes major asset purchases and projects. The inventory should be maintained by the specific work groups responsible for the maintenance of the assets. This inventory will assist the financial and capital planning staffs in making accurate decisions and projections for keeping the asset inventory in a state of good repair.

FIGURE 1
Transit Agency Inventory Categories



1.5 Asset management systems

Information system technology is a vital tool that transit operators should employ as part of an overarching asset management strategy, with “management” being the key word. Computer systems and software used for asset management should meet the business needs of the agency. However, caution should be exercised here: Acquisition and installation of an asset management software system is not sufficient in and of itself to validate that a transit operator is in fact doing a good job of asset management. Software should be viewed as a tool, much like any other tool used by staff executing physical maintenance, upgrade or replacement projects.

The range of IT systems applicable to asset management is immense and covers a spectrum of subjects from work order processing to inventory control to lifecycle costing. Valid IT systems for asset management can range from large-scale databases with complex networking and user interfaces at multi-modal agencies all the way down to simple, standalone database systems at smaller agencies. The management needs of each transit agency should dictate the level of investment. In general, asset management IT tends to focus on materials management practices, and these systems are generally different from financial systems. Integration of such disparate systems would be considered a best practice and should be taken as one of many steps in the overall implementation plan for bringing asset management to life inside a transit organization.

1.6 Business practices

Agencies must effectively align the management of assets with the organizational mission, values, strategies and objectives to achieve the greatest value for each asset-related dollar invested. This alignment is achieved through a set of business practices that may require a shift in the agency’s corporate culture.

An agency needs a program champion and program support at all management levels, including the governing body, in order to coordinate efforts in the areas of capital planning, finance, budget, operations and

maintenance. There must be a clear delineation of roles and responsibilities in the respective areas. All program elements should be documented in the form of policies and procedures to ensure continuity. The overall goal of the program should be continuous improvement. Elements of the program must, at a minimum, include the following:

- **An accurate inventory of assets.** Current assets must be inventoried and cataloged. Procedures must be set in place to document the implementation of all asset procurements, implementations and disposals. It is essential for agencies to know their assets and how they are being used.
- **A condition assessment of assets.** Knowing the condition of assets relative to standard criteria provides the agency with a measure of overall SGR and provides information for determining asset needs and replacement priorities.
- **A system of asset performance measures.** Measures of performance are used to determine the adequacy of the asset for the intended purpose. Measures are also used to compare actual operation with planned operation. This measure can also be used to determine optimum levels of asset support, functions such as preventative maintenance, spare parts inventory and employee training.
- **Cost tracking.** Costs of procurement, implementation, operation, maintenance and disposal (lifecycle) should be tracked and used to identify areas needing attention, as well as a means for evaluating asset strategies. Using net present values, asset strategy scenarios such as renewal versus replacement can be compared relative to available funding to determine the optimum strategy. Cost tracking is also used to set budgets necessary to achieve a desired level of asset performance.
- **Financial planning.** Program element information is used to identify and communicate to stakeholders the asset funding necessary to provide for the organization's strategy. This information is critical to communicate, on both a short- and long-term basis, the asset funding necessary to ensure agency sustainability.
- **Continuous improvement.** The program must be periodically evaluated to determine its effectiveness in providing accurate information and to ensure continuous improvement in the management of assets. Regular program updates and revisions with testing are encouraged. Program-generated reports should be communicated throughout the agency to maximize buy-in.
- **Evaluation of risk.** The criticality of each asset is identified to determine the best use of agency resources. Focus should be placed on the assets that are key to the mission of the agency. In addition, risk with regard to regulation must be mitigated through the effective management of assets.

1.7 Organizational change

In order for an AMP or SGR effort to take hold in an agency, it will mostly likely require a shift in the organizational thought process and culture norms. It will most likely require a shift or added dimension in the decision-making paradigm at an agency. This will require a number of elements, some of which are listed below:

- The plan must have a champion at the executive level.
- Concepts need to be taught, shared and internalized by employees at all levels.
- The transit development plan (TDP) should have a section allocated to maintaining SGR.
- Maintenance efforts should become more proactive and planned as opposed to reactionary in nature.
- Balances and compromises must be found between new construction versus rehabilitation and replacement efforts.
- Barriers between different departments need to be broken down in order for information to be shared. Department expertise needs to be recognized and valued for the contributions it can provide.

An agency should recognize that based on its size and the present state of its assets, resources will need to be dedicated to this effort. It will require personnel as well as monetary resources in order to do the job

effectively. It will also require a significant time investment. While the level of resources will need to be determined at the individual agencies, it should at least be recognized that additional efforts will need to be made in order to create the foundation upon which an agency can begin to build and carry out its asset management plan. The benefit for this level of effort comes to the agency through more efficient use of scarce capital resources focused on optimally acquiring and maintaining the agency's assets.

1.8 Performance measures

The benefit of transit assets is primarily in the service they provide and not necessarily in their intrinsic value. These assets are not purchased for the purpose of holding them. They carry value in their use. Therefore, measurement of what transit assets produce is a best practice in asset management.

A linked tier of measurement hierarchy covers the important dimensions of how an agency expects its assets to perform. The tiers are 1) condition, 2) function, and 3) capacity. Assets pass or fail tests at each of these levels, leading to data-driven decisions about the need for maintenance, upgrade or replacement of the asset.

Every transit operator must determine the specific performance measures best applicable to the delivery of its service. Common measures include the following:

- Maintenance cost per vehicle mile
- Percent of useful life
- Mean distance between failure
- On-time performance
- Ridership

2. Agency efforts

This section of the guide provides case studies of asset management planning at transit agencies, which vary by geographic region, size, age, mode, complexity and asset management maturity level. Each agency's AMP should be a strategic roadmap that delineates its high-level activities and overall goals. There is no single path or solution that will satisfy the needs of all agencies. Therefore, a review of a broad mix of peer agencies and their practices is provided below.

It is important to understand that agencies may vary significantly in size (small, medium, large), age (new, middle-aged, old or legacy), mode (bus, rail, mobility, ferry), and complexity (policy, governance, oversight, etc.). Other factors, such as ridership, fleet size, physical plant, operating environment, maintenance practices, and labor contracts, to name a few, can influence how agencies manage their physical assets. A review of these case examples will provide different perspectives and suggest possible options for agencies moving forward in developing or updating their asset management plans.

2.1 Corpus Christi Regional Transportation Authority (CCRTA)

The CCRTA is located in Texas on the coast of the Gulf of Mexico. The Authority is a regional provider of mass transportation services. The total service area is 838 square miles and has a population of 342,412 according to the 2010 Census. Prior to being established in 1986 as the Corpus Christi Regional Transportation Authority, the agency had an earlier history with Nueces County and with the City of Corpus Christi.

The Authority maintains 1,400 bus stops and 222 shelters, four transfer stations, three park and ride lots and a fleet of 72 motorbus and 34 demand response revenue vehicles. Certain commuter, para-transit and ferry services are provided through contractors specializing in these services.

The CCRTA recently created an internship program to promote “careers in transit” and to supplement the agency’s human resources. As part of the internship program one of the projects assigned was the research and development of a “Transit Asset Management” (TAM) program. The key components include:

- the development of an advisory committee (this is scalable dependent on size of staff and other resources),
- new standard operating procedures,
- new capital asset data form,
- a transit asset maintenance module user guide for an existing software program (Fleet-Net), but this could be developed as part of other commercial software applications, or on a smaller scale in Excel or an Access database,
- asset category breakdown based on the hierarchy of assets common to most transit agencies
- updated asset inventory.

Once an agency has an accurate and complete inventory of their capital assets, the next step becomes the completion of a condition based assessment process. Upon the completion of the assessment, the agency will have the necessary data to assist with investment prioritization. The benefits of a TAM program to the agency and the community include reliable, safe service, which is cost-effective and efficient.

Other options for agencies of similar size to gain knowledge regarding the components and implementation process of a Transit Asset Management program include:

- American Public Transportation Association (APTA), Federal Transit Administration, (FTA) South Texas Transportation Association and other industry trade associations websites;
- Peer agencies or referred case studies;
- Free TAM webinar training opportunities through the FTA and NTI;
- Publications from TCRP and Transportation Research Board (TRB), notably TCRP 157.

The CCRTA will readily share all information included in this document with other agencies.

2.2 Massachusetts Bay Transportation Authority (MBTA)

The MBTA provides commuter rail, heavy rail, light rail, bus, trackless trolley, bus rapid transit, ferry and paratransit service to Boston and 174 other communities in eastern Massachusetts, generating over 1.3 million trips daily. The agency’s asset inventory include more than 2,500 vehicles, 885 miles of track, 20 miles of tunnels, 467 bridges and 19 maintenance facilities. A large segment of its infrastructure dates back to the end of the 19th century. The first MBTA subway line, which opened in 1897, is the oldest in the United States.

The MBTA’s efforts to implement elements of an asset management approach started in 1999. As part of this initiative, the agency created a system-wide asset inventory. The asset inventory included asset condition information, which was incorporated into an MBTA proprietary system known as the MBTA State of Good Repair Database. The SGR Database analyzes individual capital asset records using cost, age (and condition, indirectly), useful life, renewal activity and other input. Based on the useful-life information of individual assets, the system is capable of estimating the overall replacement and/or renewal cost associated with the agency’s backlog (backlog encompasses all assets that have reached the end of their useful lives). Also, the system can report on scenarios the backlog value over time depending on the estimated amount of capital investment.

The MBTA has used the SGR data to report to the MBTA Board, the Secretary of Transportation, the Metropolitan Planning Organization, and the state legislature on its funding needs to address the SGR backlog. As a result, the MBTA is no longer responsible for funding expansion projects. All expansion efforts

are now sponsored and funded by the state government and other non-MBTA funding sources. Today, the MBTA allocates over 95 percent of its capital budget to SGR projects.

The SGR Database has been updated recently. The update included a shift from a Microsoft Access–based platform to an SQL server, web-based system. Under the Access database mode, the data were collected from the various departments and then entered manually into the system. The upgrade to the SGR Database shifts the data entry responsibility to the managing departments. Now the responsible departments can enter their latest updates directly from their own terminals.

Utilizing funding provided by the FTA through its Transit Asset Management Pilot Program, the MBTA seeks to develop a TAM system that will leverage prior and ongoing related efforts. The current MBTA Transit Asset Management program includes the following three initiatives:

- Development of a formal asset management plan to improve MBTA business processes and to bring the Authority in alignment with the underlying principles of PAS 55 and forthcoming FTA guidance on asset management. The MBTA will be the first transit agency in the United States to develop a comprehensive AMP under the new (still draft) FTA guidelines.
- Enhancements to the Authority’s existing SGR Database, including the incorporation of decay curves and condition ratings, and integration with existing enterprise asset management systems in order to better understand the relationships among asset age, condition and maintenance costs.
- Improvement of the Authority’s current project prioritization process, including the development and implementation of a new consensus-based decision support tool that utilizes a set of capital evaluation criteria based on MBTA objectives and customer expectations.

All three initiatives are expected to be fully implemented by the end of 2013

2.3 Metropolitan Atlanta Rapid Transit Authority (MARTA)

MARTA is a 34-year-old (middle-aged) multi-mode transit system providing bus, rail and mobility services in the metro Atlanta region. Ridership across all modes averages 500,000 daily. MARTA has been practicing asset management and utilizing computerized maintenance management information systems since the early 1990s. Its program focuses primarily on the following:

- Providing improved performance and best value to its customers
- Asset condition and priority code (safety, regulatory and operational criticality)
- Strategic decision making that accounts for both operating costs and capital funding requirements
- Managing and quantifying backlog by lifecycle term and monetizing 10-, 20- and 30-year needs

In 2010, MARTA began updating its asset inventory and condition assessment data in order to optimize capital investment decisions. FTA’s SGR initiative and roundtables further solidified MARTA’s desire to have trusted and readily available asset data, decision support tools and a well-informed leadership team making critical investment decisions. Shortfalls in local tax revenue, the absence of dedicated state funding and increased competition for federal funds provided additional motivation for MARTA to develop an industry-leading asset management program.

Since 2010, MARTA has done the following:

- Completed an organization-wide condition assessment determining the condition of more than 55,000 assets

- Implemented new procurement requirements in which specific asset data is a contractual requirement (deliverable) for any large-scale project or capital purchase
- Adopted a formal asset management policy for the organization
- Updated its AMP to document current priorities and practices, including monitoring asset condition and performance

2.4 Metropolitan Transportation Authority, New York (MTA)

New York MTA includes four public transit operating agencies: NYC Transit/MTA Bus, Long Island Rail Road (LIRR) and Metro North Railroad (MNR). It also includes a bridge and tunnel authority (Bridges and Tunnels) and a construction entity (MTA Capital Construction). The MTA is the largest subway service, bus and commuter rail agency in the county, carrying 8.4 million daily passengers. The portfolio of assets includes more than 6,300 subway cars, 5,800 buses, 2,300 commuter rail cars, 1,300 miles of commuter rail track, 244 commuter rail stations, 631 miles of subway track, and 479 subway stations, as well as all the associated right-of-way and support infrastructure. The pursuit of SGR is a consistent and constant strategic goal for the entire MTA.

As part of its five-year capital planning process, the MTA undertakes a system-wide condition assessment inventory. This inventory is one element of the twenty-year needs assessment, which then informs the subsequent five-year capital plan. The common theme of this process is the pursuit of a SGR.

New York City Transit (NYCT) is establishing an integrated management and information system compliant with PAS 55/ISO 5500 standards. Toward this end, it has developed an asset management policy, a concept of operation and a program plan, and is working on a gap assessment and program blueprint. The FTA awarded NYCT a \$5.6 million grant to develop a whole-life asset planning process using bus rolling stock as the use case, which will be deployed across the NYCT.

More than 10 years ago, the LIRR selected Maximo as its corporate enterprise asset management (EAM) tool. Since that time, LIRR has used Maximo to develop a relatively mature EAM program for its Maintenance of Equipment Department. The LIRR currently is in the process of expanding EAM practices to its Engineering, Customer Services and Information Technology departments. Its short-term goal is to issue a formal LIRR EAM Policy by the close of 2013 and to apply EAM practices to 16 high-priority engineering asset categories by 2015. MNR is pursuing asset management practice with its rolling stock but is in the early stages of the application of asset management principles and practices elsewhere in its asset portfolio.

2.5 Regional Transportation Authority of Northeast Illinois (RTA)

The Regional Transportation Authority of Northeast Illinois (RTA) is one of the country's largest and oldest regional systems. It serves over 650 million riders a year, with over 4,800 bus and rail cars, 380 stations, 400 routes, 7200 route miles, 600 vanpool vehicles, and over \$150 billion in assets. Although its public transit operating agencies including the Chicago Transit Authority (rail and bus operations), Metra (commuter rail), and Pace (suburban bus) each have their own asset management systems, they collaborated in 2009 to develop tools to help enhance their asset management systems and bring their systems into an improved State of Good Repair. They have been working as a team in the endeavor ever since. Accomplishments to date include the following:

- The RTA transit partners of CTA, Metra and Pace developed a regional capital asset inventory in 2011 based on a hierarchical structure for the assets of all three of its operating agencies and created a condition rating system based on FTA's 1-5 scale.
- They developed a Capital Optimization Support Tool (COST) in 2012, modeled from FTA's Term Lite Decision tool to prioritize capital expenditures. All of the operating agencies have used it to

examine and reconcile their developed capital budgets. Its use will be expanded in 2013 in the baseline development of their respective capital budgets. It will be further enhanced to recognize and prioritize future enhancement and expansion projects.

- They completed the first of five yearly updates (in 2012) of its capital asset inventories in which it enhanced the methods of its assessments, and the quantity of items sampled, resulting in improved accuracy.
- Currently, the transit agencies are improving their asset management systems by obtaining training to recognize and quantify which capital expenditures can most likely result in operation maintenance and life cycle cost increases or decreases.
- As the operating agencies develop further individual enhancements to their asset condition knowledge base, they will integrate such into the regional database as well.
- A “How To” publication regarding the methodology for development of their asset condition assessment, prioritization tool and transit asset management system is under development for the benefit of all stakeholders.

2.6 Utah Transit Authority (UTA)

The UTA began providing bus service in 1970. Since that time UTA has grown into a mid-sized multi modal transit system providing bus, light rail, commuter rail, street car, and mobility services in six metropolitan counties in Utah. UTA has actively participated in all new forums relating to Asset Management and the State of Good Repair. UTA is an excellent example of creating an improved AMP for a young rapid growth transit agency that will meet the requirements of MAP-21 and the requirements that will come from the FTA. Through selection by FTA as a Pilot Program Grant awardee, UTA has expanded the AMS that been noted for its simplicity and functionality.

Below is a list of achievements UTA has completed through development of a comprehensive AMS.:

- It has created a capital asset inventory based on a hierarchal structure for its rail assets.
- It has created a condition rating system based on a 1-10 scale that will be used to carry out condition assessments.
- It has established an Asset Management Core Committee, which has representatives from key departments. This group meets monthly.
- UTA has created two full-time positions dedicated to the SGR effort. They report to a manager and a Senior Program Manager, who divide time between this effort and other efforts they are responsible for. The managers provide valuable insight and guidance in establishing an asset management process while championing the system up to the executive level.
- It has created an electronic inspection process for its Maintenance of Way department.
- It has established risk considerations that will be used in prioritizing rehabilitation efforts in years to come.
- UTA has determined its current SGR backlog total by utilizing the TERM-Lite application. This figure was used in a presentation to agency executives. The result of this was an inclusion of SGR considerations in UTA’s long-range TDP. At the time of this writing, the details of what exactly will be addressed in the TDP are being finalized.
- In 2011 and 2012, the asset management group requested and received a budget to carry out projects identified to through the asset management process.

2.7 Washington Metropolitan Area Transit Authority (WMATA)

Asset management is being implemented at WMATA via a cross-departmental, agency-wide AMP team modeled on well-documented success achieved at the London Underground as it moved through a PAS 55 certification process. WMATA’s effort is not focused on scoring “compliant” measures on the PAS scale, but

rather in working to align organizational decision making in accordance with an asset management strategy guided by an overall long-term strategic plan. At WMATA, asset management means doing the right amount of work, at the right time, to achieve the right level of service for the right cost.

2.8 Summary / Conclusion

It is the hope and the intent of this document to alleviate or mitigate some of the concerns leaders may have in regards to implementing a State of Good Repair program at their respective agency. The document is to serve as a starting point for leaders who need to build their own plans but don't have a clear direction on where to start or what resources to reference. It was the goal to create a document which was short, easy to read, but could provide a clear path forward to develop a plan. Participants, who helped to create this document, as illustrated by the case studies, came from a wide variety of transit agencies- new and old, large and small. Hopefully that fact brings a certain level of confidence to the reader that the items outlined in this document will help in the creation and implementation of their own program. The ideas outlined in the document are fundamental and scalable to the vast majority, if not all, agencies.

Agencies or entities can take confidence in knowing this effort is something they can define and implement. It is attainable and if the concepts outlined in the document are internalized and implemented, benefits will be seen throughout an agency in both tangible and intangible forms. Efficiencies will improve, cost-savings will be realized, and agencies and riders will be able to more fully enjoy the benefits of transit.

Finally, just to reiterate, asset management and the State of Good Repair concepts are a more about the journey rather than the destination. Continuous improvement should be the goal and continual progress is vital to implementing a comprehensive and effective asset management and State of Good Repair program.

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Abbreviations and acronyms

AMP	asset management plan
APTA	American Public Transportation Association
CCRTA	Corpus Christi Regional Transportation Authority
EAM	enterprise asset management
FTA	Federal Transit Administration
ISO	International Organization for Standardization
LIRR	Long Island Rail Road
MAP-21	Moving Ahead for Progress in the 21st Century
MARTA	Metropolitan Atlanta Rapid Transit Authority
MBTA	Massachusetts Bay Transportation Authority
MNR	Metro North Railroad
MTA	Metropolitan Transportation Authority
NYCT	New York City Transit
PAS 55	Publicly Available Specification 55
SGR	state of good repair
SQL	Structured Query Language
TCRP	Transit Cooperative Research Program
TDP	transit development plan
TERM	Transit Economic Requirements Model
UTA	Utah Transit Authority
WMATA	Washington Metropolitan Area Transit Authority