Miami-Dade County
Department of Transportation & Public Works

Transit
Asset Management Plan

Prepared with support from:

PMA Consultants

MIAMI-DADE COUNTY

TABLE OF CONTENTS

The Federal Transit Administration has published a final rule to establish a National Transit Asset Management (TAM) System in accordance with section 20019 of the Moving Ahead for Progress in the 21st Century Act (MAP–21; Pub. L. 112–141 (2012), codified at 49 U.S.C. 5326). The new rule defines the term State of Good Repair (SGR) and establishes minimum Federal requirements for transit asset management that apply to all recipients and subrecipients of chapter 53 funds that own, operate, or manage public transportation capital assets. This final rule requires public transportation providers to develop and implement a Transit Asset Management (TAM) Plan. In response to this requirement, Miami-Dade County's Department of Transportation and Public Works (DTPW) approves and adopts the following document as the Agency's Transit Asset Management Plan (TAM) Plan.

As hereby certified by:

Date: 6-7-18

Alice N. Bravo, P.E.
Director / Accountable Executive
Miami-Dade Department of Transportation and Public Works

Mission Statement

"Plan for, operate, and maintain a clean, safe, reliable, and convenient transportation system that effectively enhances mobility in Miami-Dade County"

EXECUTIVE SUMMARY

In accordance with the Moving Ahead for Progress in the 21st Century Act ("MAP-21" – the federal transportation authorization signed into law on July 6, 2012), Miami-Dade Department of Transportation and Public Works (DTPW) has developed its first Transportation Asset Management (TAM) Plan (referred to as 'the Plan' for the rest of the document). The Plan is a collaborative effort, guided by the Agency's Senior Leadership, County Subject Matter Experts (SME), DTPW Division of Operations and Maintenance - as the business liaisons for the Asset Management Program, representatives from the Information Technology Department (ITD), and PMA Consultants, LLC (PMA).

The Plan will establish the requirements for managing transit assets as mandated by the Federal Transit Administration (FTA). It will identify and analyze processes needed for decision-making where the use of limited funding can be applied for the most critical State of Good Repair (SGR) projects. DTPW seeks to improve its stewardship over its physical assets, identify risks, reduce maintenance and life-cycle costs, make better informed capital investment decisions and enhance quality of service by implementing the procedures and tools identified for this asset management plan. Using the Plan as a guide, DTPW will more thoroughly analyze life-cycle costs, evaluate risks, develop a risk matrix, develop mitigation strategies, establish asset condition performance measures and targets, and recommend investment strategies.

The Plan will also provide for a more robust accounting of all DTPW's assets and their condition; quantify the level of funding required to optimize life-cycle assets over time; demonstrate the benefits and costs associated with investment decisions; and make more informed resource allocation decisions linked to overall goals which are understood and supported by the entire organization.

Finally, the Plan will also serve as an accountability and communication tool and will inform established capital and operations planning efforts.

Background

In 1960, the County Commission passed an ordinance to create the Metropolitan Transit Authority (MTA). Over the years and under various administrations, MTA evolved into the Metro-Dade Transportation Administration, Metro-Dade Transit Agency, and Miami-Dade Transit (MDT). On October 9, 2015, Miami-Dade Transit and Public Works Departments merged as one, and were renamed Miami-Dade County's Department of Transportation and Public Works (DTPW).

DTPW has a viable integrated transportation system that consists of four major components: Metrobus, Metrorail, Metromover and Special Transportation Service. These systems provide service throughout Miami-Dade County 365 days a year. Service is available as far north as Broward County and as far south as the Middle Keys. Designed to intersect with Metrorail and Metromover, DTPW's bus system serves all major shopping, entertainment and cultural centers, as well as major hospitals and schools. Metrobus routes travel approximately 29 million miles per year using more than 800 buses. Metrorail is an electrically-powered, elevated, rapid-transit system stretching 25 miles and provides service to the greater Miami area. Metromover is a 4.4-mile elevated people mover that serves the downtown central business district of Miami, including Omni and Brickell. Special Transportation Service is designed to meet the needs of people with disabilities who are unable to use regular transit services.

Guiding Principles for Asset Management

The primary focus of DTPW's asset management efforts is the preservation and safety of the existing infrastructure. The Plan will serve to: improve DTPW's business processes for management of its assets and allocation/utilization of its resources, align DTPW with the industry's best practices, FTA MAP-21 performance reporting requirements, and international standards (e.g., PAS 55). The Plan will serve as a guideline for the implementation of the Asset Management Program within each mode of DTPW's transit asset classes (i.e., vehicles, systems, and facilities).

Transit Asset Management Plan

With the passage of MAP-21, each state transportation department, along with recipients and subrecipients of Federal financial assistance, is required to develop a risk-based Transit Asset Management Plan to "report on the condition of the system of the recipient and provide a description of any change in condition since the last report; establish an analytical process or decision support tool for use by public transportation systems that allows for the estimation of capital investment needs of such systems over time; and assists with asset investment prioritization by such systems." Prior to the MAP-21 legislation, DTPW had implemented many asset management principles as part of its daily operations.

DTPW's Asset Management Plan will provide a window into its asset management practices. The Plan also establishes a blueprint that includes considerations of: risk, life-cycle management, performance management, service levels, strategic alignment, and customer outreach. The Plan provides a forum to codify current practices in these areas where they exist, and identify gaps that DTPW will address in the future. The Plan is an important step forward in furthering governmental awareness and accountability.

Key Transit Asset Management Plan Elements

This section summarizes key components of the Plan.

Asset Registry

DTPW is using the Plan process to assess the maturity level of the maintenance and management of many of its assets, to identify process improvements that will help manage them more effectively, and to apply these principles to other DTPW asset groups. Folios are to be created for each asset category to summarize inventory, estimate replacement value, and report on data collection, management techniques, reporting practices, current condition, recommended targets, and planned investment levels over the next 10 years.

Asset Management Business Structure

DTPW's internal asset management business structure is described in Chapter 3.0 - Asset Management Plan where the Plan Project Team assigned to develop the Plan is discussed. The Team structure is functional rather than organizational as the team members are not organized in units, but are dedicated groups of staff from across asset classes throughout DTPW.

Risk Management

Risk or the effect of uncertainty on objectives can help a transportation agency more successfully plan for possible system and program disruptions and complications, mitigate potential consequences, and improve agency and infrastructure resiliency.

As part of the Plan, DTPW will integrate risk management practices throughout the agency including high-level investments, management & operations plans, and individual asset management programming processes. In order to enhance its risk management practices, DTPW will develop a Risk Management Plan, establish a Risk Register, prioritize risks, and establish mitigation responses accordingly.

Asset Management Performance Targets

As part of MDT10Ahead, DTPW established a performance assessment criteria to identify goals and objectives necessary for creating the framework within the agency that would pursue its Transit Development Program (TDP)-inspired vision over time. In the 2015 MDT10Ahead annual update, DTPW developed specific goals, objectives, and measures consistent with the Agency's Mission and Vision. The goals and objectives provided a benchmark for assessment of various projects and initiatives that are proposed, planned, and implemented throughout DTPW.

As part of the Plan's development, goals, objectives, targets, and strategies adopted in the 2015 annual update will be evaluated and if necessary, adjusted to align with asset management practices and MAP-21 requirements.

Investment Plan and Strategies

DTPW receives funding from multiple sources and is tasked with multiple missions. As part of its investment strategies and prioritization of projects for asset management, DTPW has an Infrastructure Replacement Program (IRP) to evaluate asset system needs. It also uses a 40-Year Pro-Forma to evaluate financial constraints and long-term programs.

The financial plan recommended as part of the Plan, should allow DTPW to provide a realistic picture of its projected future financial health and present the Agency's financial ability to meet its long-term performance and condition goals and sustain its assets in the future. In addition to providing a summary of the highlights of the financial plan and the related implications to the state of the agency's transportation system and assets, it can also convey future performance, needs, and conditions.

Asset Management Opportunities and Challenges

The Plan is intended to be a living document that will be updated periodically and will be influenced by new policies and programs. However, there are items that could serve as challenges for near to mid-term revisions of the Plan. As an example:

- DTPW works with its partner agencies and Transportation Planning Organization's (TPO) to develop multiple asset planning documents. The coordination of recommendations in the Plan with recommendations in DTPW's non-asset management plans, such as those that address safety and congestion is essential to developing and delivering an effective and efficient program, which could potentially create fiscal challenges or new opportunities.

Next Steps

DTPW's primary reason for developing the Plan is to improve the management of its transportation assets, with special focus on risk and life-cycle costs. Meeting federal requirements is also a key objective, but success will be largely determined by the extent to which the principles and initiatives outlined in this document are incorporated, along with existing plans, into DTPW's business practices.

As a result of the transit asset management process and other parallel asset management initiatives, several enhancements are currently underway including the development of this Transit Asset Management Plan, the implementation of a Transportation Asset Management Program, integration of additional modes into an Enterprise Asset Management System (EAMS), and implementation of analytical tools to achieve the goals set out in this document.

Recognizing the difficult circumstances transportation agencies are facing in managing an aging and underfunded transportation system, there is still much that can and will be done. The Plan includes an asset management improvement plan to address these challenges, advance asset management processes and enable DTPW to manage the transportation system as effectively as possible.

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1.0 INTRODUCTION

DTPW is the 14th largest public transit system in the country and the largest transit system in Florida. The Miami-Dade County integrated public transportation system consists of four major components:

- Metrobus has a fleet of approximately 800 buses including contracted vehicles, 94 routes and 29 million miles of service;
- Metrorail has a fleet of approximately 150 cars, is an electrically powered, elevated rapid transit system that stretches approximately 25 miles (bi-directional), from Dadeland through Hialeah to the Palmetto Expressway in Medley;
- Metromover has a fleet of approximately 30 cars, approximately 4.4-miles (bi-directional) of an elevated people mover system that serves Miami's downtown Central Business District, including the Omni and Brickell areas.
- Special Transportation Service is a fleet of various vehicles that has a service area which matches the Metrobus and Metrorail system. It includes most urbanized Miami-Dade County areas excluding locations such as Trail Glades Range, Miccosukee Indian Reservation and Fisher Island.

In addition to the various modes of transportation, DTPW is responsible for the maintenance of 162 individual locations, which include: maintenance shops and utilities, office space, Metrorail and Metromover stations, parking facilities, transfer stations, pedestrian walkways, and overpasses.

Project Overview

The Transit Asset Management (TAM) Program will identify and analyze processes needed for decision-making where the use of limited funding can be applied for the most critical State of Good Repair (SGR) projects. DTPW seeks to improve its stewardship over its physical assets, identify risks, reduce maintenance and life-cycle costs, make better informed capital investment decisions, and enhance quality of service by implementing the procedures and tools identified for this program.

The success of the program will be measured in terms of the DTPW's ability to:

- Provide for a more robust accounting of all DTPW's assets and their condition;
- Quantify the level of funding required to optimize life-cycle assets over time;
- Demonstrate the benefits and costs associated with investment decisions; and
- Make more informed resource allocation decisions that are linked to agency goals, and that are understood and supported by the entire organization.

Business Objectives

The development of the Plan shall meet or exceed the following business objectives:

- Asset Management Business Architecture, Strategy and Planning;
- Life-cycle Investment Decision-Making Optimization;
- Life-cycle Delivery (Acquisition, Maintenance, Operations and Disposal);
- Asset Information Strategy and Standard;
- Risk and Performance Management;
- Business Process Review, Re-engineering and Standardization;
- Communications within an organization;
- An Implementation and Transition Plan;
- Detailed data flow diagrams for all use case scenarios;

- Logical diagrams depicting all interconnections between buildings, garages, DTPW Network and Metro Net;
- Reports required to satisfy business requirements and MAP-21 performance reporting.
- Leverage County provided virtual terminals for all users;
- Establish baseline maturity assessment to evaluate compliance with PAS55, the emerging ISO 55000 and other relevant standards.

Key Plan Benefits

The Plan will serve to improve DTPW's business processes for management of its assets and allocation/utilization of its resources; align DTPW with the industry's best practices; and meet FTA MAP-21 performance reporting requirements and international standards (e.g., PAS 55) within each of DTPW's transit asset classes.

Key benefits and characteristics of the Plan will, at a minimum, address the following:

- Establish policies, strategies and objectives to provide the principles and framework for asset management and control, supporting the organizational strategic plan with specific measurable outcomes.
- Recommend policies and procedures for staff and contractors to integrate the Plan tasks into daily business operations, as well as develop a high-level programming schedule for all required tasks, working off critical milestones such as Office of Management and Budget (OMB) submittals, and other critical dates.
- Establish methods to comply with FTA MAP-21 requirements.
- Provide the guidance required for staff to operate and maintain all assets on a continual basis.
- Recommend the necessary criteria by which decisions can be made to acquire, create, renew or dispose, utilize and maintain assets, and to determine how those assets should perform and be monitored.
- Address the full range of transit assets including both non-revenue and revenue vehicles and their major subsystems, park and ride lots, operating facilities and equipment, bus stops, and communications and fare collection systems.
- Consider new fleet, technology and facility investments beyond the current inventory to improve the system, with the intention of minimizing the operations costs through the balanced expense of capital improvements.
- Develop a methodology and define criteria to achieve consistent condition and risk assessments by asset type.
- Develop an understandable, practical condition and risk rating matrix based on inspections, performance and/or failure records for individual assets.
- Develop the methodology and define the criteria to achieve consistent condition assessments and risk assessments.
- The Plan will be life-cycle based and will recommend what, by whom, how and when actions are required.
- Produce a comprehensive document that will serve as a guideline for the implementation of the program within each of DTPW's transit asset classes.

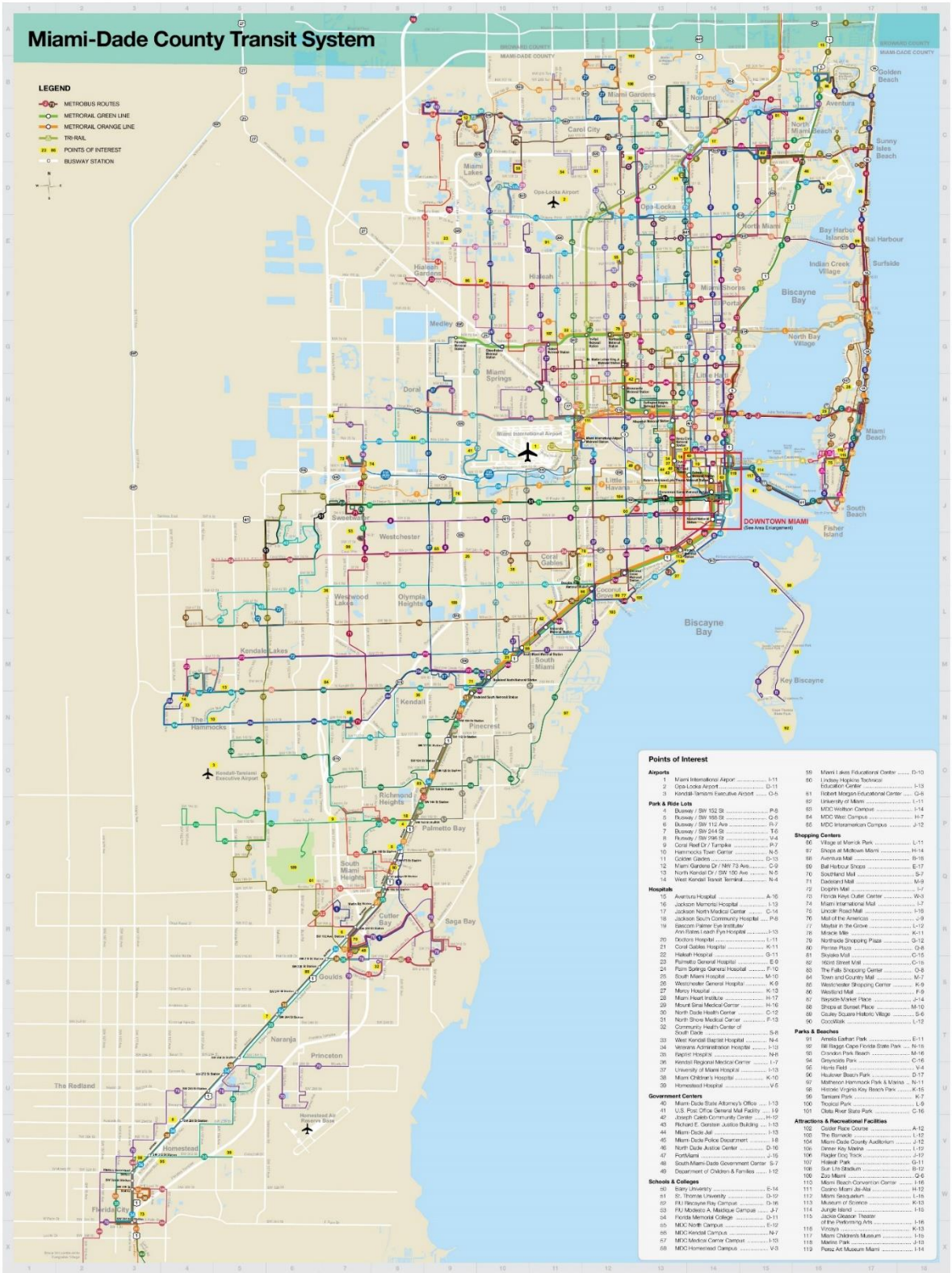
Background

As the 14th largest public transit system in the country and the largest transit system in Florida. DTPW's service area covers 306 square miles and is composed of 33 individual municipalities with an urbanized population of approximately 2.6 million. A trend persists in some areas throughout the county to incorporate, which leaves a large portion of the county populated by disadvantaged individuals in unincorporated areas who are totally dependent upon county services. DTPW is one of the largest departments in Miami-Dade County government and is responsible for planning and providing all public transit services in the County.

DTPW operates an integrated multi-modal transit system comprised of four (4) modes: bus (Metrobus), heavy rail (Metrorail), automated people-mover (APM) (Metromover), and demand-response service (Special Transportation Services or STS). The transit agency is led by a Department Director that reports to the Deputy Mayor.

In addition to the various modes of transportation, DTPW is responsible for the maintenance of numerous individual locations, which include: maintenance and inspection shops, utilities, office space, passenger stations, parking facilities, transfer stations, pedestrian walkways and overpasses. Approximately 275,000 average weekday boardings occur on the system. Figure 1 illustrates the Miami-Dade County Transit System described previously.

Figure 1 - DTPW Transit System Map



Guiding Principles of the Asset Management Program

The primary focus of DTPW's asset management efforts is to:

- Provide for a more comprehensive accounting of all DTPW's assets and their condition;
- Quantify the level of funding required to optimize life-cycle assets over time;
- Demonstrate the benefits and costs associated with investment decisions; and
- Make more informed resource allocation decisions that are linked to agency goals, which are clearly understood and supported by the entire organization.

The TAM program will identify and analyze processes needed for decision-making where the use of limited funding can be applied to the most critical State of Good Repair projects. DTPW seeks to improve its stewardship over its physical assets, identify risks, reduce maintenance and life-cycle costs, make better informed capital investment decisions and enhance quality of service by implementing the procedures and tools identified for this TAM program.

Specifically, the Plan:

- Defines DTPW's asset management objectives;
- Summarizes the inventory and condition of Miami-Dade County's system travel trends;
- Documents a realistic estimate of funding expected to be available for the system over the next 10 years;
- Documents DTPW's asset management business structure, policies and practices;
- Illustrates how risk is managed and presents a list of priority risks and mitigation strategies for addressing them;
- Describes how DTPW manages its assets throughout their lifetimes;
- Defines investment strategies used to guide the allocation of available funds;
- Summarizes issues at the National and State level that are expected to impact the Plan and DTPW's asset management practices; and
- Outline an agenda for future improvements to asset management and the Plan.

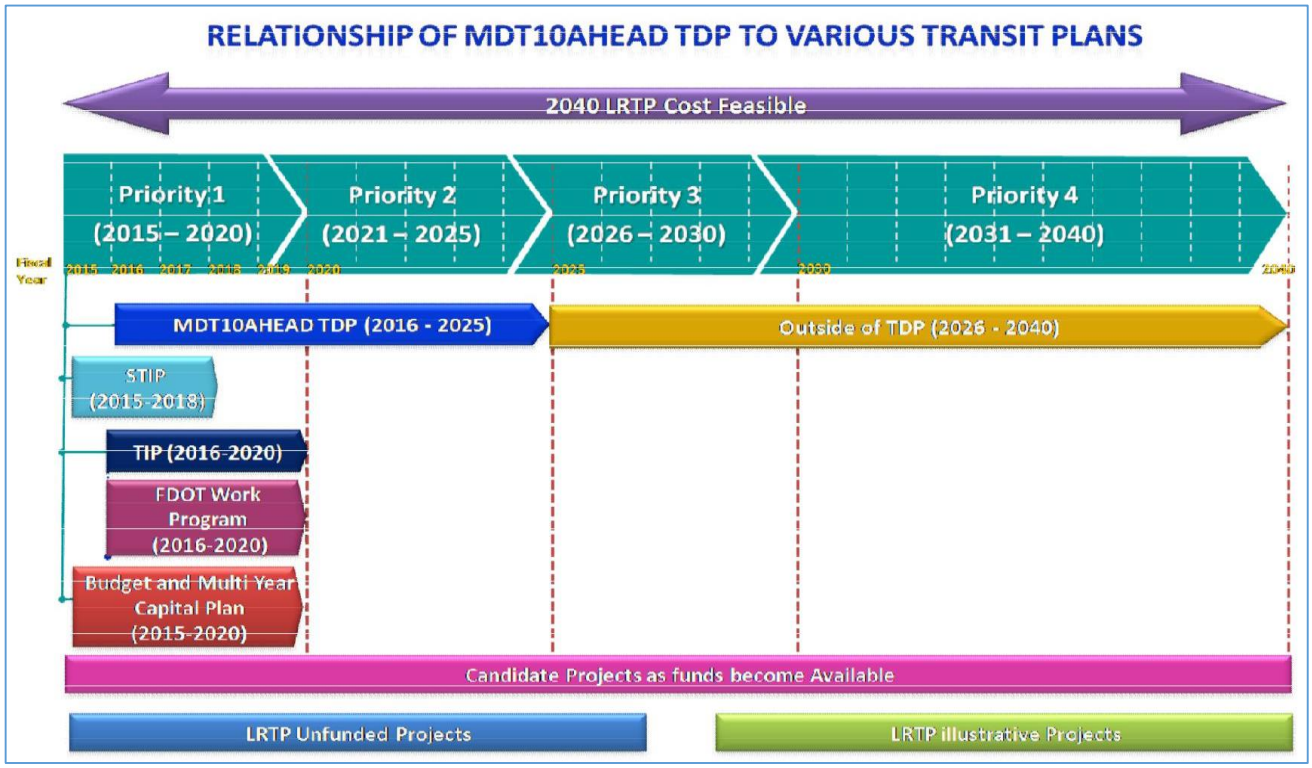
Asset Management at DTPW is considered in the Transit Development Plan (TDP) required for public transit service providers by The State of Florida Public Transit Block Grant Program. A TDP major update is required every 5 years and TDP annual updates are required in interim years. TDP updates must be submitted to the Florida Department of Transportation (FDOT) by September 1st of each year.

The MDT10Ahead 2015 Annual Update, the TDP, serves as the DTPW's strategic guide for public transportation in Miami-Dade County over the course of the next 10 years. As part of preparing the annual MDT10Ahead, projects are prioritized and selected according to the asset management investment strategies. The program is fully funded, fiscally constrained and includes expected budgets, accomplishments, and key milestone dates for every project. The resulting program represents the mix of projects which provide the best progress towards the Agency's goals.

MDT10Ahead includes a summary of DTPW's facilities and services; describes the past year's civic engagement efforts; assesses the agency's performance in the previous year; identifies DTPW's implementation plan; explores short-term plans and longer term plans; and explores the Transit agency's finances. In general, MDT10Ahead presents the operational and capital improvements needed to ensure DTPW is able to provide quality transit services to the County's residents and visitors for years to come. This document is DTPW's planning tool for the implementation and operation of transit services through 2025.

Overall, the TDP is a benchmark document that describes the current state of DTPW and the direction it intends to go in the coming years. The TDP is subject to change in correspondence with the County's Adopted Budget and Multi-Year Capital Plan. **Figure 2** shows the relationship of the MDT10Ahead to other Transportation Plans.

Figure 2 - Relationship of MDT10Ahead to other Transportation Plans



Other documents that currently address asset management practices at DTPW include the *Facilities Maintenance and Equipment Plan*, *DTPW Metrorail Fleet Management Plan*, *Metromover Fleet Management Plan,* and *Metrobus Fleet Management Plan*.

Document Objectives

DTPW's Transit Asset Management Plan outlines roadmap for improving stewardship over physical assets, identify risks, reduce maintenance and life-cycle costs, make better informed capital investment decisions and enhance quality of service by implementing the procedures and tools identified for this TAM program.

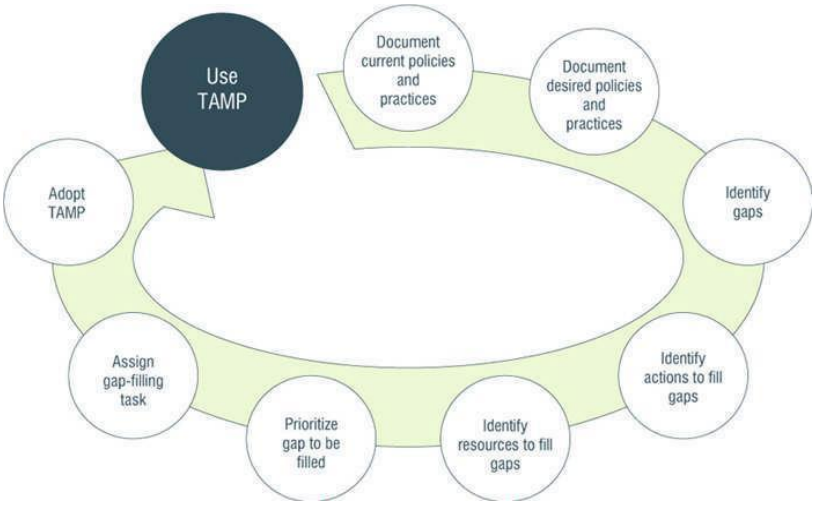
The success of the program will be measured in DTPW's ability to:

- Provide for a more comprehensive accounting of all assets and their condition;
- Quantify the level of funding required to optimize life-cycle assets over time;
- Demonstrate the benefits and costs associated with investment decisions; and
- Make more informed resource allocation decisions that are linked to agency goals, which are clearly understood and supported by the entire organization.

Furthermore, the Plan explains the roles, responsibilities and processes related to establishing and executing transit asset management activities at DTPW. The Plan covers the breadth of asset management practices at DTPW and should achieve the following objectives:

- **Institutionalize the implementation of asset management practices.** DTPW has made great strides in modernizing its programming processes.
- **Communicate Asset Management Policy and Strategy.** To date, DTPW's asset management policy has been scattered in numerous documents such as its TDP update, NTD reports, Fleet Management Plans, Maintenance Plans and STIP updates. The Plan pulls together all of the relevant information from these sources to present internal and external stakeholders with a clear understanding of DTPW's vision and implementation of asset management.
- **Document and prioritize opportunities for improvement of business practices.** Transit asset management is a continual improvement process. As described in the American Association of State Highway and Transportation Officials (AASHTO) Transportation Asset Management Guide: A Focus on Implementation, the development of a TAM Plan "is an ongoing process of communication with partners, self-evaluation, gap identification, prioritization, improvement, and adoption." This plan maps the process for continual improvement of TAM business practices. **Figure 3** illustrates this concept.

Figure 3 - Iterative TAMP Development Process



Source: AASHTO Transportation Asset Management Guide, A Focus on Implementation

Transit Asset Management Plan Content

MAP-21 requires States, funding recipients, and subrecipients to develop a risk-based asset management plan (i.e., TAM Plan) for the National Transportation System to improve or preserve the condition of the assets and the performance of the system. MAP-21 contains specific provisions for the content to be included in the Plan:

1. A summary listing of the transportation mode assets, including a description of the condition of those assets;
2. Asset management objectives and measures;
3. Performance gap identification;
4. Life-cycle cost and risk management analysis;
5. A financial plan; and
6. Investment strategies.

DTPW is one of the largest transit system in the United States, with a service area that covers approximately 306 square miles. It operates an integrated multi-modal transit system which includes:

- **Metrobus** (bus),
- **Metrorail** (heavy rail),
- **Metromover** (automated people-mover (APM)), and
- **Special Transportation Services** (Paratransit).

In addition to the various modes of transportation, DTPW is responsible for the maintenance of 162 individual locations, which include; maintenance shops and utilities, office space, passenger stations, parking facilities, transfer stations, pedestrian walkways, and overpasses (**Facilities**).

To provide a full understanding of DTPW's asset management practices guided by the MAP-21 requirements, DTPW will focus on the following classes: **Metrobus, Metrorail, Metromover and Facilities**.

In order to meet these requirements, this Plan is presented as follows:

- **Chapter 2 – State of the System** examines the overall demand on the DTPW system by the traveling public, and summarizes the inventory and condition of the different asset modes.
- **Chapter 3 - Transit Asset Management Practices** describes DTPW's asset management business structure, policies and practices.
- **Chapter 4 – Life-Cycle Management** presents the principles of life-cycle management used by DTPW and explains the process used to prioritize projects under this philosophy.
- **Chapter 5 – Risk Management** outlines the process used to assess risk, and develop a risk management plan.
- **Chapter 6 – Performance Targets** defines a set of performance targets.
- **Chapter 7 – Gap Analysis – Asset Management Knowledge** defines and documents the Agency's asset management maturity.
- **Chapter 8 – Financial Resources** documents the expected funding for the system over a 10 year period.
- **Chapter 9 – Investment Plan** illustrates how the available funds are provided for planning purposes and describes DTPW's investment strategies related to asset management.
- **Chapter 10 – Improvements Plan** defines specific improvement areas to pursue and lays out an agenda for future improvements to asset management policy and practices as well as the Plan.

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2.0 STATE OF THE SYSTEM

System Overview

This is an overview describing the state of Miami-Dade's transportation systems in terms of demand, inventory and condition. DTPW operates the rapid transit Metrorail, the Downtown Metromover, and Metrobus systems. Metrorail is composed of two rail lines (Green and Orange lines) with 23 stations radiating from the city center towards outlying neighborhoods north and south of Downtown. Metromover operates throughout the Downtown and Brickell neighborhoods, and is composed of 3 rail loops and 21 stations. Metrobus operates over 94 routes, including the South Dade Busway.

As of April 2018, DTPW has a daily passenger ridership of 274,550 as averaged over the first 6 months of FY 17-18 comparable to FY 16-17 stats of 306,613. DTPW has seen decreasing passenger ridership since FY13-14, with combined four-mode ridership decreasing by 19%, following a nationwide trend. Additionally, an increase in boardings of 10.9 million have caused an impact to our ridership as a result of additional municipal services. Although not under the control of DTPW, Tri-Rail is Miami's commuter rail system, and connects Miami to Fort Lauderdale and West Palm Beach.

Metrobus

Metrobus is DTPW's fixed-route bus service. Metrobus operates 7 days a week, 24 hours per day. A total of 94 routes comprise DTPW's regular bus service structure as served by a total fleet of 757 buses and 16 contracted routes with 42 buses. DTPW's family of services Metrobus includes local, circulator, limited-stop, express, and BRT (Bus Rapid Transit) services. Figure 4 illustrates the DTPW Metrobus system route map and service area coverage.

Local Service

Local bus service collects and distributes high-turnover ridership along arterials radiating to and from dense activity centers. This service type is characterized by frequent stops, short and moderate passenger trips, and slow average bus speeds over the course of an entire route.

Circulator Service

Circulator or shuttle bus service operates short route connections between activity centers, or as a feeder to provide a connection with another transit service.

Limited-Stop Service

Limited-stop service serves designated bus stops along a route. With fewer stops, limited routes have significantly increased operating speeds when compared to local service. The MAX routes serve stops at major transfer points or approximately every 1.5 mile (in the Miami Central Business District (CBD)) to 1 mile (in suburban areas) along a route.

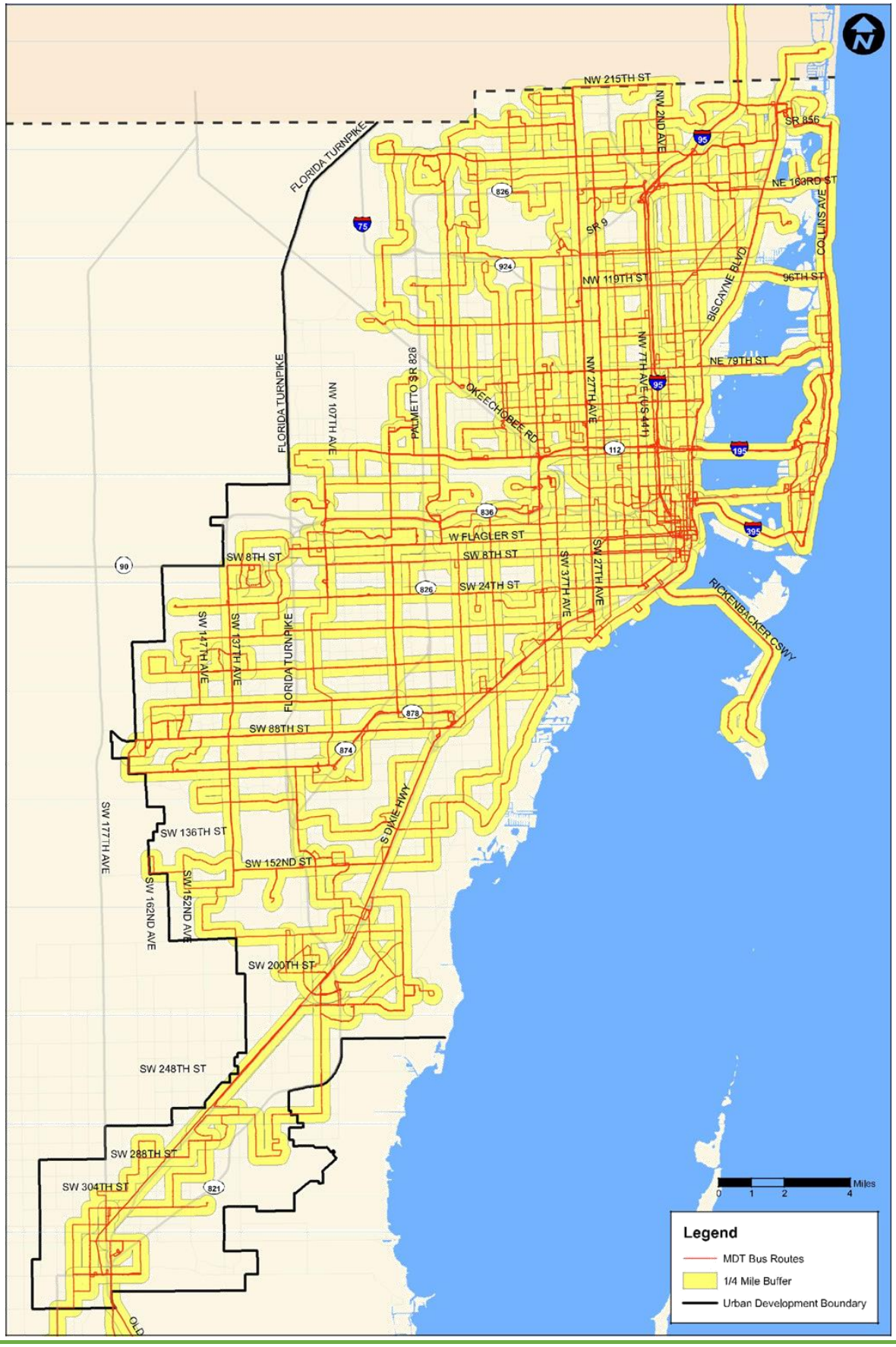
Express Service

Express service is a type of service similar to limited-stop service that has fewer stops and operates at a higher speed than local service. Express routes serve outlying areas (designated park-and-ride lots or shopping centers), some with direct service to the Miami CBD. They usually operate along a freeway or major arterial road to increase the operating speed.

Bus Rapid Transit (BRT)

The South Miami-Dade Busway is a 19.8-mile two-lane, at-grade dedicated busway corridor for DTPW bus service along U.S. 1 from SW 344th Street in South Miami-Dade to the Dadeland South Metrorail Station. Full-size buses serve 29 bus stations and five park-and-ride areas along the Busway. Buses also operate within adjacent neighborhoods and enter the exclusive lanes at major intersections.

Figure 4 - DTPW Metrobus System Map



Metrorail

Figure 5 - DTPW Metrorail System Map

Metrorail (Figure5) provides passenger service to 23 stations on a 24.8-mile heavy rail electrified line. The system operates primarily on an elevated guideway with transfer points to Tri-Rail passenger rail service and the DTPW Metromover system. DTPW maintains a total fleet of 158 Metrorail vehicles.

Rail Car Fleet

DTPW's Metrorail active revenue car fleet consists of 134 Miami Transit vehicles manufactured by the Budd Company between 1982 and 1985. The revenue fleet entered service beginning in April 1984 with the last married pair was accepted in April 1986. In addition, 24 Miami Transit vehicles manufactured by Hitachi Rail Italy beginning 2017 have been received with 16 starting revenue service between 2017 and 2018. Each vehicle is 75 feet in length and with a full passenger load of approximately 210 riders.

Rail Lines

DTPW operates two lines of service with 4 and 6 car trains. The legacy Green Line from Palmetto Station to Dadeland South Station and the Orange Line from the Miami Intermodal Center (MIC) at Miami International Airport to Dadeland South station.

Metromover

DTPW's automated people mover (APM) or Metromover (Figure 6) is an elevated system that serves 21 stations and is comprised of 3 loops:

- Downtown Miami Central Business District (Inner/Downtown Loop);
- School Board and Perez Arts Museum to the north (Outer/Omni Loop);
- Brickell area to the south (Outer/Brickell Loop).

DTPW maintains an active fleet of 29 Metromover vehicles and operates with a maximum of 2 cars per train. Metromover operates free of charge and stops at 21 wheelchair-accessible stations from the School Board area to Brickell, serving major destinations throughout Downtown Miami.

Facilities

Figure 6 - DTPW Metromover System Map

Operation & Inspection Facilities

DTPW currently operates 3 maintenance bus garages and 1 heavy maintenance. The garages are located in various areas throughout the County to provide efficient maintenance and storage services at the following locations:

1. Central Facilities Maintenance Building - 3311 NW 31st Street, Miami, Florida 33142;
2. Metrobus Support Services Building – 3295 NW 31 Street, Miami, FL 33142; a support bus service (heavy maintenance) facility;
3. Coral Way Facility: 2775 SW 74th Avenue, Miami, Florida 33155; and
4. Northeast Facility: 360 NE 185th Street, Miami, Florida 33179.

The Metrorail fleet of rail cars is maintained and stored at the William E. Lehman Center located at 6601 NW 72nd Avenue, Miami, Florida 33166.

The Metromover fleet of 29 cars is maintained by the Joseph Bryant Metromover Maintenance Facility located at 100 SW 1st Avenue in Downtown Miami.

Park-and-Ride Facilities

DTPW currently has more than 14,000 available parking spaces, including 34 park-and-ride lots all of which serve one or more Metrobus routes with seventeen of those locations located at Metrorail stops.

Pedestrian Overpasses

To facilitate a safe passenger connection DTPW maintains pedestrian overpasses throughout its transit system. A listing of the primary location of these pedestrian overpasses:

- Douglas Road Metrorail Station Pedestrian Overpass – 3060 SW 37 Court
- Vizcaya Metrorail Station Pedestrian Overpass – 3201 SW 1st Avenue
- Hialeah Metrorail Station Overpass -125 East 21 Street
- Snapper Creek Expressway and US-1 Overpass – Snapper Creek Expressway and US 1
- University Metrorail Station – Mariposa Court and US 1

System Demand

Metrobus

As part of its service planning process, Metrobus monitors passenger loads and route performance based on 3 sources of information:

1. Field staff checks buses for passenger loads and on-time performance. Data is collected on an as needed basis, such as when reports of overcrowding are received, and are used to adjust headways and for other proposed service changes.
2. Automatic registering fareboxes provide the number of passenger boarding's per trip. Data can be extrapolated to provide an estimate of the maximum load for specific trips. Farebox information is usually corroborated by field staff before any service changes are implemented.
3. The monthly DTPW Ridership Technical Report provides information on the average daily ridership and other productivity measures of the bus routes. Analysis of this information alerts planners of those routes that could be exceeding the passenger loading guidelines.

Automatic registering fareboxes provide the number of passenger boarding's per trip. Data can be extrapolated to provide an estimate of the maximum load for specific trips. Farebox information is usually corroborated by field staff before any service changes are implemented. Additionally, the monthly DTPW Ridership Technical Report provides information on the average daily ridership and other productivity measures of the bus routes. Analysis of this information alerts planners of routes that could be exceeding the passenger loading guidelines.

Passenger load data is compared with DTPW's Service Guidelines to determine the level of service needed to meet passenger demand. The scheduling process produces the maximum peak schedule vehicle demand by operating division for both the AM and PM peak periods.

Service Planning and Scheduling specifies the number of buses required for the prepared schedule by time of day. Upon receipt of the Service Plan and Metrobus schedule, Bus Operations and Performance Management prepares an Operational Plan, which includes, among other characteristics, distribution of the total vehicle fleet to each of the Operations & Inspection Divisions based on assigned service requirements.

Metromover

Passenger Demand

On November 6, 2002, Metromover eliminated all passenger fares and initiated free service for all passengers. Boardings in FY 2018 are projected to reach approximately 8.8 million. Annual boardings of approximately 9.5 million for FY16-17 represent a ridership increase of 17.2 percent since 2004.

General Ridership Growth

Average weekday ridership in FY 2018 shows a trend of ongoing ridership decrease for Metromover. The current average weekday ridership as averaged over the first 6 months of FY 17-18 lower than the same statistic for the previous FY 16-17 year of 32,874 by 2,020 boarding's. Average Saturday ridership has been decreasing (15.5%) as averaged over the first 6 months of FY 17-18 compared with the same statistic for the previous FY 16-17 year. Sunday ridership as averaged over the first 6 months of FY 17-18 has shown a decrease of 8.3% compared with the same statistic for the previous FY 16-17 year and slightly decreasing over the previous several years. The previous high was 14,980 in FY 15-16.

Estimates of Future Demand

Rail Transportation supports the Service Plan developed by Service and Mobility Planning Division of DTPW for Metromover. The service plan defines system peak vehicle requirements to meet the operations schedule. Service and Mobility Planning specify vehicle configuration, i.e., single vehicles or 2 vehicles (coupled), and the number of vehicles required by time of day. Upon receipt of the service plan, Rail Transportation prepares a Metromover Operational Plan. The Operational Plan includes among other characteristics, distribution of total vehicle fleet to the categories of passenger service vehicles, recovery vehicles, and maintenance assigned vehicles.

Demand estimates for premium transit services are developed through the periodic updating of the Miami Urbanized Area Long Range Transportation Plan (LRTP) and the use of transportation models to ascertain daily trips taken by the population at large. Statistics taken into account include the area's population projections as well as the mix of various residential, commercial, and industrial land uses in the region, including other socio-economic factors, such as household income, education levels, auto ownership and/or availability, the location of major attractions or destinations, and employment centers.

Passenger demand is influenced not only by socio-economic factors, e.g., income levels and private automobile availability, but also by other factors such as weather, pricing of fares, retail price of fuel, parking fees, and transit system reliability.

Metrorail

Passenger Demand

The DTPW Metrorail reported 19,984,735 annual unlinked passenger trips for FY 16-17. This is a decrease of 6.9% (1,476,304 unlinked passenger trips) over FY 15-16 (21,461,039), and a decrease (1,925,874) unlinked passenger trips) over FY 14-15 (21,910,609). The annual reduction in FY16-17 is in part due to the major Atlantic Hurricane in September 2017. Weekday ridership averaged 68,075 unlinked passenger trips in FY 16-17 and is currently at 66,693 as averaged over the first 6 months of FY 17-18 (this trends at a 6.9% decrease vs. the comparable period in FY 16-17).

To estimate passenger demand and resulting Peak Vehicle Requirements (PVR), DTPW follows the FTA standards. FTA minimum requirements in the fleet management plans outline an eight step process for determining the Demand for Revenue Vehicles: Establishment of passenger demand and resulting peak vehicle requirement from FTA Memorandum, September 2, 1999; Guidance: Rail Fleet Management Plan. That process forms the basis of DTPW's calculation for peak vehicle requirements.

Asset Registry

The Asset Registry will outline the inventory classifications within the DTPW's varying modes of transportation. Table 1 represents a summary of DTPW's current active transit mode asset registry. The details of each modes asset inventory are described throughout this chapter.

Table 1. DTPW Asset Inventory Summary

Transit Mode	Asset Type	Amount
Metrobus	Bus	757
Metrorail	Heavy Rail Cars	150
Metromover	APM	29
Facilities	Stations	23 (Metrorail)
Facilities	Station	21 (Metromover)
Facilities	Other	118

Inventory and Condition

Facilities Inventory

The Facilities Maintenance Division maintenance managers, staff and Superintendents established an inventory of existing equipment based on a detailed review of all equipment located throughout assigned DTPW facilities. Categories included in the inventory are the following facility types:

Administrative Facilities

Offices which house management and supporting activities for overall transit operations such as accounting, finance, engineering, legal, safety, security, customer services, scheduling, and planning. They also include facilities for customer information or ticket sales that are not part of any passenger station.

Maintenance Facilities

NTD defines two types of maintenance facilities: General Purpose and Heavy Maintenance. The two maintenance facility types are defined as General Purpose Maintenance Facilities where mechanics perform routine maintenance and repairs and Heavy Maintenance Facilities where agencies may perform engine and other major unit rebuilds. Heavy maintenance facilities are reported by ownership category.

Ownership Types

Maintenance facility ownership is identified based on the type of service provided (directly operated or purchased transportation). For directly operated service, the report includes if the facility is publicly owned or privately owned. DTPW identifies ownership of the facility, lease from another public agency, or lease from a private entity. For purchased transportation service, public or private involvement in the maintenance facility is indicated.

Shared Facilities

For reporting purposes, shared facilities are allocated among the various modes or types of service using the facility.

Passenger and Parking Facilities

Passenger station information documented includes fixed route and fixed schedule services for all transit systems. Data is reported for all passenger facilities used by DTPW for the following transportation systems:

Administrative and Maintenance Facility Inventory Data

Data on administrative and maintenance facilities reported include information such as facility name, address, square footage, year built or substantially reconstructed, and the primary mode served by or operated out of the facility. Further, for each reportable facility, the percent of responsibility by DTPW for capital replacement costs, including costs that would be part of the planning, design, and replacement of a facility are included. The inventory information also specifies facility sub-type based on size and function.

Passenger and Parking Facility Inventory Data

All passenger facilities falling under these definitions are reported and the percent of responsibility is indicated under "percent capital responsibility." For these facilities, the number of parking spaces can also be used here as an indication of facility size.

Metrobus Inventory

DTPW Metrobus Fleet Management Plan 2018

DTPW Metrobus Fleet Management Plan 2018 (MFMP) prepared by the Performance Analysis Division indicates as of May 2018, DTPW's Metrobus active revenue fleet consists of 757 vehicles and 42 contracted buses, as displayed in **Table 2**. This table includes the vehicles necessary for revenue service, maintenance requirements and spares by division.

Inventory List

The MFMP includes a detailed listing of the vehicle inventory. The listing includes vehicle number, division vehicle assigned to, the life-to-date mileage and the odometer read date as well as, the vehicle in-service date.

Table 2 – Total Fleet Demand and Division Assignment - May 2018

Division	Mini Buses (26, 31 & 32 Feet)	Large Buses (40 Feet)	Articulated Buses (60 Feet)	Coach MCI (45 Feet)	Fleet Total
Central O & I	2	189	25	0	216
Contracted	42	0	0	0	42
Coral Way O & I	3	221	45	0	269
Northeast O & I	0	242	19	11	272
Total	**47**	**652**	**89**	**11**	**799**

Metrobus currently operates 652 (40-feet) buses, 89 (60-feet) articulated buses, 5 (32-feet) buses and 11 MCI (45-feet) over the road coaches.

Metrorail Inventory

Rail Car Fleet

DTPW's Metrorail active revenue car fleet consists of 150 Miami Transit vehicles, 134 manufactured by the Budd Company and 16 manufactured by Hitachi Rail Italy with another 8 vehicles pending acceptance. Vehicles operate as a minimum of two-car units, referred to as "married pairs".

Table 3 - Legacy Metrorail Vehicle Fleet – May 2018

Number of Cars	134
Car Length	75 Feet
Car Width	10 Feet, 2 ½ Inches
Maximum Speed	70 MPH
Normal Acceleration	3.0 MPH/s^2
Normal Deceleration	3.2 MPH/s^2
Manufacturer	The Budd Company
Propulsion Type	700V AC Drive
Service Entry Dates	April 1984 – April 1986

Table 4 - New Metrorail Vehicle Fleet – May 2018

Number of Cars	24
Car Length	75 Feet
Car Width	10 Feet, 2 ½ Inches
Maximum Speed	70 MPH
Normal Acceleration	3.0 MPH/s^2
Manufacturer	Hitachi Rail Italy
Propulsion Type	700V DC
Service Entry Dates	November 2017 – March 2018

Rail Lines

Metrorail provides passenger service to 23 stations on a 24.8-mile heavy rail electrified line. The system operates primarily on an elevated guideway with transfer points to Tri-Rail passenger rail service and the DTPW Metromover system.

DTPW operates two lines of service. The legacy Green Line from Palmetto Station to Dadeland South Station and the Orange Line from the Miami Intermodal Center (MIC) at Miami International Airport Station to Dadeland South station.

Metromover Inventory

Metromover is a unique form of transit service. It serves as a collector/distributor for customers moving throughout the Central Business District. Passengers use Metromover not only to travel from one downtown location to another but also to access Metrorail and Metrobus. Metromover services 21 stations along its routes.

Table 5 - Current Metromover Vehicle Fleet

Number of Cars	29
Car Length	39 Feet
Car Width	9 Feet, 4 Inches
Maximum Speed	30 MPH
Normal Acceleration	2.0 MPH/s^2
Normal Deceleration	2.0 MPH/s^2
Manufacturer	Bombardier Transportation Systems
Propulsion Type	600V AC Source
Service Entry Dates	April 30, 2008 – February 27, 2009, 12 Phase III, MC032-MC043 February 2011 – December 12, 17 Phase III, MC044-MC060

Performance Measures

Performance Analysis & Materials Management

Performance & Materials Management, comprised of Performance Analysis (PA), Materials Management and Warranty, is an independent management division responsible for directing and establishing plans, programs and policies. These are designed to provide effective and efficient operations and maintenance for the Bus, Metrorail and Metromover systems, ensure compliance, meet current and future training needs of the department and assure adequate control measures are established and maintained for repair processes. Additionally, PA develops and implements reliability and maintainability programs required to monitor, evaluate and maintain the established performance of the transit system.

Performance Analysis assigns dedicated staff within each division for the collection, reporting and analysis of maintenance information with respect to the subsequent major functions:

- Regulatory Requirements (Federal, State & Local)
- Maintenance Scheduling
- Equipment Status
- Failure Analysis
- Performance Reporting
- Compliance Monitoring
- Campaign Scheduling and Reporting

The core of Performance Analysis is its records system, wherein all pertinent information is routinely recorded. Maintenance activity and record keeping is accomplished by means of dual Computer Maintenance Management Systems (CMMS): Transit Equipment Administration (TEA) – a legacy system and Enterprise Asset Management System (EAMS) – new windows based system. Shop managers utilizing both the TEA System and EAMS are also able to track all preventive and corrective maintenance actions. Hard copies of each Repair Order are maintained by Performance Analysis.

From these records, PA extracts and processes the information necessary to accomplish its objectives:

- Prepare preventive maintenance schedules;
- Monitor and report on performance of all maintenance functions relative to quantity, quality and timeliness;
- Develop, administer and manage data collection, performance measures and compliance criteria for the management of all systems;
- Forecast labor and material requirements for the future for significant labor/material intensive events;
- Initiate and provide information for improvements in system reliability, maintainability, and quality and maintenance program effectiveness;
- Monitor equipment status and performance; provide early warning of major impact events.
- Analyze data to determine root causes and provide solutions;
- Research records and prepare special ad hoc reports as required for reliability, maintainability, quality and risk management analysis purposes;
- Monitor effectiveness, cost and appropriateness of the approved;
- Preventive Maintenance Program and initiate program revisions when so indicated;
- Receive, process, and input into CMMS all maintenance actions to maintain up-to-date equipment records for all serialized equipment, components and assemblies; and
- Develop daily, weekly, and monthly performance reports.

DTPW's extensive support infrastructure means maintenance managers are able to exercise more control over maintenance processes. In addition, DTPW uses a highly developed system of manual record-keeping. The efficiency of the automated and manual system working together assures the best possible vehicle maintenance at the lowest cost.

Performance Analysis has an increasingly supportive role in providing Bus Maintenance as well as Bus Operations management with additional analytical tools used on a weekly and monthly basis to accomplish their objectives more efficiently and effectively.

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3.0 TRANSIT ASSET MANAGEMENT PRACTICES

This chapter describes DTPW's asset management business structure, policies and practices. It addresses the following topics:

- DTPW's organizational structure;
- DTPW's asset management business structure;
- Asset Management Policy; and
- Transit Asset Management Plan management.

Organizational Structure

DTPW is led by a Department Director that reports to the Deputy Mayor of Miami-Dade County. The Deputy Director of Planning, Design & Engineering, Deputy Director of Transit Operations, and Deputy Director of Finance & Administration all report directly to the Director's Office. These directors lead the main divisions at DTPW.

Asset Management Business Structure

DTPW's internal asset management business structure is functional rather than organizational. At this time, the members of the Transit Asset Management Plan Project Team are dedicated Subject Matter Experts (SME) from the Performance Analysis Section, staff from across asset modes of Transit Operations, and consultants.

The Project Team is in charge of developing and implementing the Plan. However, for successful implementation of the Plan, groups have been established to focus on asset management to:

- Generate consistent decision-making;
- Set consistent performance measures and establish appropriate targets to ensure accountability;
- Guide local and regional decisions for preservation of the system;
- Make centralized decisions for the most important system renewal and strategic improvement projects;
- Manage expectations; and
- Ensure the best investment practices.

The following is a synopsis of the groups participating in asset management governance and practice:

Program Delivery Committee

The Program Delivery Committee (PDC) is headed by the Director and consisting of executive-level and other key staff, to provide strategic vision and executive leadership for asset management.

Asset Program Team

The Asset Program Team (APT) provides enterprise-wide leadership on asset management policies, practices, tools, and investments. This Team is directed by the Chief of Performance Analysis or Designee, SME, Division Directors for Metrobus, Metromover, Metrorail, Facilities, Finance, Procurement, and consultants. This linkage has been established to foster connection between program development and program delivery.

Asset Management Teams

Asset Management Teams (AMT) have been established for specific asset classes and functions: Metrobus, Metromover, Metrorail, Facilities, and various other divisions. A charter that clearly articulates the assets managed, mission, purpose, composition, meeting frequency, and roles and responsibilities will be established for each team.

Figure 7 - Proposed Internal Asset Management Business Structure for DTPW

Asset Management Policy

DTPW describes the process utilized to develop, review, and approve all asset management policies and standards. Asset management policy includes documents such as the Plan, TDP, Fleet Maintenance Plans and similar strategic and tactical directives related to investments.

Any policy may be drafted by an asset team, an organizational unit, or a temporary task force. In the case of a temporary task force, a member of the APT will be identified to champion the effort, and will be responsible to inform the APT on the status of the assignment.

Once the policy is drafted, it is reviewed internally by the APT and any internal stakeholders identified by the APT. The internal review process utilizes the resources of DTPW's Asset Management Framework described previously. After addressing the comments of the internal reviewers, the policy is approved with the appropriate signatures.

For policy impacting external stakeholders, a maximum of 30 days will be provided for external review and comment. The APT will oversee the collection of comments and develop any necessary revisions. Following revisions from external review, the draft is resubmitted for approval.

> *"The effective management, allocation and utilization of resources, control and maintenance of assets as well as cost effectively extending the useful life of equipment, fleet, infrastructure and facilities. To ensure compliance with a strategic and systematic process of operating, maintaining and improving capital assets effectively through the entire life-cycle."* – Policy # POL-AD-008

TAM Plan Management

The Plan is designed to be a living document, in that the processes, strategies, and funding levels described in it are all subject to continuous improvement. The Plan is closely related to DTPW's TDP - MDT10Ahead Annual Update, and hence changes to this document would be reflective of revisions to these processes. In addition, the Plan will be updated in its entirety at least every 4 years. Although, internal updates could be performed on a biennial cycle, to allow introduction of major programmatic changes in advance of the TDP and/or the TIP/STIP updates. This will enable new criteria and methods to be thoroughly vetted and refined prior to the initiation of the TDP or TIP/STIP updates.

The Plan biennial review process will be initiated by the APT. The APT will develop a draft scope of changes for review. The scope will identify changes in practices, tools, policies, fiscal projections, condition projections, risks, mandates, etc. that will impact asset management.

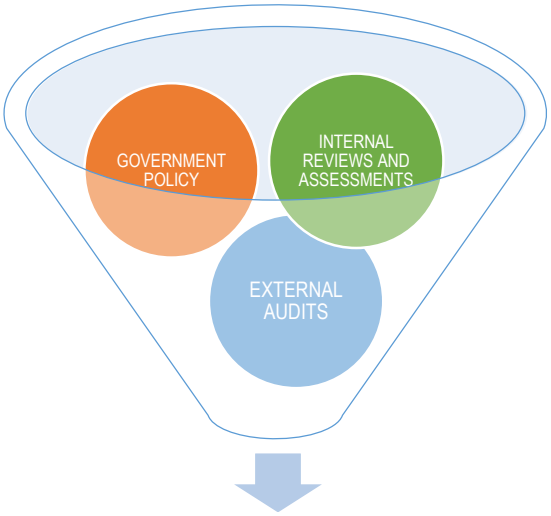
Asset Management Improvement

DTPW is continually improving the efficiency and effectiveness of its asset management business practices and tools. Until all assets are incorporated into the asset management business structure, Enterprise Asset Management System, and the business structure is fully integrated with other strategic plans, DTPW will continue to expand the scope of its asset management practices.

Targeted business improvements are generated from many sources, as shown in **Figure 8**. The three (3) primary sources are:

1. External policies including legislative actions, federal agency rules, judicial findings, etc.
2. External reviews and audits by regulatory agencies such as FTA, FDOT and Miami-Dade County.
3. Internal assessments, reviews, and audits, which are performed by program areas as part of the normal business practice of continual improvement, as well as on a larger scale in preparation for major efforts such as a program update or reorganization.

Figure 8 - Asset Management Improvement Sources



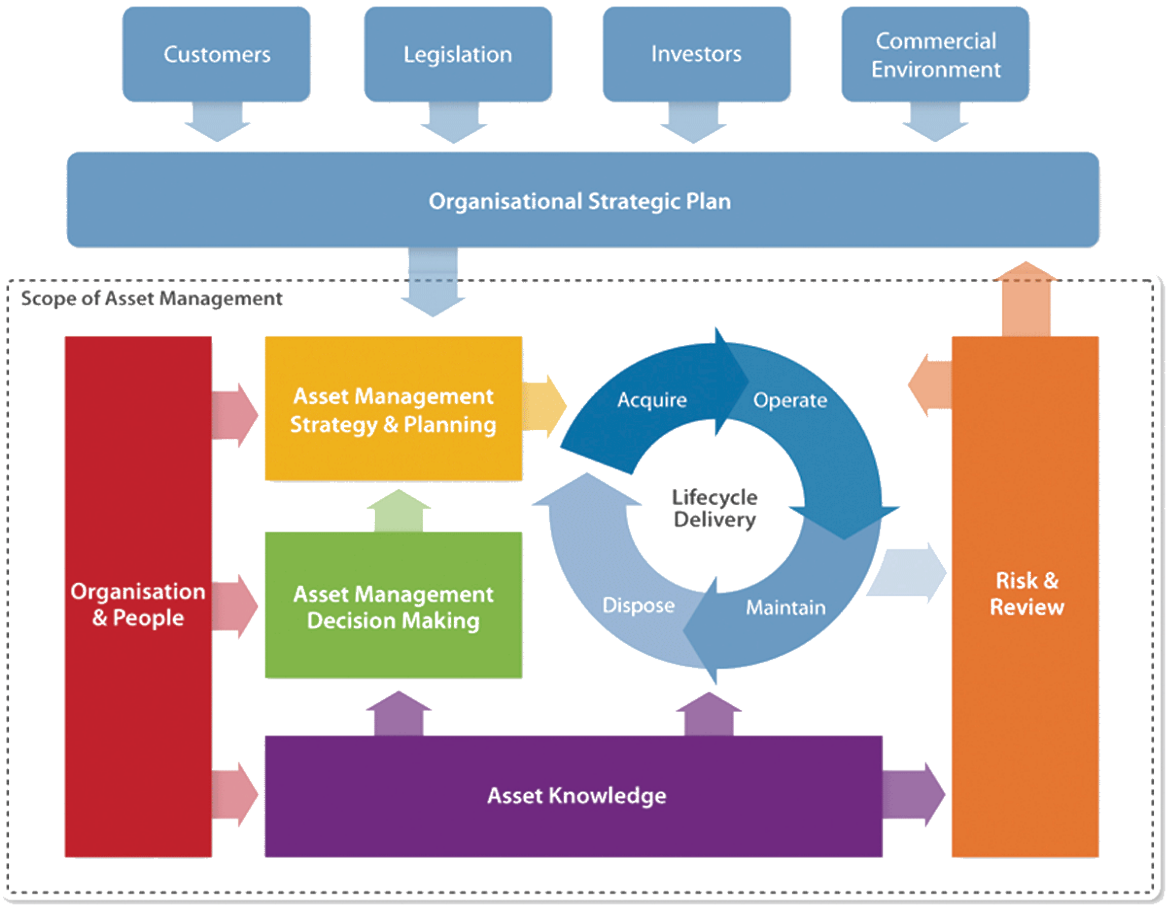
The result of the process is DTPW's Asset Management Improvement Plan. Development and updating of the Improvement Plan is managed according to the current Asset Management Policy described previously. Self-Assessments of the agency will also be performed using the PAS 55:2008 process to evaluate agency maturity on asset management.

Existing Asset Management Practices

Asset Management is considered in the Transit Development Plan (TDP) required for public transit service providers by The State of Florida Public Transit Block Grant Program. A TDP major update is required every 5 years and TDP annual updates are required in interim years. TDP updates must be submitted to the Florida Department of Transportation (FDOT) by September 1st of each year.

MDT10Ahead includes a summary of the facilities and services; describes the past year's civic engagement efforts; assesses the agency's performance in the previous year; identifies DTPW's implementation plan; explores short-term plans and longer term plans; and explores the Transit agency's finances. Overall, *MDT10Ahead* presents the operational and capital improvements needed to ensure DTPW is able to provide quality transit services to the County's residents and visitors for years to come. This document is a planning tool for the implementation and operation of transit services through 2025.

Figure 9 Overview of the Asset Management Process



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4.0 LIFE-CYCLE MANAGEMENT

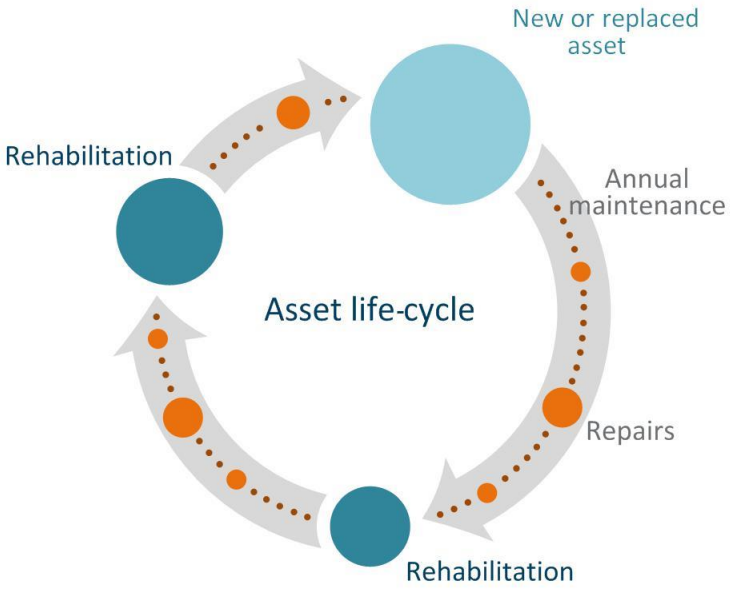
The basic principles of transit asset management as outlined in MAP-21 Section 625.17, requires a transit provider balance competing necessities when considering life-cycle investment needs of its assets. Additionally, the overall standards used to determine State of Good Repair (SGR) ask whether: (1) an asset is able to perform its manufactured design function; (2) whether the asset is able to operate without posing a known unacceptable safety risk; and (3) whether the asset's life-cycle maintenance needs have been met or recovered. These high-level standards are broad enough to be applied to existing transit asset management practices regardless of size, mode, or operating environment.

Life-cycle Management is characterized in *the AASHTO Transportation Asset Management Guide: Focus on Implementation* as "maintaining existing system performance at a constant desired level while minimizing resource consumption and externalities over the long term." The emphasis is on long term preservation and sustainability without sacrificing system performance or public safety. Asset management helps to minimize the total cost of managing transportation assets in part by focusing on all phases of an asset's life-cycle as seen in Figure 10.

DTPW's asset life-cycle management involves looking at an asset over its life span and applying preservation treatments to prolong its remaining useful life. Different asset preservation methods significantly prolong an asset's useful life while keeping performance at the most optimal level affordable. In some instances, preservation is significantly less costly than replacement.

As part of the initial TAM implementation, DTPW Life-Cycle Management will be further developed for all modes.

Figure 10 – Asset Life-Cycle Phases



Life-Cycle Cost Considerations

Life-cycle cost means the cost of managing an asset over its whole life.

All physical assets deteriorate with age and use. As assets decline, there are appropriate treatments which could be applied to slow or repair deterioration. In general, treatments are categorized by their impact and cost:

- Preventive maintenance typically averts deterioration without significantly improving condition or provide a modest improvement in condition. These treatments are only applicable to assets that are still in relatively good condition.
- Corrective maintenance generally involve repairs to specific elements or aspects of an asset. This type of maintenance is used for assets which are in fair to good condition, but in need of specific repairs.
- Rehabilitation is required for assets which still have a potential for significant remaining service but have a substantial number of components in need of repair, or major components in need of substantial repair.
- Replacement/reconstruction is required when an asset has reached the end of its service life and can no longer be extended though repair or rehabilitation.

Generally, DTPW has relied on a non-optimal worst first approach to maintain or replace assets. A worst first approach is one in which assets are ranked from worst condition to best condition, and then work down the list until funds are expended. Most often, assets that are prioritized on a worst first basis require reconstruction or replacement, which can be very costly relative to other types of maintenance and preservation activities.

Windows of Opportunity

Over time, assets deteriorate through different stages of condition. As the asset condition gets worse, it will require more extensive treatments to bring it back to a state of good repair. A key goal of a Life-cycle Cost Analysis (LCCA) is to find the most effective level of maintenance where life-cycle costs are kept to an absolute minimum. Over the life of a facility, well-timed maintenance is estimated to cut life-cycle costs roughly in half, compared to a policy where no maintenance is performed at all. This point may be known as the "happy medium," where maintenance expenditures are neither too frequent nor delayed too long. The period of time where a particular work type is the proper treatment for the distress in the asset is called the "window of opportunity."

As part of this Plan, the implementation of life-cycle analyses will be evaluated for each asset type in order to determine which of the strategies would be most cost-effective over an extended period. Analysis periods of various lengths should be used for different asset classes to include one full reconstruct (replacement) cycle for each asset.

At least two improvement strategies would be analyzed for each asset – a "typical" strategy, considering the types of treatments normally performed by DTPW, and a "worst-first" strategy, which assumed limited improvements and that each asset would be allowed to deteriorate to the point that it needed to be replaced. A third strategy, referred to as the "desired" strategy, would follow the treatment intervals suggested as ideal in DTPW's Fleet Manuals in order to identify the "window of opportunity" for a timely maintenance.

Life-Cycle Cost Analysis

Life-Cycle Cost Analysis (LCCA) is an analytical technique used to assess the total cost of an asset. It takes into account all costs associated with construction, inspection, maintenance, and disposal. LCCA is especially useful when comparing alternate strategies that fulfill the same performance requirements but differ with respect to construction, maintenance and operational costs. These can be compared in terms of the total costs over the entire life-cycle of the asset.

Therefore, it is important to manage the facilities as cost-effectively as possible over their entire service life. In LCCA, this preference is quantified as a discount rate. The life-cycle cost of an asset includes costs associated with construction, inspection, maintenance, and disposal. It is the total cost to build, inspect, maintain, and dispose of an asset over the analysis period when the costs incurred in future years are converted to current dollars.

The analysis period of a LCCA should be as short as possible while still satisfying the following criteria:

- Long enough that further costs make no significant difference in the results.
- Long enough that at least the first complete asset replacement cycle is included.

The LCCA Process

LCCA is performed as some parts of the processes at DTPW. However, to improve on the asset management practices, LCCA calculations will be evaluated for implementation to help impact decisions. To accomplish a consistent LCCA across all asset modes, the LCCA process involves (1) establishing objectives for the analysis, (2) determining the criteria for evaluating alternatives, (3) identifying and developing design alternatives, (4) gathering cost information, and (5) developing a life-cycle cost for each alternative.

Step 1. Establish Clear Objectives

An LCCA study must have clear objectives to be successful. LCCA can capture dollar cost variations between alternatives and show which option will have the lowest overall cost.

Step 2. Determine LCCA Metrics (total cost and payback)

The two primary metrics to be used and calculated in LCCA are the life-cycle costs of each alternative and its payback over a pre-defined study life. Basically, consideration would be given to total costs and the time it takes to recover an initial investment. When two alternatives have similar operational and maintenance costs over the study life, "first" costs (i.e., construction or replacement costs) will most likely drive the decision.

Step 3. Identify the Base Case and Develop Alternative Designs

The alternative that captures the "standard" design or minimum requirements for a project is called the "base case." The design team must develop alternatives to evaluate against the base case. These alternatives must be developed in sufficient detail to derive good cost estimates, which are required to run the life-cycle cost calculations and to capture the incremental cost differences of the options. The intent of these guidelines is to capture as much cost benefit as possible given a reasonable amount of effort and investment. Analysis of alternatives should consider the effects of diminishing returns. Where possible, effects should be calculated for each measure individually as well as for the measures in combination.

Step 4. Gather Cost Information

Cost information comes from a variety of sources, including cost estimating consultants, contractors, historic data, vendors, and designers. For each alternative, gather all relevant cost information. Identify additional soft cost requirements for the alternatives as well.

Step 5. Perform Life-Cycle Cost Calculations

For each alternative, calculate the metrics listed in Step 2 above, using the parameters listed under Life-cycle Cost Parameters below. Test each alternative against the 2 metrics and make a recommendation on which to incorporate into the design.

LCCA Calculation Method

LCCA properly weighs money spent today versus money spent in the future. All costs should be converted to common, current dollars and then summed to develop a total cost in present dollars for each alternative. This quantity is sometimes referred to as the net present value or the total cost in today's dollars.

With the net present value calculated for each alternative, comparisons are simple because units are consistent. The best option is simply the alternative with the lowest life-cycle cost or net present value. The basic formula is as follows:

$$LCC = C + PV_{recurring} - PV_{residual\text{-}value}$$

Where:

LCC is the life-cycle cost
C is the Year 0 construction cost (hard and soft costs)
PV*recurring* is the present value of all recurring costs (utilities, maintenance, replacements, service, etc.
PV*residual-value* is the present value of the residual value at the end of the study life (note: these guidelines recommend this to be $0)

Life-Cycle Cost

The primary purpose of LCCA is to determine which investments, made today, are the most cost-effective in the long-term to keep the infrastructure in service. It is also used to identify and prioritize the best opportunities and timing for this strategic activity.

DTPW collects data on all asset modes and follows Operations & Maintenance Manuals to determine the time to treat each asset in order to minimize the life-cycle cost of the transportation system. LCCA is also used to evaluate maintenance or make purchase decisions of equipment. As part of the development of the Department's Five Year Capital Improvement Plan, Life-cycle Costs are also considered to determine if funding will be provided from the Operating or Capital Budget. With the development of the Plan, DTPW intends to pursue additional analytical tools and processes to determine a more precise forecast for asset planning.

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5.0 RISK MANAGEMENT

Risk Management is a key component of asset management as it allows DTPW to prepare for the occurrence of events that could impact its ability to deliver planned infrastructure investments or manage the network effectively. Risks can be beneficial to a program such as increased funding, or negative such as damage from a major weather event. In either case, it is important to be prepared for major risks that could impact the delivery of the DTPW's Asset Management Program.

DTPW's approach to risk management is consistent with its overall approach to asset management with the objective of managing risks at the agency, program and project levels, to maximize opportunities and minimize threats to the comprehensive program. This approach requires balancing risk across asset classes and programs with a focus on minimizing overall risk threats to the agency-wide system and capitalizing on risk opportunities. The focus is not on making the most conservative decision on any specific project or policy, instead the intent is to make informed decisions based on reasonable consideration of future events and an estimate of the impacts of those events.

Risks can have impacts on an agency at various levels. Some risks may impact the entire Department; others may impact a single asset type or a single route. For the Plan, risks are categorized into the levels of: Agency, Program, or Project, as defined in **Figure 11**.

Figure 11 - Levels of Risks

Source: Risk-Based Asset Management: Examining Risk-based Approaches to Transportation Asset Management; Report 2: Managing Asset Risks at Multiple Levels in a Transportation Agency, FHWA, 2013

Risk Management Process

DTPW's risk management process consists of the following 5 primary steps:

Step 1 - Establish Context. This step involves understanding and documenting the social, cultural, legal, regulatory, economic and natural environment to which DTPW is sensitive.

Step 2 – Identify Risks. DTPW formally identifies the risks that could affect its programs.

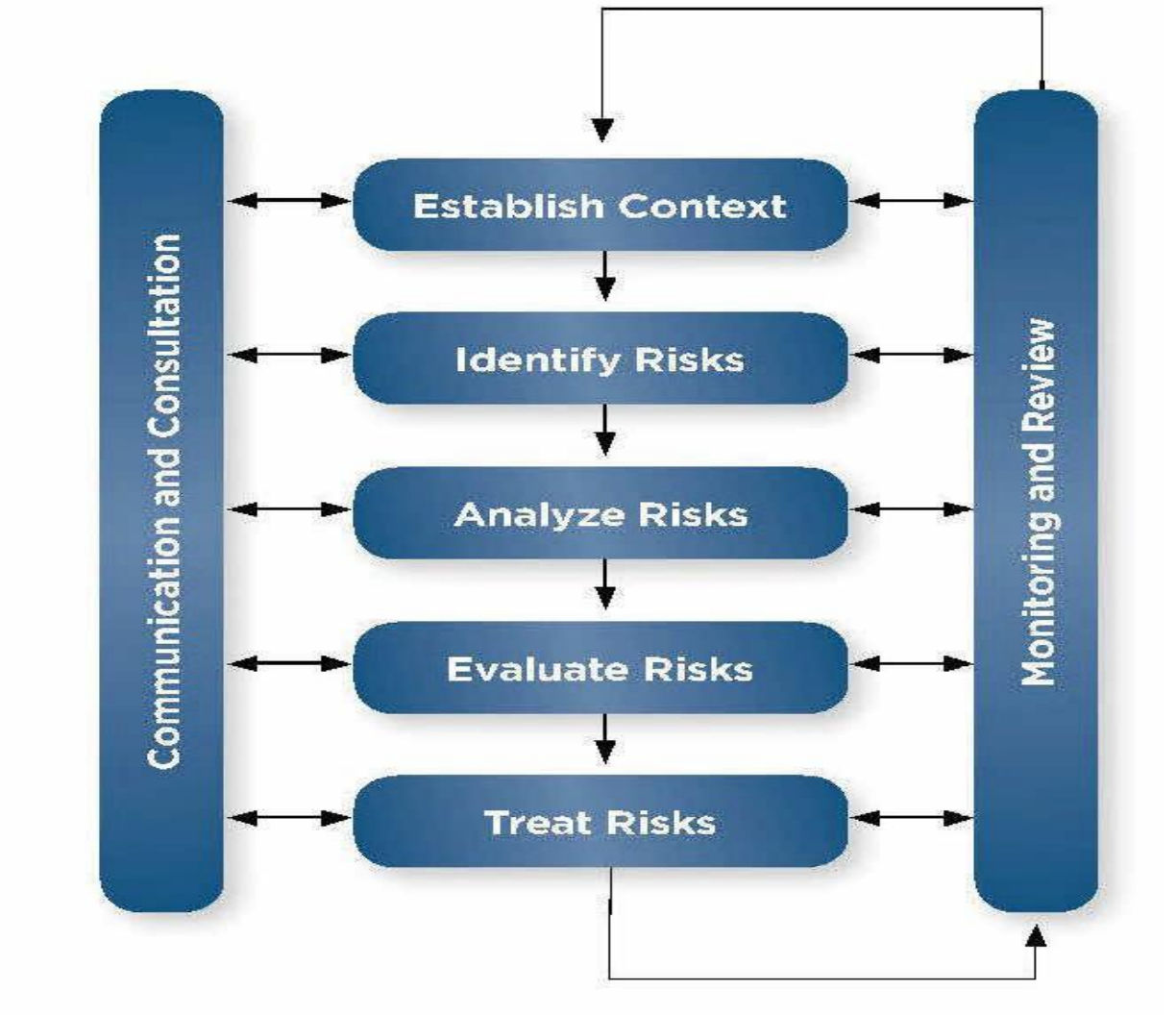
Step 3 – Analyze Risks. DTPW evaluates the probability of risk with its impact.

Step 4 – Evaluate Risks. DTPW supports decision-making by comparing the magnitude of the risks identified in the preceding two steps with its risk tolerance.

Step 5 – Treat Risks. This decision-making step applies the "five T's." These are to treat, tolerate, terminate, transfer, or take advantage of the risk.

This process, as described by the International Organization for Standardization (ISO), is illustrated in **Figure 12**.

Figure 12 – ISO Risk Management Framework



Source: International Standards for Risk Management (Principles and Guidelines) ISO 31000:2009

Step 1. Establish Context and Step 2. Identify Risks

DTPW combines step 1 and step 2 into a group exercise that includes brainstorming of risks by individuals, combining of risks by the group, developing risk descriptions, and reaching a working consensus on which risks will be included in further analysis and prioritization. This process is done by agency-wide business units through facilitated discussion. Before analysis and prioritization can begin, the risks must be clearly defined so each member of the business unit has the same understanding of the risk and the risk can be communicated to other stakeholders.

Step 3. Analyze Risks

The analysis and prioritization of risks is an iterative process, in which risks are initially prioritized by each asset management business unit, then a combined risk register is reprioritized by the Asset Program Team (APT), and finally the PDC may recommend adjustments to this prioritized order.

Initial prioritization by the business units is done objectively. Each risk is assigned an overall risk score equal to the product of its impact and likelihood scores. The business unit records the risk score in their risk register and sorts the list in order of descending score.

Risk score = likelihood of occurrence x impact if it occurs

Step 4. Evaluate Risks and Step 5. Treat Risks

During risk evaluation, each asset management business unit compares each risk to the defined risk tolerance and develops a recommended treatment. In this context, treatments are referred to as risk mitigation strategies. The strategy is recorded in the Business Unit's risk register.

Compiling a Risk Register

Compiling the risk register and subsequent reviews are the final key elements to the risk management process. When the APT receives the risk registers from the other Business Units, the risks are added to the register. The APT reviews the combined risk register looking for opportunities to combine risks, find synergies between mitigation strategies, and adjust priorities.

Combining Risks. It is likely that a given risk can impact several programs and asset classes at the Division and Agency level. In such cases, the same risk may be identified by multiple business groups. The APT identifies the potential redundancies and determines how best to include the risk in the comprehensive register.

Synergies in Mitigation Strategies. In some cases, a single strategy such as a policy change may act to mitigate multiple risks. When reviewing the business units' risk registers, the APT looks for opportunities to mitigate multiple risks with a single strategy. This is done by looking for similar mitigation strategies proposed by multiple business units or by deciding to handle some program level risks with Agency level mitigation strategies.

Adjusting Overall Priorities. Initially, the comprehensive register is sorted according to the scores assigned by the original business units. APT then reviews the list comparing each risk to the risks immediately above and below determining if adjustments are required in the overall priority.

Initial Risk Register

Risk – or the effect of uncertainty on objectives – can help DTPW more successfully plan for possible system and program disruptions and complications, mitigate potential consequences, and improve agency and infrastructure resiliency.

As part of this Plan, DTPW will integrate risk management practices throughout the agency from high level investment, management, and operations plans to individual asset management programming processes. As part of the Plan's development process, a workshop was held to identify high-level concerns crucial to the successful implementation of the Asset Management Program. These concerns or potential risks, include the following:

- Procure additional qualified staff
- Review the hiring process to procure qualified staff
- Complete the development of a centralized system to track assets, warranties, and work orders to include all modes of transportation
- Implement the use of technology to track inventory of assets (ex. Barcodes, RFID, etc.)
- Develop a building profile by location to identify fixed assets and life-cycle
- Update replacement plans for each division and develop implementation timeline for component replacement efficiency
- Improve communication between the Budget Department and Divisions to understand what projects from the priority list have been already included/addressed within other projects.
- Review of the current procurement processes to obtain timely responses for services and equipment
- Implement Cost Benefit Analysis of renting versus purchasing certain equipment

Other risks that could impact DTPW's assets or the ability to manage its assets include:

- Climate change continues to impart a wetter weather pattern on Miami-Dade County with more intense storms (e.g., Andrew, Charley, Wilma, etc.) and sea level rise;
- Demographics which impact transportation policy are departing from their historic trends, including: reduced vehicle ownership, reduced annual VMT growth; VMT increasingly concentrated in urban areas, higher fuel-efficiency vehicles;
- Evolving customer use (i.e., commuter/local, trade, intercity, emergency response and public evacuation, and tourism/recreation);
- Improved software tools and new performance measures must be developed by DTPW to quantifiably optimize investment levels across programs, (e.g., vehicles, IT, systems, safety, mobility, access, etc.); and
- Consistent, comprehensive data is not readily available for inventory or condition assessment.

As part of enhancing its risk management practices and as part of the development asset management program, DTPW will plan a risk management analysis to establish a risk register, prioritize these risks and establish mitigation responses accordingly.

Updating the Risk Register

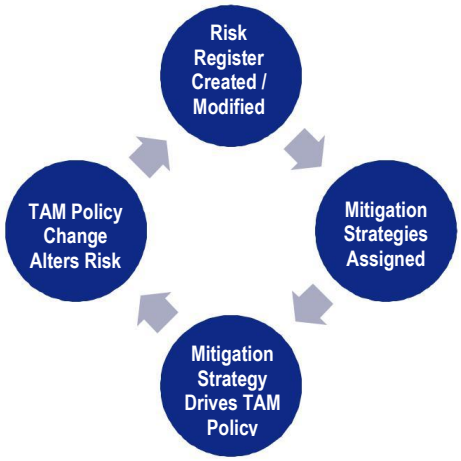
The risk register will be managed and updated by the APT, following the asset management policy development process. As a part of regular meetings, agency-wide teams will discuss risks and the status of mitigation strategies. As changes to risks or mitigations strategies that impact the risk register emerge the agency-wide team will notify the APT.

The APT is responsible for making necessary changes to the risk register and recommending new or modified mitigation strategies to PDC. At least quarterly, the APT will review the risk register and make changes as necessary. The APT may assign a working group or sub-team to track the register as well.

Risk Management in the Asset Management Process

The APT and AMT refer to the risk register when developing or revising asset management policies or guidance. **Figure 13** demonstrates the feedback loop between the risk register and policy development process. As risks are identified and mitigated, the risk register will need to be updated. Updating the risk register will alter mitigation strategies and drive new policy improvements.

Figure 13 - Risk Management and Asset Management



To facilitate this process, DTPW will assign each mitigation strategy to a specific resource which can be a business unit or an asset management team. The assigned resource will be responsible for delivery of the mitigation strategy and keeping the APT informed on their status.

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6.0 PERFORMANCE TARGETS

DTPW established a performance assessment criteria to identify objectives necessary to create the framework within the agency that would follow the Transit Development Plan (TDP)-inspired vision over time. The goals and objectives provides a benchmark for assessment of various projects and initiatives that are proposed, planned, and implemented throughout the system.

The performance objectives include:

- Improve Convenience, Reliability, and Customer Service of Transit Services
- Improve Operational Safety and Security
- Improve Coordination and Outreach
- Enhance the Integration of Transit Services to Support the Economy and Preserve the Environment
- Maximize the Use of All Funding Sources
- Maximize and Expand Transit Services
- Transit System Shall Fully Meet the Requirements of the Americans with Disabilities Act (ADA)

These objectives focus on improving the transit system and will have a direct impact on asset management. Each objective is subdivided into measures with outlined criterial. In some cases, multiple performance targets are created from an outlined measure. The progress in achieving the objectives are analyzed and updated annually. A three (3) point scale is utilized to reflect the status:

- Exceeded/Ahead of Target (**3**)
- Met/ On Target (**2**)
- Not Met/Behind Target (**1**)

An example of an objective, measures, targets, accomplishments and the status is provided in Table 6.

Table 6 – Sample Performance Criteria

Objective	Measure	Target	Accomplishments	Status
Improve accessibility to major employment, recreation, educational, healthcare, retail centers, and cultural attractions	Percent Coverage of the urbanized area	Provide a minimum of 60% transit coverage of the urbanized area	73%	3
	Amount of transit service route miles within ¼ mile of major health facilities, recreation, education, employment, cultural and social service facilities	Healthcare: 50 route miles	51.3	3
		Tourist Attractions and Special attractors: 300 route miles	319.8	3
		Educational: 100 route miles	108.8	3
		Major Employment Areas and Employers: 40 route miles	44.2	3
		Retail Centers: 90 routes miles	91.2	3

From an operations perspective, performance targets, measures, and asset tracking are based on those required by the National Transit Database (NTD), safety guidelines, manufacturer's maintenance guidelines and operation manuals, industry standards, and best practices. DTPW'S *Monthly Operations* Report documents the performance indicators as required by NTD, the goals set for each category and monthly status of performance.

Target Setting Process

Target recommendations should consider a combination of current policy and investment direction (e.g. *DTPW10Ahead*), Federal and State requirements (e.g. MAP-21, GASB 34), risk, expected or anticipated deterioration, principles of life-cycle costs, and system demand.

Specific targets may be approved, modified or rejected through DTPW's planning process and senior leadership review. Approved or modified targets for the various asset classes will be used to calculate investment needs and guide resource allocation decisions in future iterations of the Plan. These targets will also be used to further develop and refine DTPW's asset management strategies.

When establishing asset management targets, DTPW considers the following:

- The value of the asset to the overall interconnected transportation system and its users;
- The condition and uses of the asset;
- Risk of asset failure;
- Traffic volumes;
- Funding availability and restricted uses of that funding;
- Life-cycle cost considerations;
- Asset management investment strategies; and
- An analysis of future funding versus performance scenarios.

The resulting targets reflect an attempt to focus on preserving as much of the system as possible while also providing funding for the most critical replacement, safety, and enhancement projects as seen from an agency-wide perspective. The balance of needs, funding and resulting performance targets will be driven from a more analytical approach when cross-asset optimization is implemented as part of the Enterprise Asset Management process. In addition, DTPW will work to incorporate risk analysis into future target updates.

As part of the Plan, DTPW seeks to enhance its target setting with a set process to establish targets that consists of multiple iterations of the following steps:

- Determine total funding available;
- Divide funding among assets;
- Determine amount of asset specific funding that goes to service life extension or condition improvement;
- Develop treatment strategies for identified assets;
- Consider condition of assets; and
- Evaluate the "window of opportunity" for treating needs for individual assets or asset segments.

Separate and classify needs into:

- Asset preservation, system renewal, safety element, and enhancements;
- The dollar cost required to treat the assets in each of these four categories;
- Funding estimates for each of these categories;
- Model the results;
- Determine the percentage of modeled result conditions are achievable;
- Review results, and repeat steps as necessary until a working consensus is achieved; and
- Establish or update targets.

To further the discussion, the terms target and plan outcomes can be applied to differentiate between desired outcomes and the outcomes DTPW plans to achieve within the constraints of available resources. A single number can represent both ideas if DTPW plans to achieve its desired outcome.

In situations where a target and a plan outcome diverge due to insufficient resources, DTPW uses the target to communicate need, while managing its program and maintenance activities to the plan outcome.

State of Good Repair (SGR)

Objective standards have been established in MAP-21 to allow transit providers to operationalize, quantify and audit their SGR performance. The proposed objective standards are:

(1) The asset is able to perform its manufactured design function;
(2) The use of the asset in its current condition does not pose a known unacceptable safety risk; and
(3) The asset's life-cycle investment needs have been met or recovered, including all scheduled maintenance, rehabilitation, and replacements.

An asset is in a state of good repair when each objective standard is met.

The objective standards allow for an auditable SGR definition that is high-level and broad enough to incorporate existing transit asset management practices with varying modes, sizes, and operating environments.

The conventional approach for defining assets being in SGR is that the assets are replaced before the end of their useful life. Examples of these definitions are 12 years for buses, 25 years for rail cars, and 50 years for stations.

Often, these definitions are based on federal grant requirements that only permit federal funding to be used for asset replacements when the assets have reached minimum ages. Recent and more detailed approaches recognize that, in practice, the need to replace an asset is related not only to age, but to other factors as well, such as intensity of use (e.g., miles), level of preventive maintenance, and climate. Therefore, two identical assets may be scheduled for replacement at different ages based on the intensities of their use and their respective levels of maintenance.

The approach used by the FTA in its Transit Economic Requirement Model (TERM) simulates the full life and decay of all transit assets based on factors such as asset use (e.g., miles), annual maintenance, and age. Empirically derived decay curves are used to determine when assets should be replaced. These curves are based on detailed asset condition inventories that used a five-point scale (1 = poor condition, 5 = excellent condition). An asset should be replaced when its condition falls below 2.5. TERM is an analysis tool designed to help evaluate long-term transit recapitalization needs. TERM can estimate the level of capital investment required to attain a SGR (or other investment objective) and can also assess how variations in capital funding availability will likely impact the future condition and performance of assets.

The TERM model consists of the following criteria:

- Inventory of transit assets
- Agency-mode operating characteristics
- Urbanized areas demographics
- Cost and investment benefits data by mode
- User-defined investment scenarios

- Asset rehabilitation and replacement polices
- Budget constraints
- Financial assumptions (inflation, discount rate)
- Estimation of investment needs by type, mode, and urban area size
- Asset condition forecasts

To ensure long-term SGR requirements are met, the IRP Committee annually focuses on needs and SGR for all asset modes. Areas such as bus and rail vehicle procurement; rehabilitation of bus and rail maintenance facilities and equipment; escalator and elevator rehabilitation; maintenance of tracks and wayside; fare collection system upgrades; and information technology improvements are discussed and considered. Based on the input, an adequate IRP budget is prepared for Facilities, Metrorail, Metromover, and Metrobus systems to maintain service reliability, system safety, and ensure life-cycle investment. Implementation of the IRP is done by replacing or upgrading all of the Metrorail, Metromover, and Metrobus assets according to normal replacement cycles as defined by industry standard. To enhance these practices, DTPW will consider the implementation of TERM and other analytical tools.

Scenario Analysis

An important aspect of DTPW's performance target setting process is understanding the relationship between funding levels and future asset management performance. This is done for two primary reasons:

1. Provide a basis for cross asset trade-offs; to see what critical performance levels can be achieved by moving funds from one asset class to another.
2. To demonstrate critical thresholds that could be achieved by additional funding.

DTPW can use asset inventory and condition data, manufacturer's manuals along with deterioration curves to determine the appropriate treatment for each asset in a given year. These deterioration curves account for the significant factors which impact asset deterioration including asset type and materials. Software tools can help including the implementation of Monte-Carlo analysis formulas customized to forecast asset management performance.

The windows-of-opportunity approach described previously to optimize the timing of each treatment on each asset can also be a product of this approach. Some assets may be within a window of opportunity for a specific treatment for many years. The model optimizes treatment timing by predicting which year the asset is likely to slip out of its current window and recommends a more appropriate treatment timeline. This allows DTPW to plan its treatments in advance to maximize return on investment and provide sufficient lead time for project delivery.

Once the model has recommended a treatment for each asset, it then allows the user to prioritize treatments based on any performance measure. It is important to note that this prioritization is constrained by the budget.

This approach will provide a more in-depth insight as to the best use of funds and the most cost effective and efficient moment to invest in the asset.

7.0 GAP ANALYSIS - ASSET MANAGEMENT KNOWLEDGE

DTPW provides monthly operations reports and various other reporting mechanisms related to its asset management practices. The difference between SGR levels and future target levels can be considered to be a performance gap.

As part of the Plan implementation process and identifying gaps regarding asset management practices within the Agency, a self-assessment or gap analysis is performed as a tool to further develop the Plan and asset management practices. This self-assessment process will be performed periodically as part of the implementation of the overall asset management program, which is intended to help monitor the progress of the agency towards its goals. Initially, the Publicly Available Specification (PAS) PAS 55:2008 standards were incorporated as a method to implement self-assessment.

PAS 55:2008

The Self-Assessment Methodology Question sheet for PAS 55 provides one hundred and twenty-one (121) questions covering each of the twenty-eight (28) elements of PAS 55:2008 demonstrated in **Figure 14**. Each question set comprises the following components:

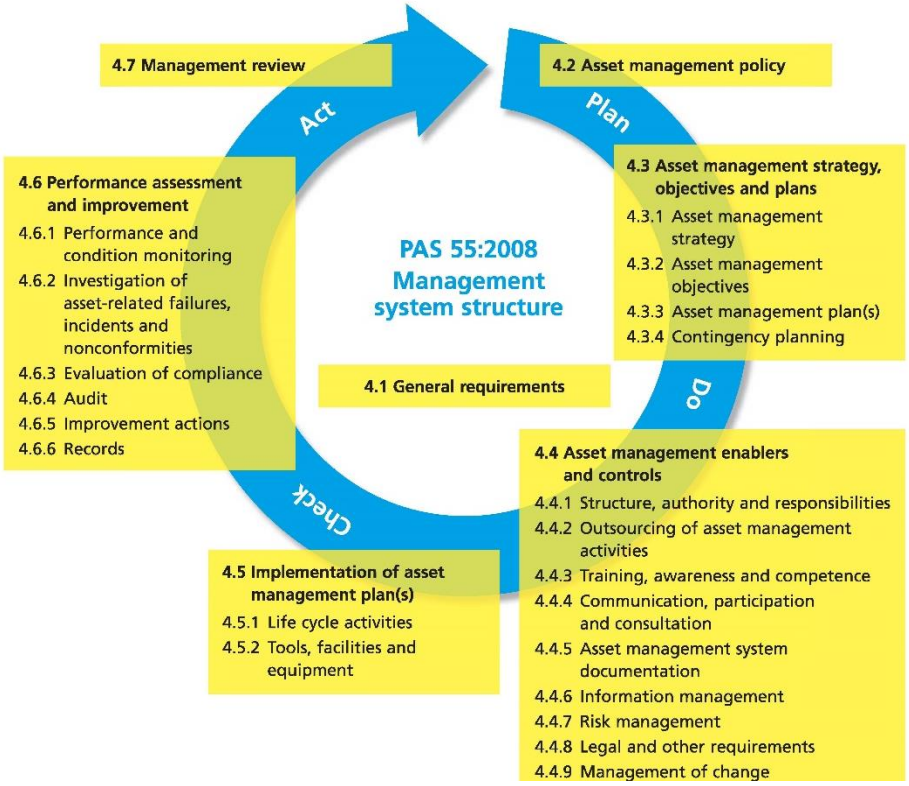
- Five possible indicators describing the performance criteria associated with each level of maturity;
- Guidance on why the question is being asked;
- Guidance on who should be able to provide a response to the question; and
- Guidance of additional documentation and evidence that could be reviewed to assist with the assessment of the level of maturity.

DTPW's gap questionnaire was developed based on this framework and adjusted to cover the following assessment area topics:

A. Policy Goals and Objectives
B. Transportation Asset Management (TAM) practices
C. Performance & Condition, Corrective & Preventive, and Investigation
D. Asset Inventory, Continual Improvement and Change Management
E. Information Management, System Documentation and Records
F. Outsourcing and Communication
G. Risk Management, Audit & Compliance, and Management Review
H. Training, Competence and Equipment, Facilities

The answers are recorded and weighted equally to assess the maturity level of each area. The maturity answers are provided to help the organization determine its level of maturity, or conformance, with the requirements of PAS 55:2008.

Figure 14 – BSI PAS 55:2008 Management System Structure Assessment Areas

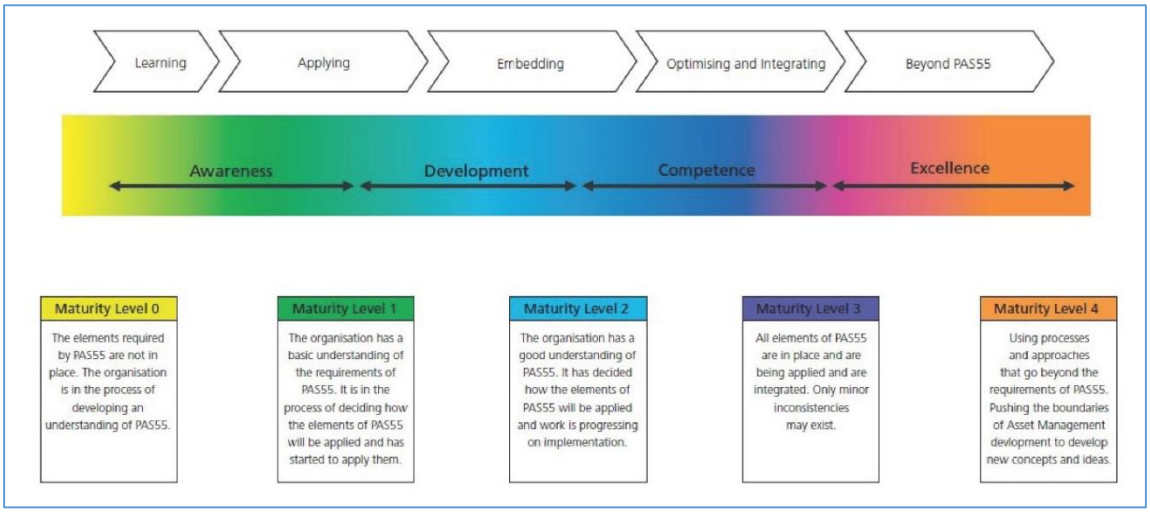


Maturity Rating Scale

The Self-Assessment Methodology considers 5 "levels" of maturity against which an organization can measure its conformance with each of the elements of BSI PAS 55:2008. The maturity level scale shown in Figure 15 includes an indication of where the Self-Assessment Methodology considers BSI PAS 55:2008 compliance to rest.

Evidence builds from the lowest to the highest maturity levels (i.e. from 0 to 4), therefore, in order to achieve a particular level of maturity; an organization should satisfy itself that the contents of preceding maturity levels have been considered.

Figure 15 – BSI PAS 55:2008 Maturity Scale



However, a 5-point scale was developed and introduced in the 2011 Transportation Asset Management Guide – A Focus on Implementation.

The AASHTO Guide expanded on these definitions and provided a table that described characteristics associated with each of the five maturity levels in six different areas: 1) processes; 2) frequency; 3) sub-element emphasis; 4) process formality; 5) data and technology; and 6) outputs and results (AASHTO 2011).

This process provided a framework to develop, implement and identify gaps and areas of improvement in asset management.

Self-Assessment Methodology (SAM)

As established by the Institute of Asset Management (IAM), DTPW performed the assessment using internal resources as oppose to an external asset management assessor. As part of the Maturity Gap Analysis process, DTPW:

a. Appointed a coordinator, also known as the Tool Administrator, responsible for all matters concerning the assessment, including:
    i. Organizing the people within the organization who will be respondents to the questions;
    ii. Arranging for all information to be captured within the tool;
    iii. Reporting on the results of the assessment to the organization;
b. Confirmed the scope of the asset management system to assess;
c. Confirmed the survey questionnaire format as the assessment process;
d. Arranged appropriate 'vertical and horizontal' cross-sections of its workforce to act as respondents for the assessment exercise;
e. Provided appropriate pre-assessment communication and introductory training to ensure that the respondents were aware of the assessment process and their peart within it;
f. Identified the questions to be asked for each survey group;
g. Agreed why the assessment is being undertaken and how the output will be used; and
h. Considered all internal stakeholders.

GAP Analysis Assessment Results

According to the results from the GAP Survey, DTPW has an overall score of 2.81 with a gap of 2.19. At an agency-wide level, the highest Asset Management awareness is in the assessment area of Training, Competence and Equipment, Facilities; while the lowest maturity level is in the assessment area governing Policy, Goals and Objectives.

It is important to note that no prior training on asset management practices and methods was given to the staff in an effort to obtain an unbiased response, the maturity levels for this survey have been adapted to focus on the level of known knowledge of DTPW's current asset management practices.

Table 7 below reflects the score for each assessment area.

Table 7 - Maturity Level per Assessment Area

	TAM Assessment Areas	Maturity Level (Avg)	Gap
A.	Policy Goals and Objectives	2.70	2.30
B.	Transportation Asset Management	2.79	2.21
C.	Performance & Condition, Corrective & Preventive, and Investigation	2.75	2.25
D.	Asset Inventory, Continual Improvement and Change Management	2.76	2.24
E.	Information Management, System Documentation and Records	2.90	2.10
F.	Outsourcing and Communications	2.72	2.28
G.	Risk Management, Audit & Compliance and Management Review	2.80	2.20
H.	Training, Competence and Equipment, Facilities	3.08	1.92
Overall DTPW Average TAM Maturity Level		**2.81**	**2.19**

8.0 FINANCIAL RESOURCES

DTPW receives funding from multiple sources and is tasked with multiple missions. A Financial Plan is developed and maintained to reconcile the identified transit improvement needs with available financial resources. In the financial plan, the estimated costs of providing the agency's existing and planned new services are projected over a 10 year horizon. The financial resources that will support those services are also identified and estimated. Through the development of this financial plan DTPW determines which service improvements are financially feasible and establishes a timeline by when said improvements can be implemented.

Asset Management at DTPW is considered in the Transit Development Plan (TDP) required for public transit service providers by the State of Florida Public Transit Block Grant Program. A TDP major update is required every 5 years and TDP annual updates are required in interim years. TDP updates must be submitted to the Florida Department of Transportation (FDOT) by September 1st of each year.

The *MDT10Ahead 2015 Annual Update*, the agency's TDP, serves as the agency's strategic guide for public transportation in Miami-Dade County over the course of the next 10 years.

MDT10Ahead includes a summary of DTPW's facilities and services; describes the past year's civic engagement efforts; assesses the agency's performance in the previous year; identifies DTPW's implementation plan; explores short-term plans and longer term plans; and explores the agency's finances. Overall, *MDT10Ahead* presents the operational and capital improvements needed to ensure DTPW is able to provide quality transit services to the County's residents and visitors for years to come.

MDT10Ahead establishes both funded and unfunded needs in order to create the framework for a long-term vision of transit improvement projects as represented in the 25-year Miami-Dade County Long Range Transportation Plan (LRTP). In addition, *MDT10Ahead*, as updated annually, identifies and presents short-term improvements for implementation through the 5 year MPO TIP, FDOT Work Program process and Miami-Dade County FY 2015 Adopted Budget and Multi-Year Capital Plan.

Other Programs relevant to DTPW funding include:

Long Range Transportation Plan to the Year 2040

The update of the Miami-Dade County Long Range Transportation Plan (LRTP) to the Year 2040 is a primary activity in Miami-Dade County's transportation planning process to meet federal and state requirements for an update of the Transportation Plan every 5 years. Federal law requires that the LRTP address minimum of a 20 year planning horizon from the date of the Metropolitan Planning Organization (MPO) adoption.

Transportation Improvement Program (TIP)

The Transportation Improvement Program (TIP) specifies transportation improvements for the next 5 years. All projects receiving federal funds must be included in this plan. Other major projects, which are part of the area's program of improvements, but which do not receive federal funds, are included in the TIP as part of the planning process.

Florida Department of Transportation (FDOT) Five Year Work Program

In each cycle, a new fifth year is added, and the first year drops off as projects are completed. A new project only begins to move forward after it is funded and then placed in the Work Program's fifth year. Each phase of a project generally takes 2 years to complete. Therefore, some projects could take up to 10 years or

more from initiation to completion and would cycle through the Work Program several times. The current 5 year Work Program covers the period from July 1st, 2016 through June 30th, 2020.

State Transportation Improvement Program (STIP)

The State Transportation Improvement Program (STIP) is a federally mandated document which must include a listing of projects planned with federal participation in the next 4 fiscal years. Although the STIP is approved annually by Federal Highway Administration (FHWA) at the beginning of each federal fiscal year (October 1st), FHWA allows FDOT to report these 4 years on a state fiscal year basis (July 1st thru June 30th). This is because the report is based upon the same projects that are listed in the first 4 years of FDOT's Adopted Five Year Work Program.

Adopted Budget and Multi Year Capital Plan

Miami-Dade County has a responsibility to appropriately plan for and strategically manage the funding of public services desired by the community. The annual budget and multi-year capital plan are essentially a plan of activities consistent with the County's Strategic Plan and the resources required to achieve those goals.

Each departments operating and capital budgets are evaluated on an annual basis as one cohesive plan. The County's budget and multi-year capital plan, spans 6 fiscal years, is adopted on an annual basis by the Board of County Commissioners, and conveys the services to be delivered to the community as well as the resources required to provide those services.

Transit Asset Management Plan - Financial Plan Components

A comprehensive financial plan that supports long-term asset management will, at a minimum, include the following primary components for consideration:

- The various uses of funds based on forecasted system conditions and performance targets which will include assumptions related to future projections.
- Projected revenues from all available and anticipated sources of funds including related assumptions.
- Projected gaps or surpluses based on the above.
- Scenarios reflecting adjustments necessary to address gaps, if any, along with related consequences.
- Final proposed financial plan to support the agency's asset management plan.

Discussing each of these areas in the financial plan should allow DTPW to provide a realistic picture of its projected future financial health. The plan will also present the agency's financial ability to meet its long-term performance and condition goals and sustain its assets in the future.

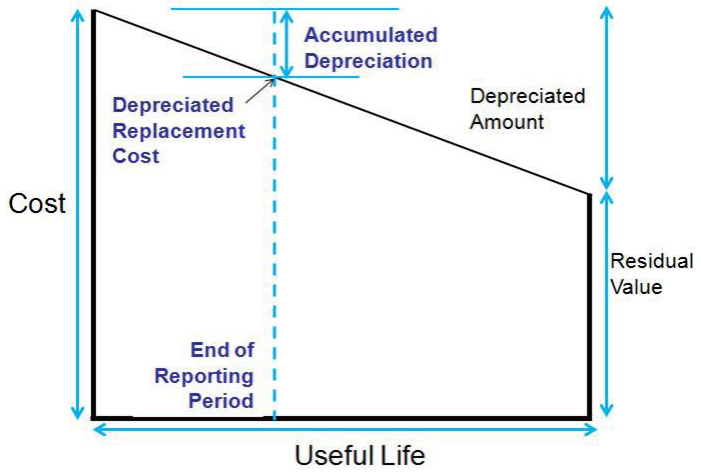
Valuation of DTPW Assets

Transportation assets represent a significant investment. Therefore, it is important to preserve the value of transportation assets through a series of planned activities that extend their service lives for as long as possible.

As an asset ages, its value and functionality gradually declines. In accounting terms, this decrease in value is referred to as depreciation. Monitoring the change in asset value over time (illustrated in **Figure 16**) is one way of determining whether investment levels in transportation assets are financially sustainable. Stated simply, if an agency is not investing at least as much as its assets are depreciating each year, the assets are losing value and the program is not financially sustainable. The use of value to monitor financial

sustainability is gaining momentum nationally. Therefore future analysis as part of the Plan may include a comparison between estimated asset depreciation and anticipated investment.

Figure 16 - Illustration of the Concept of Asset Value Deterioration



Capital Assets

Capital Assets are recorded at cost. Expenses for maintenance, repairs, and minor renewals and betterments are expensed as incurred. Capital assets are defined as those assets with an initial, individual cost of $5,000 or more and a useful life of more than 1 year. Major renewals and betterments are treated as capital additions. Depreciation is provided using the straight-line method over the estimated useful life of the respective assets. The major categories of depreciable capital assets in service and their estimated useful lives are as follows: Buildings and Guideway Structures 50 years; Transportation and other equipment 3 – 30 years.

Materials and Supplies

Materials and Supplies: Inventories are valued at the lower of cost, determined using an average cost method, or market. Inventories consist primarily of maintenance materials and supplies for rolling stock and other transportation equipment.

DTPW tracks and prepares a monthly operations report with various performance measurements and maintains close track of all vehicle use and repairs. A method to value assets should be introduced to help implement an asset valuation process as part of asset management at DTPW. The use of the Government Accounting Standards Board Statement No. 34 (GASB-34) offers 2 alternatives to choose from to account for infrastructure assets.

(1) Modified Approach: Under this approach, GASB Statement No. 34, paragraph 23, states that infrastructure assets that are part of a network or a subsystem of a network are not required to be depreciated as long as two requirements are met. Under the modified approach, infrastructure assets are required to be capitalized. However, they do not have to be depreciated if the agency meets two requirements: first, the assets area managed using an asset system with up-to-date inventory, condition level assessments and annual amount required to maintain the assets; second, those assets be maintained above condition. All expenditures made to maintain these assets under the modified approach would have to be expensed in the period incurred, while expenditures for additions and improvements would have to be capitalized. Per GASB Statement No. 34, paragraph

25, additions or improvements increase the capacity or efficiency of the infrastructure assets rather than preserve the useful life of the assets.

(2) Depreciation: The second alternative is to depreciate the capitalized infrastructure assets. Also, if a government no longer meets the requirements for using the Modified Approach, then the infrastructure assets must be depreciated over their estimated useful lives. The depreciation can be calculated for a class of assets, a network of assets, a subsystem of a network, or individual assets. To determine estimated useful lives, a government can use general guidelines obtained from professional or industry organizations, information for comparable assets of other governments, or internal information.

As part of the Plan, DTPW will evaluate both approaches and determine which best fits the current data being documented for all assets and which approach carries the most cost effective implementation.

The use of this approach will provide DTPW with an industry standard in the evaluation of its assets that can also serve to draw comparisons from similar systems using these standards and further evaluate its assets.

Funding Sources Overview

Miami-Dade Transit's operations are supported by a range of federal, state, local, and directly-generated revenue streams. The most recent MDT10Ahead update shows the projected operating revenues for FY 2016 by major category that total over $678 million.

Revenue categories listed in the update are described below:

- Fare Revenues: DTPW currently recovers approximately 25 percent (25%) of its operating expenses from fare revenue.
- Other Operating Revenues: These operating revenues include items such as advertising.
- Federal Grants: Federal grants take the form of a Formula Grant for Preventative Maintenance to assist transit agencies with keeping equipment in a state of good repair.
- State Block Grants: These revenues were developed by the Florida Legislature to provide a stable source of funding for public transit. The grants are distributed to all eligible Florida transit providers on a formula basis.
- Other State Operating Support: This category includes funds from the Urban Corridor Program and Transportation Disadvantaged (TD) program. The Urban Corridor program provides funding for projects that relieve congestion or assist with other mobility issues within a particular corridor. The Transportation Disadvantaged programs provide funding to assist TD populations which include persons with physical or mental disabilities, have low incomes, or are older individuals who are unable to transport themselves or purchase transportation.
- PTP Surtax: The People's Transportation Plan provides for sales tax revenue to support public transit and roadway infrastructure improvements.
- County General Funds: Miami-Dade County supplies DTPW with funding each year from its general fund.
- Additional Local Revenue or Service Cuts: DTPW may receive funds from other local sources in a given year or cut service to balance the budget.
- Local Option Gas Tax: DTPW receives three cents for every local gallon of gasoline sold within the County.

- **Interest and Capital Reimbursements**: Sometimes DTPW receives reimbursement from other governmental entities on joint purchases.

Projected Operating Revenues

Future revenue growth is projected to fluctuate with a low level of tax revenue growth resulting from the existing state of the economy. However, in years without any major policy changes, total available funding for DTPW is expected to grow at a rate of slightly over three percent (3%) annually. In addition, DTPW does foresee a separate major policy action related to funding during FY 2016 – FY 2025 to include:

Regular programmed fare increases: The Pro Forma projects a 25 cent increase in the base fare (from its current level of $2.25 to $2.50) in FY 2018, with another 25 cent increase levied in 2021. These increases have the effect of increasing the overall revenue growth rate in those years. These programmed fare increases which occur every 4 years are determined by policies approved by the Miami-Dade County Board of County Commissioners that authorize DTPW to implement regular fare increases to keep pace with inflation.

Planned Capital Expenditures

DTPW's planned capital expenditures for the period FY 2016 to FY 2025 are summarized in **Table 8**. Large capital projects or ongoing projects during FY 2016 – FY 2025 (such as bus acquisition and replacement), may be funded by a combination of debt proceeds and cash.

Many of the projects listed in the following table, such as the rail vehicle replacement, will greatly improve the quality and longevity of the existing DTPW transit system. However, most of the projects in **Table 9** are scheduled for completion on or before 2020. After 2020, the capital program consists only of scheduled bus acquisitions and the Infrastructure Renewal Program (IRP), which is the agency's long-term projection of future rehabilitation and replacement needs throughout the DTPW system.

Table 8 - Projected "Cash" Revenue Sources for Capital Projects (FY 2016 - FY 2025) ($000s)

Funding Source	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 21-25	Total
FTA Bus & Bus Facility Formula	$2,377	$2,377	$2,377	$2,377	$2,377	$2,377	**$14,262**
FTA Section/ Formula Grant	$19,228	$16,096	$20,616	$16,477	$2,170	$1,000	**$75,587**
FDOT Funds	$4,003	$4,991	$1,348	$0	$0	$0	**$10,342**
Lease Financing-County Bonds/Debt	$20,000	$20,000	$20,000	$20,000	$20,000	$0	**$100,000**
People's Transportation Plan Bond Program	$110,163	$152,505	$98,613	$34,646	$25,721	$11,873	**$433,521**
Capital Improvement Local Option Gas Tax	$724	$184	$0	$0	$0	$0	**$908**
Total:	$156,495	$196,153	$142,954	$73,500	$50,268	$15,250	$634,620
Expenditure Commitments	$156,495	$196,153	$142,954	$73,500	$50,268	$15,250	$634,620
Capital Funding Surplus/(Deficit)	$0	$0	$0	$0	$0	$0	$0

Source: Miami-Dade Transit Capital Book, F2 (revenue) and F5 (expense) Reports

Summary of Capital Plan

Revenue sources for capital projects are presented in **Table 9** for the 10 year period from FY 2016 to FY 2025. All projected capital expenditures could be funded with either PTP surtax debt proceeds or on a pay-as-you-go basis, depending on the availability of funds. This capital budget is achieved by aggressive borrowing against the PTP surtax (ultimately requiring the inclusion of additional LOGT and general funds in DTPW's budget, as described above, to guarantee debt coverage).

This capital budget is based upon the budgetary assumptions applied within the FY 2015 Pro Forma and these assumptions are subject to change correspondingly in line with the finalization of the County's Budget and Capital Operating Plan resulting in a different budgetary outcome than presented in this TDP.

Table 9 - DTPW Capital Budget (FY 2016 – FY 2025) ($000s))

Project	FY 15-16		FY 16-17		FY 17-18		FY 18-19		FY 19-20		FYs 21-25				
	PTP	Other	PTP	Other	PTP	Other	PTP	Other	PTP	Other	PTP	Other	Total	PTP	Other
Transit Operations SYSTEM (TOS) Replacement Project	$0	$205	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$205**	**$0**	**$205**
Bus and Bus Facilities	$10	$2,450	$0	$2,377	$0	$2,377	$0	$2,377	$0	$2,377	$0	$2,377	**$14,345**	**$10**	**$14,335**
Park and Ride Quail Roost	$0	$60	$0	$1,246	$0	$0	$0	$0	$0	$0	$0	$0	**$1,306**	**$0**	**$1,306**
Dadeland North Metrorail - Elevators	$60	$60	$550	$550	$79	$78	$0	$0	$0	$0	$0	$0	**$1,377**	**$689**	**$688**
Busway ADA Improvements	$0	$1,120	$0	$275	$0	$0	$0	$0	$0	$0	$0	$0	**$1,395**	**$0**	**$1,395**
State of Good Repair Projects	$0	$1,000	$0	$1,000	$0	$1,000	$0	$1,000	$0	$1,000	$0	$1,000	**$6,000**	**$0**	**$6,000**
Bus CAD/AVL	$0	$0	$0	$0	$578	$0	$0	$0	$0	$0	$0	$0	**$578**	**$578**	**$0**
High-Cycle Switch Logic Control Cabinets	$2,750	$0	$2,750	$0	$2,750	$0	$0	$0	$0	$0	$0	$0	**$8,250**	**$8,250**	**$0**
Bus Replacement	$10,000	$20,000	$10,000	$20,000	$10,000	$20,000	$10,000	$20,000	$10,000	$20,000	$0	$0	**$150,000**	**$50,000**	**$100,000**
Metromover Improvements	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$0	$0	$0	$0	**$56,000**	**$28,000**	**$28,000**
Pedestrian Overpass - University Metrorail Station	$0	$2,468	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$2,468**	**$0**	**$2,468**
Metrorail Maintenance Vehicle Lifts	$2,700	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$2,700**	**$2,700**	**$0**
Kendall Enhanced Bus Service	$510	$510	$177	$176	$0	$0	$0	$0	$0	$0	$0	$0	**$1,373**	**$687**	**$686**
Mover Fiber Replacement	$0	$77	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$77**	**$0**	**$77**
Traction Power Rectifier Transformer Replacement for Rail	$0	$2,500	$0	$2,500	$0	$2,500	$0	$2,500	$0	$0	$0	$0	**$10,000**	**$0**	**$10,000**
Metrorail LED Lighting	$0	$942	$0	$942	$0	$942	$0	$0	$0	$0	$0	$0	**$2,826**	**$0**	**$2,826**
Infrastructure Renewal Plan	$12,500	$0	$12,500	$0	$12,500	$0	$12,500	$0	$12,500	$0	$0	$0	**$62,500**	**$62,500**	**$0**
Metrorail and Metromover Traction Power Cable and Transformer Replacement	$0	$2,129	$0	$2,129	$0	$2,129	$0	$2,129	$0	$0	$0	$0	**$8,516**	**$0**	**$8,516**
SR 836 Express Bus	$1,432	$500	$4,746	$4,155	$4,113	$7,155	$1,004	$2,683	$0	$0	$0	$0	**$25,788**	**$11,295**	**$14,493**
Northeast Transit Hub Enhancements	$330	$330	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$660**	**$330**	**$330**
NW 27 Ave Enhanced Bus Service	$2,391	$3,271	$2,484	$0	$2,484	$0	$2,484	$0	$2,484	$0	$0	$0	**$15,598**	**$12,327**	**$3,271**
Track and Guideway Rehabilitation	$6,922	$0	$2,634	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$9,556**	**$9,556**	**$0**
Associated Transportation Improvements	$0	$489	$0	$494	$0	$499	$0	$504	$0	$509	$0	$0	**$2,495**	**$0**	**$2,495**
Transportation Security Projects	$0	$600	$0	$630	$0	$661	$0	$661	$0	$661	$0	$0	**$3,213**	**$0**	**$3,213**
Park and Ride Lot Kendall Dr (SW 127 Ave)	$293	$621	$82	$174	$0	$0	$0	$0	$0	$0	$0	$0	**$1,170**	**$375**	**$795**
Rail Vehicle Replacement	$63,265	$0	$109,582	$0	$59,109	$0	$1,658	$0	$737	$0	$11,873	$0	**$246,224**	**$246,224**	**$0**
SUBTOTAL	**$110,163**	**$46,332**	**$152,505**	**$43,648**	**$98,613**	**$44,341**	**$34,646**	**$38,854**	**$25,721**	**$24,547**	**$11,873**	**$3,377**	**$634,620**	**$433,521**	**$201,099**

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9.0 INVESTMENT PLAN

DTPW has an Infrastructure Replacement Program (IRP) to evaluate asset system needs as part of the investment strategies and prioritization of projects for asset management. In addition, a 40 Year Pro-Forma is used to evaluate potential financial constraints and long-term programs. The Ten Year FY2016-FY2025 MDT10Ahead Implementation Plan Tables present the transit project items' cost and status as of December 2014, with page references to the MDT10Ahead 2014 Major Update page for detailed project descriptions. DTPW's Funded, Partially Funded, and Unfunded Projects are listed as part of this report. Information highlighting changes in scope, timing, budget or completion versus the 2014 Major Update is also provided.

The investment plan looks at sources of revenue (current and projected), expenditures, operational (operation and maintenance), and capital (additions, improvements, rehabilitation, etc.) to satisfy asset sustainability needs and to meet projected demand. A narrative in the investment plan will need to describe and consider assumptions relating to inflation, long-term economic and demographic trends, and other related factors in relation to the Plan.

Revenue Sources

The investment plan identifies and discusses all the sources of revenue available, these sources tend to include:

- Motor fuel tax receipts;
- Federal-aid transit funds;
- Various state fees, such as drivers' license and vehicle-registration fees;
- Bond income;
- Special fees such as development-impact fees;
- General revenue transfers, although these usually are rare;
- Other sources such as on-time appropriations or income sources unique to the Agency;
- State fuel tax revenue that increases or decreases based on the economy, increasing fuel economy standards, and increasing use of transit or personal transportation;
- The impact of the addition or removal of critical sources, such as fee increases or repeals;
- The magnitude of income dependent upon bonding, which may or may not be sustainable;
- The one-time impact of the American Recovery and Reinvestment Act (ARRA) funds which are unlikely to be repeated; and
- Changes in the availability of Federal-aid funds.

Forecasting Future Revenue

A discussion of the Agency's best estimates of future revenue, by income source, for the next decade provides the future plan and helps to set the challenges and address expectations.

Forecasting Expenditures

The forecasting of expenses is as important as forecasting the revenues. The expenditure part of a investment plan draws from the analysis section of the asset management plan. It reports upon desired and forecasted levels of expenditures by program areas. Importantly, it shows the gaps, if any, between the desired and forecasted levels of expenditures.

Asset Management Investment Strategies

Some of DTPW's current investment strategies with respect to asset management include:

- 10-Year Bus Replacement Plan which is based on historical information gathered from Operations & Management of bus issues after their initial 10-year period of service.
- The Infrastructure Replacement Program (IRP) which focuses on existing assets.
- The Adopted Capital Budget and 40 Year Pro-Forma serve as a high-level fund allocation document.
- MDT10Ahead as previously discussed provides a strategic long-term vision of the agency as it includes a financial plan highlighting financial resources such as income and expenses.
- Other programs include the Transportation Improvement Program (TIP), the Citizens Independent Transportation Trust (CITT), and the Yearly Bond Analysis.

Stakeholders involved in the development of these plans and strategies include internal and external resources. Internal input for these investment strategies is provided by: DTPW Director, Deputy Director of Operations, Deputy Director of Engineering, Planning, & Development, Assistant Director of Finance, Safety & Security, Quality Assurance, Capital and Operating Budget Mangers, and the Grants Manager. While external stakeholders who also provide input consist of: Office of Management and Budget (OMB), Citizens Independent Transportation Trust (CITT), Transit and Mobility Services Committee (TMSC), Board of County Commissioners (BCC), Transportation Planning Organization (TPO), Audit Management Services (AMS), and the Office of Commission Audit (OCA).

Prioritizing Investments

In accordance with MAP-21, investment prioritization requirements provide strategic guidance for improving the condition of assets through both consideration of life-cycle costs and itemization of the actions necessary to achieve desired asset conditions.

The transit provider would be required to base its approach on the policies, goals, objectives, and strategies identified in their Plan and ensure that safety is given due consideration. Investment prioritization in a Plan should include the following:

a. The Plan must include an investment prioritization that identifies projects to improve or maintain the state of good repair of capital assets over the horizon period of the Plan.
b. Projects to improve or maintain the state of good repair of capital assets must be ranked in order of priority and the year in which they are anticipated to be carried out.
c. Ranking of projects in the investment prioritization must be established on the basis of the transit asset management policy and strategies identified in the Plan.
d. The investment prioritization must give due consideration to those projects for state of good repair that pose an identified unacceptable safety risk.
e. The investment prioritization must take into consideration an estimate of funding levels and funding sources that are reasonably expected to be available in each fiscal year during the Plan horizon period.
f. The investment prioritization must take into consideration requirements under 49 CFR 37.161 and 37.163 concerning maintenance of accessible features, as well as requirements under 49 CFR 37.43 concerning alteration of transportation facilities.

When developing investment priorities, DTPW accounts for various factors, including revenue trends, federal and state law, level-of-service provided by the system, and public input. Over the next 10 years, DTPW's priorities are described in its Ten Year Implementation Plan FY2016-FY2025 (MDT10Ahead).

Most asset management projects are currently addressed by the IRP which meets once a year to prioritize and assign funding to infrastructure projects for existing facilities or asset modes. The purpose of the IRP process is to identify, evaluate, prioritize, and program capital improvement projects that are necessary in order to maintain the existing transit system in a state of good repair. Project commitments are based on the IRP evaluation and prioritization process. Projects are typically prioritized based on life-safety concerns and minimizing life-cycle costs.

However, the Project Prioritization and Budget Approval Process includes the following steps:

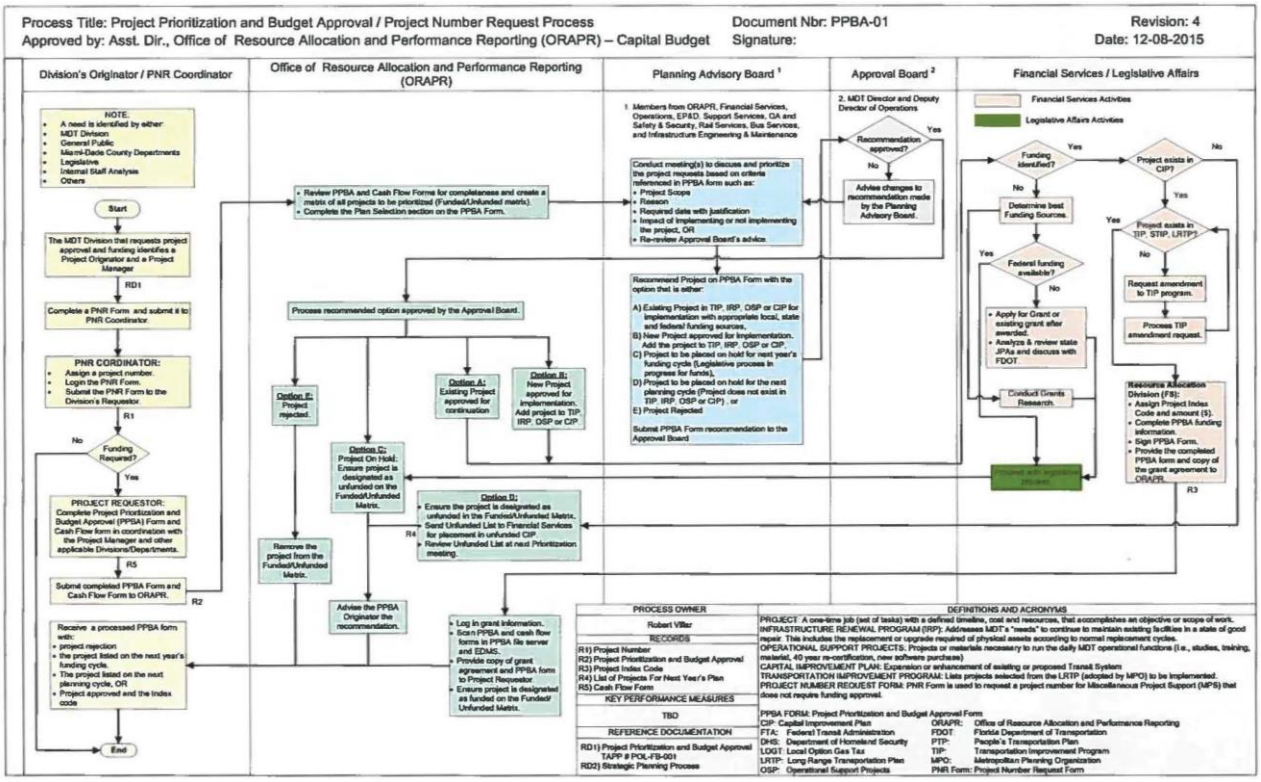
(1) Receive and log in the Project Priority Budget Approval (PPBA)/Cash Flow.
(2) Review PPBA/Cash Flow for completeness.
(3) Confirm project existence in the CIP, TIP, IRP, and OSP.
(4) Prioritize the projects according to established criteria.
    a. Review PPBA form to determine if the disposition is in TIP, IRP OSP or CIP for implementation with appropriate local, state, and federal funding sources;
    b. New Project approved for implementation, add the TIP, IRP, OSP, or CIP;
    c. Project to be place on hold for next year's funding cycle (legislative process in progress of funds); and
    d. Project to be place on hold for next planning cycle (Project does not exist in TIP, IRP, OSP or CIP) or rejected.

(5) Prepare form to determine available funding services and amounts (i.e., PTP, FTA, FDOT, local Govt., etc.)
    a. Funding has been approved and available for payment of project cost
(6) Provide the Project Manager (PM) with Index Codes via approved PPBA/Cash Flow documentation.
(7) Projects that are placed on hold or rejected for current funding will be placed on an unfunded project list for future consideration.
    a) Present the PPBA to the advisory board for review and approval as necessary.

The advisory board members may include the Director, Deputy Director of Administration, Deputy Director of Operations, Deputy Director of Engineering, Planning, & Development, Assistant Director of Finance, Safety & Security, and Quality Assurance.

Throughout the project, the division works with the Project Manager until close-out to monitor project cost control and reconcile project cost. **Figure 17**, illustrates the process flow previously described.

Figure 17 – Project Prioritization and Budget Approval Flow Chart



DTPW can only fund a small portion of the immense backlog of projects annually, given its financial operating constraints. As mentioned, each year all capital project requests, including those addressing SGR, are prioritized and submitted by each Division to the IRP for consideration as part of the annual Capital Investment Program (CIP).

To determine which projects receive funding, each submission is scored against a predetermined criteria. The entire list of projects, with their scores and associated costs, is reviewed by management to determine which ones will receive funding.

Although safety and life-cycle costs are given strong consideration, additional factors such as health, environment, SGR, operational impact, cost benefit and legal commitments should be considered. The weighted consideration of all these issues should enhance the ability to prioritize the funding of specific asset renewal or replacement projects in the constrained funding environments.

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10.0 IMPROVEMENT PLAN

This Plan identifies DTPW's priorities for future improvements to its asset management program and assets with special focus on risk and life-cycle costs. Success will be largely determined by the extent to which the principles and initiatives outlined in this document are incorporated, along with existing plans, into DTPW's business practices.

DTPW has established an Asset Management Project Team also referred to in this document as the Asset Management Team (AMT) responsible for developing, updating, and monitoring the enhancements of the Plan as well as other asset management planning initiatives. As a result of the Plans process and other parallel asset management initiatives, several enhancements are currently underway. This includes collection of better maintenance data to improve life-cycle costs for individual assets, integration of additional asset classes into an Enterprise Asset Management System (EAMS), and use of additional analytical tools to achieve targeted goals.

Recognizing the difficult circumstances transportation agencies are facing in managing an aging an underfunded transportation system, there is still much that can and will be done. The TAMP includes an asset management improvement plan that addresses the following activities:

- Methodologies to account for economic benefits of a proposed transportation investment;
- A consistent set of performance measures and Cost Benefit Analysis;
- Agency-wide risk management;
- New program-management software to track accomplishments and performance;
- Comparable performance measures across asset modes to allow direct comparison of condition trends between assets, and extend these measures to include safety and sustainability;
- Self-Assessment processes for periodical analysis of gaps to determine agency asset management maturity level and focus on low maturity areas;
- EAMS to expand the "systems not projects" approach to include safety and mobility needs; Expand EAMS reporting to account for all asset modes and integrate it to asset management practices;
- Inform City, County and other Local Government officials on the topic of Asset Management;
- An Enterprise Asset Management Program (EAMP) with all asset modes and cross-asset trade-off modules;
- Life-Cycle management practices and tools for all asset modes to inform decision-making;
- Performance reporting capabilities with asset management strategies and goals;
- Procurement processes to obtain timely response for services and equipment; and
- Communication between the Divisions and Budget Department to better determine budget needs and use of funds; a centralized, automated system to compile and process all communications related to complaints, and document response.

These initiatives will be prioritized, resourced, and tracked to completion through DTPW's asset management business structure. They will advance asset management processes and enable DTPW to manage the transportation system as effectively as possible.

Opportunities, Challenges and Next Steps

DTPW's Asset Management Plan is intended to be a living document that will be updated periodically and will be influenced by new policies and programs. However, there are several items which have been identified as opportunities and/or challenges that could impact the Agency's next steps and require mid-term revisions of the Plan.

Opportunities

- Continued expansion of EAMS to include all asset modes, the system would prove to be a powerful tool in implementing the Plan and serving as a central database for inventory and asset condition.
- Transition from a "reactive" to a "proactive" approach regarding asset management.
- Integration of risk management agency-wide as part of asset management.
- Expand the existing asset management practices.
- DTPW already provides performance measurements as required by the National Transit Database (NTD), there is an existing structure of assessment that can be further developed to meet the growing asset management requirements.
- Develop cross-asset trade-off optimization scenarios.
- Develop more sophisticated cost-benefit models that enable decision-makers to assess multiple treatment and investment scenarios.
- Continue to perform regular self-assessments to evaluate asset management maturity levels.

Challenges

- Integrating EAMS to all asset modes, presents a challenge in its data collection which, given the size of the transit system can prove monumental. The resources required might not be available to gather all the information needed to implement asset management practices in a desired period. Identifying the resources and availability of those familiar and most qualified to properly document the necessary data represents a challenge.
- DTPW interacts with various organizations FDOT, TPOs, CITTs and others, it will be a challenge to extend the discussion on asset management and how it may alter the existing processes.
- The acclimation of staff and current systems to new processes can be challenging transition which may impact implementation of new asset management practices resulting from the Plan.
- Sharing of knowledge of the transit system represents a challenge as new staff with limited familiarity about the system enter DTPW, and senior staff with extensive understanding of the system retire. The passing of that knowledge needs to be addressed so operation of the system remains efficient.
- Identification of funding to implement asset management practices.
- Training of staff on asset management practices.
- Development or identification of tools to execute proposed asset management related calculations that may inform decision-making agency-wide.
- Integrating asset management practices within the current workload of staff at DTPW.
- Integration of risk management agency-wide.
- Integration of Procurement into asset management practices to account for acquisition processes and its impact to asset management. A review of the agency or county procurement process as to its alignment with asset management.

Next Steps

Below defines next steps that DTPW intend to take in order to improve its asset management program:

Refine the Balance of Investments

Continue to refine the distribution of available resources between Preventive & Corrective Maintenance vs. System Renewal and Improvements.

Improve Condition Modeling and Forecasting

With the anticipated implementation of its Enterprise Asset Management System, DTPW will be able to consider multiple decision trees that vary based on fiscal environment, treatment strategies and program objectives. DTPW will be able to use these decision trees to create different scenarios that can be used to support the resource allocation and programming processes.

Improve Asset What-if Scenarios

With the implementation of its Enterprise Asset Management System, DTPW will be able to combine asset scenarios into "super scenarios" where various super scenarios can be compared for a given funding level to determine which will provide the optimal outcome.

Assess Non-Condition Related Trade-Off Impacts

Additional factors beyond condition outcomes need to be systematically considered in establishing an ideal program balance. Factors which indirectly impact assets such as safety appurtenances, economic impacts to businesses, future large scale developments, mobility and congestion, and any other quantifiable impacts should be considered in making trade-off decisions. DTPW will evaluate these options to determine which can become systematically measured and used in decision making.

Develop Sustainability Indices

An Asset Sustainability Index as well as indices for vehicle sustainability, facility sustainability, and maintenance sustainability can help to understand and communicate the impact of DTPW's asset management program.

Improve Program Balance for Optimal Sustainability

The primary goal of the current asset program is to preserve the condition of as much of the system as possible. DTPW will continue to investigate options for assessing additional impacts of programming decisions such as social, economic, and environmental consequences of programming decisions to create a transportation system that is sustainable from not just the perspective of the physical asset, but also the activities that the assets support.

Integrate Procurement

There is currently a need to improve procurement processes to obtain materials in a timely manner so as to be able to effectively provide maintenance to assets. There is a strong disconnect between the procurement process and the asset modes need.

Enhance Risk Management

The key projected risks included: climate change, making data-driven decisions, organizational issues, program balance, funding, demographic changes and understanding what key corridors are for critical transportation purposes like commerce, tourism, commuting, emergency response and evacuation, pedestrian and bike use, and mass transit. DTPW will dedicate resources to further develop the Risk Register, Risk Prioritization and Mitigation Plans.

TRANSIT ADMINISTRATIVE POLICY (TAP)

No: POL-AD-008
(Ref POL-AD-001 for Doc Source No.)

Issue Date: 05/26/2017

Revision: 0

Posted by: Information Technology Services

Section: Performance Analysis

Title: Transit Asset Management

Date Posted:

Carlos De La Torre, Chief, Performance and Materials Management — Date: 6/2/17

*Note: Reference TAP Policy POL-AD-001 (Appendix – A) for the Document Source Number and assign TAP No. to this document. See the following example: (Rail Services: POL-RS-001)

REVIEWER SECTION:

Lazaro Palenzuela, Chief, Quality Assurance Division — Date: 6/2/17

Jennifer Walker, Chief, Human Resources — Date: 6/21/17

Ruben Lejra, Chief, Paratransit Administration & Contracted Services — Date: 6/23/17

Robert McClellan, Chief, Infrastructure Engineering & Maintenance — Date: 6/26/17

Eric Muntan, Chief, Office of Safety & Security — Date: 7/5/17

Albert Hernandez, Assistant Director, Transit Engineering — Date: 7/19/17

Derrick J. Gordon, Assistant Director, Bus Services — Date: 7-12-17

Jerry Blackman, Assistant Director, Rail Services — Date: 7/25/17

Robert Villar, Assistant Director, Financial Services — Date: 8/9/17

Steve Feil, Deputy Director, Operations — Date: 8/20/17

APPROVAL SECTION:

Alice N. Bravo, P.E., Director, DTPW — Date: 8-10-17

TRANSIT ADMINISTRATIVE POLICY (TAP)	No: POL-AD-008 *(Ref POL-AD-001 for Doc Source No.)*
Issue Date: 05/26/2017 Revision: 0 Posted by: Information Technology Services	Section: Performance Analysis Title: Transit Asset Management Date Posted:

Policy Change Justification

(Give a brief description of the reason for change)

Original issuance of the policy

Revisions

The Policy is a dynamic document. As major revisions occur, the revisions and/or the entire policy will be distributed. For minor revisions, only the affected pages will be issued. Upon receipt, previous revisions of the policy shall be destroyed. Include all policies that are superseded in the description of revision block below.

Revision	Approval Date	Pages	Description of Revision
Rev. 0		New Document	Initial Issue

1.0 Authority

Director, Miami-Dade County Department of Transportation and Public Works (DTPW)

2.0 Purpose

To establish a Transit Asset Management (TAM) Program for continual improvement, achieve and maintain a State of Good Repair (SGR), improve agency wide reliability, set performance management expectations for life-cycle management plans, investment prioritization and optimize use of funds across an assets life-cycle in compliance with federal reporting requirements.

3.0 Policy & Scope

This policy facilitates the effective management, allocation and utilization of resources, control and maintenance of assets as well as cost effectively extending the useful life of equipment, fleet, infrastructure and facilities. To ensure compliance with a strategic and systematic process of operating, maintaining and improving capital assets effectively through the entire life-cycle.

4.0 Cross Referenced Documents

Type	Number	Title
Federal Register	Vol. 81, No. 155	Public Transportation Safety Program
Federal Register	Vol. 81, No. 143	Transit Asset Management Final Rule
Guidebook	Publication No. FHWA-HIF-10-023	American Association of State Highway and Transportation Officials Transportation Asset Management Guide
Guidebook	N/A	Federal Transportation Administration Facility Condition Assessment
Guidebook	N/A	Guideway Performance Restriction Calculation
Guidebook	N/A	National Transit Database Asset Inventory Module Reporting Manual
Guidebook	N/A	Publicly Available Specification 55:2008
Guidebook	(FTA Report No. 0098)	Federal Transportation Administration Transit Asset Management Guide
Guidebook	N/A	Transit Asset Management Plan
Public Law	P.L. No. 114-94	Fixing America's Surface Transportation Act
Public Law	P.L. No. 112-141	Moving Ahead for Progress in the 21st Century Act
Transit Administrative Policy	No: POL-SS-006	Electrical Safety Policy
Transit Safety Policy	No: 80-	Personal Protective Equipment Policy
Transit Administrative Policy	No: POL-AD-002	Project Prioritization and Budget Approval Policy
Transit Administrative Policy	No: POL-HR-002	Training Coordination Policy

5.0 Definitions

Term	Definition
Accountable Executive	Single, identifiable person ultimately responsible for carrying out the safety management system of a public transportation agency; transit asset management practices; and control or direction over the human and capital resources needed to develop and maintain both the agency's public transportation agency safety plan and transit asset management plan.
Administrative Facilities	The offices which house the executive management and supporting activities for overall transit operations such as accounting, finance, engineering, legal, safety, security, customer services, scheduling and planning. This also includes separate buildings for customer information or ticket sales, which are owned by the transit agency and which are not a part of passenger stations.
Agency Maturity GAP Analysis	A process or report designed to obtain the current level of knowledge and understanding or baseline, of asset management. Pinpoints deviation between the current and desired states in asset management maturity.
Assessment Area	A broad category of a key transportation asset management area for which a strategic assessment is to be conducted. These are referred to as *Level 1* items within a Maturity Scale Survey definition.
Asset Category	A grouping of asset classes, equipment, rolling stock, infrastructure, and facilities.
Asset Classes	A subgroup of capital assets within an asset category.
Asset Inventory	A register or repository of capital assets, and information about those assets.
Asset Management	Strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired State of Good Repair over the life-cycle of the assets at minimum practicable costs.
Asset Management Risk Register	A listing of key risks and action items that independently identify and characterize project risks, provide a description of the potential risks, their qualitatively-evaluated potential consequences, and the likelihood of each risk's occurrence.
Capital Asset	Property of any kind held by an organization, whether connected with the business or profession or not connected. It includes all kinds of property, movable or not movable, tangible or intangible, fixed or circulated.
Capital Improvement Program (CIP)	Expansion or enhancement of existing or proposed Transit System.

Term	Definition
Certification	Formal procedure by which an accredited or authorized person or agency assesses and verifies (and attests in writing by issuing a certificate) the attributes, characteristics, quality, qualification, or status of individuals or organizations, goods or services, procedures or processes, or events or situations, in accordance with established requirements or standards.
Condition Assessment	The process of inspecting the asset to collect data that are used to measure condition and performance. The condition assessment process involves regular inspections that evaluate an asset's visual and physical conditions (such as structural issues or faulty components). This process addresses risk, ensures that the asset can meet its level of service requirements, and provides information from which assets can be managed across their life-cycle. (a) Outlines condition inspection and performance measurement approach for each class and (b) Address risk and ensures assets can meet their performance requirements.
Decision Support Tool	A tool, software or mechanism which demonstrates a simple, quantifiable, agreed-upon prioritization criteria that demonstrate the link between capital investments and agency outcomes. These criteria will provide a transparent, consistent way to evaluate state-of-good repair needs across all asset classes.
Equipment	Tangible property (other than land or buildings) that is used in the operations of a business. Examples of equipment include devices, machines, tools, and vehicles.
Evaluation Plan	A document to track and assess the results of the enhancements throughout the life of a program. It is a living document that should be referred to and updated on a regular basis.
GAP Analysis	A technique that organizations use to determine what steps need to be taken to move from its current state to its desired future state. The Gap Analysis consists of (a) listing of characteristic factors (such as attributes, competencies, performance levels) of the present situation ("what is"), (b) listing factors needed to achieve future objectives ("what should be"), and then (c) highlighting the gaps that exist and need to be filled. Gap Analysis forces an organization to reflect on who it is and ask who they want to be in the future.
Horizon Period	The fixed period of time (between certification) when a transit provider will evaluate the performance of its Transit Asset Management Program.
Implementation Strategy	A plan outlining the activities necessary to achieve the asset management goals. The plan outlines a schedule with roles, responsibilities, accountabilities, tasks, and dependencies.

Term	Definition
Infrastructure	The underlying framework or structures that support a public transportation system.
Infrastructure Renewal Program (IRP)	Addresses the departments needs to continue to maintain existing facilities in a state of good repair. The refurbishment or replacement of all assets according to normal replacement cycles as defined by industry standards.
Investment Prioritization	A structured and consistent activity that aims to analyze the current operational environment to identify any projects running in parallel within the same portfolio, develop a scoring model including ranking criteria, and apply that model to prioritizing the projects in order to determine the execution order that ensures the highest efficiency of the overall portfolio.
Level of Service	Describes what an asset is intended to deliver to its users matching expectations. It is a qualitative or quantitative measure of how well an asset is delivering a needed service.
Maintenance Management	The management of maintenance activities (activities that are performed on asset, cost of maintenance).
Maintenance Facilities	The garages and buildings where routine maintenance and repairs are performed and, where engine and other major unit rebuilds are performed.
Moving Ahead for Progress in the 21st Century Act (MAP-21)	Federal Law signed July 6, 2012 - A streamlined, performance-based, and multimodal program to address the many challenges facing the U.S. transportation system including improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery.
Passenger Stations	A designated location, stop, or terminal where a patron may board or disembark from any mode of transportation.
Performance Measures	An expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets.
Performance Targets	A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the Federal Transit Administration.
Program Delivery Committee (PDC)	A Committee, headed by the Accountable Executive consisting of executive-level and other key staff, providing a strategic vision and executive leadership for asset management.

Term	Definition
Publicly Available Specification (PAS)	It enables the integration of all aspects of the asset life-cycle: from the first recognition of a need to design, acquisition, construction, commissioning, utilization or operation, maintenance, renewal, modification and/or ultimate disposal.
Quality Assurance	A program for the systematic monitoring and evaluation of the various aspects of a project, service, or facility to ensure that standards of quality are being met.
Rolling Stock	A vehicle used to provide revenue or non-revenue services. This asset category can include heavy rail, buses, paratransit vehicles, service vehicles, supervisor vehicles and light rail vehicles (automated guideway).
State of Good Repair (SGR)	The condition in which a capital asset is able to operate at a full level of performance: (a) ability to perform designed function; (b) does not pose a known unacceptable safety risk; and (c) the life-cycle investments have been met or recovered.
Transit Economic Requirements Model (TERM)	Federal Transit Administration's Capital Needs Analysis Tool used to assess the current physical condition and future investment needs of the nation's transit assets/operators.
Transit Economic Requirements Model Scale	A scale comprised of a 1-5 rating; 5 being like new, 3 being around mid-life, and anything rated less than 3 is not in a SGR.
Tier I Provider	A recipient that owns, operates, or manages (a) one hundred and one (101) or more vehicles in revenue service during peak regular service across all fixed route modes or in any one non-fixed route mode, or (b) rail transit.
Tier II Provider	A recipient that owns, operates, or manages (a) one hundred (100) or fewer vehicles in revenue service during peak regular service across all fixed route modes or in any one non-fixed route mode, or (b) a sub recipient under the 5311 Rural Area Formula Program, (c) or any American Indian Tribe.
Transit Asset Management (TAM)	The strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life-cycles, for the purpose of providing safe, cost-effective, and reliable public transportation.
Transportation Improvement Plan (TIP)	A list of upcoming transportation projects—covering a period of at least four (4) years. The plan is developed in cooperation with the state and public transit providers. The plan includes capital and non-capital surface transportation projects, bicycle and pedestrian facilities and other transportation enhancements, Federal Lands Highway projects, and safety projects included in the State's Strategic Highway Safety Plan, all regionally significant projects receiving Federal Highway Administration

Term	Definition
	or Federal Transportation Administration funds, or where FHWA or FTA approval is required, in addition to non-federally funded projects that are consistent with the Metropolitan Transportation Plan. The TIP must be fiscally constrained.
Transportation Planning Organization (TPO)	A Transportation Planning Organization (Formerly Metropolitan Planning Organization MPO) is a federally mandated and federally funded transportation policy-making organization in the United States that is made up of representatives from local governmental transportation authorities.
Useful Life	The Federal financial interest in a capital asset, expected life cycle of a capital asset or the acceptable period of use in service determined by FTA.
Useful Life Benchmark (ULB)	The expected life-cycle or acceptable period of use in service for a capital asset, as determined by a transit provider, or the default benchmark provided by FTA. Useful Life Benchmark is NOT the same as the useful life for FTA grant programs.

6.0 Roles & Responsibilities

Individual	Roles & Responsibilities
Accountable Executive	• Identify Program Delivery Committee • Approve Agency Maturity GAP Analysis • Approve Asset Management Policies • Approve Set Performance Targets • Present and acquire approval of all required documentation • Approve additional resources, if required • Approve and certify Transit Asset Management Plan • Approve Investment Prioritization Strategies • Approve GAP Analysis Report • Approve Evaluation Plan
Program Delivery Committee (PDC)	• Provide strategic vision and executive leadership of Transit Asset Management Program • Set expectations for Comprehensive Program updates • Set expectations for Transportation Improvement Program updates • Review and approve Asset Management Policies • Review and approve Agency Maturity GAP Analysis • Review and approve Condition Assessment Program • Review and approve GAP Analysis Report • Review and approve Transit Asset Management Plan • Review and approve Implementation Program • Review and approve Asset Management Risk Register • Approve additional resources, if required • Review and approve Evaluation Plan • Review and approve Training Program
Performance Analysis	• Identify Asset Program Team • Present Agency Maturity GAP Analysis • Present Asset Management Policies • Present Set Performance Targets • Present all required documentation • Present additional resource recommendations, if required • Present Transit Asset Management Plan • Present Investment Prioritization Strategies • Present GAP Analysis Report • Present Condition Assessment Program • Present Implementation Program • Present Asset Management Risk Register to Program Delivery Committee

Individual	Roles & Responsibilities
	• Approve Performance Measures • Present Evaluation Plan • Approve all Standard Operating Procedures • Oversee the continual improvement of the Asset Management Plan • Ensure all tasks are being performed in accordance with regulatory requirements • Recommend Training Programs
Asset Program Team (APT)	• Draft Performance Measures • Develop and conduct Agency Maturity GAP Analysis Survey • Develop and maintain Asset Inventories • Develop, implement and maintain Transit Asset Management Program • Prepare Standard Operating Procedure • Prepare and update Transit Asset Management Program • Update Transit Asset Management Plan during Horizon Period • Set State of Good Repair Targets Annually • Develop and maintain a Condition Assessment Program • Perform a GAP Analysis • Draft Evaluation Plan • Update data for the Federal Transit Administration Transit Asset Management Program every four (4) years • Develop and coordinate Asset Management Risk Register • Draft Investment Prioritization Strategy • Manage Decision Support Tools • Develop Implementation Plan • Review established Asset Management Team Policies • Coordinate recommended/approved training programs
Asset Management Team (AMT)	• Provide technical guidance for Transit Asset Management Program updates • Propose quantifiable prioritization criteria • Incorporate both asset condition and operational performance characteristics • Develop necessary measures, forms, and submission tools for Transit Asset Management Program updates • Analyze Program deliverables with overall goals, objectives, and strategies • Recommend the approval of individual projects to the Asset Program Team • Establish policies

Individual	Roles & Responsibilities
Financial Services	• Identify, secure and prioritize funding for asset repair/replacement • Coordinate and Review Decision Support Tools Report • Coordinate Infrastructure Renewal Plan • Coordinate Investment Prioritization Strategies • Submit National Transit Database Report • Manage Capital Improvement Project • Coordinate Transportation Improvement Plan • Coordinate State Transportation Improvement Plan • Ensure all tasks are being performed in accordance with regulatory requirements
Rail Services	• Identify Condition Assessors • Perform Condition Assessments • Certify assets below the approved State of Good Repair threshold • Ensure Condition Assessors have proper licensing and/or certifications • Provide Asset Inventories • Provide Performance Restrictions monthly • Ensure all tasks are being performed in accordance with regulatory requirements • Ensure safety compliance with applicable Personal Protective Equipment • Provide training and refresher courses
Bus Services	• Identify Condition Assessors • Perform Condition Assessments • Certify assets below the approved State of Good Repair threshold • Ensure Condition Assessors have proper licensing and/or certifications • Provide updated Asset Inventories • Ensure all tasks are being performed in accordance with regulatory requirements • Ensure safety compliance with applicable Personal Protective Equipment • Provide training and refresher courses
Infrastructure Engineering and Maintenance (IEM)	• Identify Condition Assessors • Perform Condition Assessments • Certify assets below the approved State of Good Repair threshold • Ensure Condition Assessors have proper licensing and/or certifications

Individual	Roles & Responsibilities
	• Provide Asset Inventories • Ensure all tasks are being performed in accordance with regulatory requirements • Ensure safety compliance with applicable Personal Protective Equipment • Provide training and refresher courses
Engineering Area • Structural Inspection • Track & Guideway • Facilities Maintenance • System Engineering	• Perform Condition Assessments in accordance with Certified Inspection Reports • Submit final Certified Inspection Reports • Validate assets below the approved State of Good Repair threshold • Provide and Certify State of Good Repair criteria • Ensure Condition Assessors have proper licensing and/or certifications • Provide Asset Inventories • Ensure all tasks are being performed in accordance with regulatory requirements • Ensure safety compliance with applicable Personal Protective Equipment • Provide training and refresher courses
Special Transportation Services (STS)	• Fleet Status Report • Provide contractual changes • Ensure all tasks are being performed in accordance with regulatory requirements
Office of Safety and Security	• Asset Management Risk Register • Ensure compliance to Public Transportation Safety Program • Ensure correction/repair is conducted for all safety critical deficiencies
Quality Assurance Division (QAD)	• Ensures compliance with Federal Transportation Asset Management Guide (FTA Report No. 0098)

7.0 Requirements

The Transportation Asset Management (TAM) Final Rule establishes a framework to monitor and manage public transportation assets, improve safety, increase reliability and performance, and institute performance measures. The purpose of the Final Rule is to help achieve and maintain a State of Good Repair (SGR) for the nation's public transportation assets and the reduction of SGR backlogs. The Moving Ahead for Progress in the 21st Century Act (MAP-21) requires the development of a TAM Program for all public transportation agencies receiving Federal financial assistance. The Program outlines how to address asset management policy and goals.

7.1 Transit Asset Management Elements

The Final Rule requires Tier 1 Providers to develop an individual TAM Plan through a TAM Program. As a Tier 1 Provider which owns, operates and manages four (4) distinct modes of transportation, the TAM Plan must include nine (9) distinct elements:

7.1.1 Inventory of Capital Assets

a. An inventory organized by categories and class of capital assets which must include all assets owned, operated or managed except equipment with an acquisition value under $50,000 that is not a service vehicle; and
b. The inventory includes exclusive use maintenance facilities, passenger stations, rolling stock, guideway infrastructure, pedestrian overpasses and administrative facilities which are third-party owned or jointly procured.

7.1.2 Condition Assessment

a. FTA requires the agency to achieve and maintain capital assets to operate at a full level of performance;
b. Conduct facility condition and performance assessments over a three (3) year period;
c. A third of the agency must be reported each year to achieve the full implementation;
d. Monitor asset status and condition, determine level of service, measure performance and determine unmet needs; and
e. A multi-dynamic approach could be used for all assets.

Note: A complete description of the requirements for 7.1.1 and 7.1.2 can be reviewed in the FTA Transit Asset Management Guide Report No. 0098.

7.1.3 Decision Support Tools

a. FTA requires the decision support tool enable policy-makers to understand the implications of different resource allocation decisions and support prioritization across goals;
b. The tool should optimize decision-making through the use of comprehensive and reliable forecasts models;

c. Communication on how modeling is intended to be used (planning versus budgeting); and
d. The tool modeling should have significant amounts of data, including age, condition, useful life, operating statistics, and historic condition data (decay curves).

7.1.4 Investment Prioritization
a. A prioritized list of projects by fiscal year to manage or improve the SGR; and
b. The project list identifies unacceptable safety risks and accessibility requirements to determine repair/replacement priorities.

7.1.5 TAM and SGR Policy
a. A "top down" approach to the asset management program; and
b. A strategy consisting of actions that support the implementation of the policy.

7.1.6 Implementation Strategy *(See 7.2 Implementation Strategy)*

7.1.7 List of Key Annual Activities (*See 7.4 Key Annual Activities)*

7.1.8 Identification of Resources
a. A summary or list of potential resources, including personnel, developed to implement the TAM Plan.

7.1.9 Evaluation Plan
a. An outline to monitor, update, and evaluate the TAM Plan and Program to ensure continuous improvement.

7.2 Implementation Strategy

TAM Plan implementation strategies focus on actions and the operational level processes taken to achieve and maintain a SGR. The approach to implement TAM practices, include establishing a schedule, accountabilities, tasks, dependencies, and roles and responsibilities. The following requirements are critical to the implementation:

7.2.1 **Resource Management**: Efficient resource decision making on how to best manage capital assets and ensure recommendations are based on the condition and age of the asset.

7.2.2 **Asset Management Maturity**: Assess current asset management knowledge, future performance targets, and implement improvements in a clear and structured way through measurable results.

7.2.3 **Training and Development**: Workforce training on TAM Program assures adequate control measures are established and maintained for the repair/replacement processes.

7.2.4 **Investment Prioritization**: Ranks capital projects and/or programs to achieve or maintain a SGR.

7.3 National Transit Database (NTD)

The NTD Asset Inventory Module (AIM) is designed to collect basic information on assets and infrastructure. As condition for receiving federal funding, the agency is required to report annually.

7.3.1 Asset Inventory Module (AIM) Report

a. Administrative and Maintenance Facilities
b. Passenger and Parking Facilities
c. Rail Fixed Guide Inventory
d. Track Inventory
e. Service Vehicles
f. Revenue Vehicles
g. Performance Targets
h. Narrative Report

7.3.2 Set Performance Targets

Performance targets are set annually by asset class and asset category:

a. Rolling Stock: % of revenue vehicles exceeding ULB;
b. Equipment: % of non-revenue service vehicles exceeding ULB;
c. Facilities: % of facilities rated under 3.0 on the TERM Scale; and
d. Infrastructure: % of track segments under performance restriction.

7.3.3 Narrative Report

An annual narrative report that provides a description of any change in the condition from the previous year and describes the progress made during the year to meet the performance targets set in the previous reporting year.

7.4 Key Annual Activities

FTA requires a list of essential actions which are critical to achieving the agency's asset management goals for the year.

a. Maintain and update Asset Inventories;
b. Establish and Set Performance Targets;
c. Update TAM Plan with significant changes;
d. Establish, maintain and update Implementation Plan;

e. Review and/or modify Performance Measures;
f. Perform Condition Assessments;
g. Conduct Investment Prioritization; and
h. Complete NTD Asset Inventory Module

7.5 Agency Maturity GAP Analysis

An Agency Maturity GAP Analysis should be performed every three (3) years as a part of the TAM Program. This self-assessment is performed periodically to monitor the progress of the agency asset management knowledge versus the overall program's goals.

7.6 Horizon Period

The TAM Plan must cover a horizon period of at least four (4) years and updated any time during this period. Updates should coincide with the planning cycle of the Transportation Improvement Program or Statewide Transportation Improvement Program. Significant changes to the asset inventory, condition assessments, or investment prioritization would result in an amendment to the TAM Plan.

7.7 Evaluation Plan

FTA requires a continuous improvement plan also known as an evaluation plan, setting milestones to track the progress of the asset management program. The evaluation of all aspects of the TAM Program should be outlined and reveal any potential risks. In addition, the Plan should reflect any successful factors and/or any reduction/increase in SGR backlog.

For more details, see TAP Policy and Format No. POL-AD- 001, posted on the TAPs.

DTPW **Standard Operating Procedure (SOP)**

Title of Procedure:	Agency Maturity GAP Analysis for Asset Management	Procedure Number	Revision Date
		PR-AD-013	4/11/17
Division	Performance Analysis	Revision Level	Original Issue Date
		0	4/11/17

Reference Documents:		
	Transportation Asset Management – GAP Analysis Tool and User Guide	American Association of State Highway and Transportation Officials (AASHTO) Guide
	Transit Asset Management Guide – Report #0098	Transit Asset Management (TAM) Plan
	Transit Asset Management Final Rule – Federal Register Vol. 81 No. 143	Institute of Asset Management (IAM) Website
	Publicly Available Specification (PAS) 55:2008	

References to other documents, standards or local, state or federal mandates that amplify or reinforce requirements stated are listed here. Note: Reference Standards above need to be "met" or "equaled" for SOP compliance.

REVIEW LOG

Title	Print Name	Signature	Date
Production Coordinator	Adriana Quintero		4/12/17
Special Projects Administrator I	Larisa Aploks		4/12/17
Special Projects Administrator II	Karen Johnson		4/14/17

Interdepartmental reviews by required personnel are listed here.

SOP APPROVAL SECTION

Title	Print Name	Signature	Approval Date
Chief, Performance and Materials Management	Carlos De La Torre		4/14/17

List of Records:		
	GAP Survey Instructions	DTPW Knowledge & Understanding Scale
	PAS 55 Maturity Scale	Self-Assessment Methodology (SAM)
	GAP Analysis Framework Table	AASHTO Maturity Scale

REVISION LOG

Current Rev. No.	Revision Date	Changes	Reason for Change	Initiator
0	4/11/17	Implementation	Initial Issue	Tammy Dickens

Title of Procedure:	Agency Maturity GAP Analysis for Asset Management	Procedure Number		Revision Date
		PR-AD-013		**4/11/17**
Division	Performance Analysis	Revision Level		Original Issue Date
		0		**4/11/17**

1.0 Purpose

To identify and assess the level of maturity of the Transit Asset Management (TAM) program, and to benchmark against best practices.

2.0 Scope

To identify strengths and potential growth; provide clear direction for enhancements which could improve the decision-making process, enhance the data and tools that support asset management, both internally and externally.

3.0 Responsibility

Individual	Responsibilities
Chief, Performance and Materials Management	▪ Identify TAM Team / Coordinator ▪ Approve Set Performance Targets ▪ Approve GAP Analysis Findings ▪ Approve GAP Report ▪ Confirm all MAP-21 requirements are met and in compliance to FTA standards
Performance Analysis	▪ Assess the capabilities of the TAM Program ▪ Determine the desired capabilities of the TAM Program ▪ Develop and update TAM Improvement Plan with prioritized enhancements ▪ Perform a GAP Analysis every three (3) years (5% of agency) ▪ Update data on maturity level for the FTA TAM Program every three (3) years ▪ Ensure all tasks are being performed to standards by internal and contracting staff ▪ Survey outreach ▪ Update GAP Analysis Report
Coordinator / Asset Management Team	▪ Assess the capabilities of the TAM Program ▪ Determine the desired capabilities of the TAM Program ▪ Develop and update TAM Improvement Plan with prioritized enhancements

Title of Procedure:	Agency Maturity GAP Analysis for Asset Management	Procedure Number		Revision Date
		PR-AD-013		**4/11/17**
Division	Performance Analysis	Revision Level		Original Issue Date
		0		**4/11/17**

Individual	Responsibilities
	▪ Perform a GAP Analysis every three (3) years (5% of agency) ▪ Update data on maturity level for the FTA TAM Program every three (3) years ▪ Ensure all tasks are being performed to standards by internal and contracting staff ▪ Survey outreach ▪ Update GAP Analysis Report
All Divisions	▪ Complete surveys ▪ Identify training if required ▪ Compliance to procedure

4.0 Procedure

A GAP Analysis must be performed every three (3) years as part of the Transit Asset Management (TAM) Plan process. This self-assessment should be performed periodically to monitor the progress of the agency towards its maturity goal. Surveys will be distributed to staff through an outreach effort. Results from these surveys, will identify areas where improvements are identified for regulatory compliance. By analyzing these gaps, results from these surveys can create specific action plans to move the agency towards its maturity goals and close the knowledge gaps between the State of Good Repair (SGR) levels and future targets as identified in the gap analysis report.

Note: A gap analysis does not provide the action plan, it only provides the foundation of understanding necessary to create it.

4.1 GAP Analysis Tool

The Excel-based GAP Analysis Tool will help identify and highlight improvements as part of the requirements for Moving Ahead for Progress in the 21st Century Act (MAP-21). The Survey Tool is designed to collect data and calculate the agency knowledge of TAM and determine actions to achieve improvements. The four (4) key segments of this assessment include:

1. Strategic Self-Assessment – Provide a useful approach in helping to organize thinking and to develop a consensus among top-level managers as to where the agency's strengths and needs for improvement lie, and to then structure an agenda for improvements and change.
2. TAM Maturity Model – Allows an agency to reliably locate its current position and to help it determine the next steps it should take.
3. TAM GAP Analysis – Helps pinpoint the most important areas of deviation between the current and desired states, which form the basis of a list of tasks to be accomplished in order to achieve the desired advancement in maturity.

4. Identify Appropriate TAM Practice – Determines the agency's strategic goals and regulatory requirements, customer expectations, nature of the asset, exposure to risk, availability of resources, and benefit-cost analysis.

The Publicly Available Specification (PAS) 55:2008, provides objectivity for several aspects of good asset management, from life-cycle strategy to everyday maintenance (cost/risk/performance).

- Assign user-defined weight factors to Criteria, Element, and Assessment Area items in a survey definition, so that weighted-average target and current ratings can be determined at different analysis levels.
- View weighted-average target and current ratings at any analysis level (i.e. at the overall level, and for any specified Assessment Area, Element, or Criteria included in the survey definition). Results are presented in tabular and chart format.
- View weighted-average target and current ratings for a specified *series* of defined 'Rating Sets' or 'Results Groups.' This feature can be used to view time series ratings or gaps determined for any specified Assessment Area, Element, or Criteria included in the survey definition. Results must be presented in a tabular and chart format.

4.2 How to Perform a GAP Analysis Survey

The Self-Assessment Methodology (SAM) was established by the Institute of Asset Management (IAM) to provide clear objectives and goals. The Survey Tool is designed to help complete the following tasks within the gap survey:

- Organize and setup survey definitions as it relates to the scope of the asset management system.
- Create customized Survey Workbooks for computer user access that are used by raters to enter assessment rating values.
- Create customized user Survey for frontline staff without computer access that are used by raters to enter assessment rating values.
- Collect rater data from completed User Survey Workbook, and import the results back into the GAP Analysis Tool.
- Collect rater data from completed Survey from frontline staff, and import the results back into the GAP Analysis Tool.
- Store and organize collected user rating data so that they are easily accessible for analysis and results viewing.

4.3 Target Assessment Areas

Title of Procedure:	Agency Maturity GAP Analysis for Asset Management	Procedure Number		Revision Date
		PR-AD-013		**4/11/17**
Division	Performance Analysis	Revision Level		Original Issue Date
		0		**4/11/17**

The GAP Analysis data structure is designed to evaluate current and desired asset management capabilities at three (3) different levels; Assessment Areas - high level, Element - subcomponent and Criteria – questions. Areas of assessment are:

- Policy Goals and Objectives
- Transportation Asset Management (TAM)
- Performance & Condition, Corrective & Preventive, and Investigation
- Asset Inventory, Continual Improvement and Change Management
- Information Management, System Documentation and Records
- Outsourcing and Communication
- Risk Management, Audit & Compliance and Management Review
- Training, Competence and Equipment, Facilities

Note: All Assessment Areas may change based on the maturity of the agency.

4.4 TAM Rating Scale Process

The 2011 American Association of State Highway and Transportation Officials (AASHTO) Guide relates to Transportation Asset Management (TAM) as a strategic and systematic process of operating, maintaining, upgrading and expanding physical assets effectively throughout their life-cycles. It focuses on business and engineering practices for resource allocation and utilization, with the objectives of better decision-making based upon quality information and well-defined objectives. The AASHTO Guide provides definitions as it relates to the Maturity Level Scale for assessing the difference between each maturity levels within the areas. Within the agency, a modified *5-point* Maturity Scale will be used by the raters for ease of use and described through the following:

- Processes
- Frequency
- Sub-element emphasis
- Process formality
- Data and technology
- Outputs and results

4.5 Results

Maturity level results should be grouped together and summarized by Assessment Areas. The GAP Survey should include different groups within the agency from senior to frontline staff. This will provide a diverse and inclusive assessment to gauge the agency-wide TAM knowledge. Answers received should be recorded and weighted to assess the maturity level of each area. The results from this process will lead to real improvement and enable business deliverables to be achieved more efficiently and effectively with fewer resources.

4.6 Approval

The Chief of Performance Analysis must approve and submit for Certification.

5.0 Definitions

Assessment Area	A broad category of a key transportation asset management area for which a strategic assessment is to be conducted. These are referred to as *level 1* items within a survey definition.
Certification	The highest ranking official is ultimately responsible for ensuring that a TAM plan is developed and carried out in accordance with this part. Approval is required for each annual performance target and setting performance targets for group plan participants.
Criteria	Specific statement or questions that are individually assessed and weighted in order of importance to determine the gap between target ratings and current ratings. There are referred to as *level 3* items within a survey definition.
Element	A subset of the Assessment Area that has a list of Criteria associated with it. These are referred to as *level 2* items within a survey definition.
GAP Analysis	A process in business used to identify the requirements that will enable a company to close the gap between its current level of performance utilizing existing resource allocations and its potential performance based on time, money and human resources available to achieve them effectively.
Moving Ahead for Progress in the 21st Century Act (MAP-21)	It requires that transit providers conduct a condition assessment on all inventoried assets for which the provider has direct capital responsibility, and also set performance targets requirements for the identified assets. The purpose of the Final Rule is to help achieve and maintain a State of Good Repair (SGR) for the nation's public transportation assets and the reduction of SGR backlogs.
Publicly Available Specification (PAS)	It enables the integration of all aspects of the asset lifecycle: from the first recognition of a need to design, acquisition, construction, commissioning, utilization or operation, maintenance, renewal, modification and/or ultimate disposal.

Rating Set	A named container within the GAP Analysis Tool that stores individual imported user rating data. They are important from an analysis standpoint because: 1) aggregated results are always summarized by rating set, and 2) the GAP Analysis Tool allows the user to compare aggregated results between sets.
Results Group	A named set of one or more survey groups. The concept of results group was introduced in the tool to provide the Tool Administrator with the ability to compare the results between individual survey groups, or combined groups survey groups.
Self-Assessment Methodology (SAM)	It enables organizations in all sectors to measure their capabilities against the requirements of the optimal management of physical assets, providing the definition of good practice in the whole-life management of assets.
State of Good Repair (SGR)	A formula program that replaced the Fixed Guideway Modernization program. It provides capital assistance to maintain fixed guideway and high intensity bus systems in a state of good repair. These funds reflect a commitment to ensuring that public transit operated safely, efficiently, reliably and sustainably, so that communities can offer balanced transportation choices that help to improve mobility, reduce congestion, and encourage economic development.
Survey	A user-defined list of Criteria that are organized further into broader categories of Element and Assessment Area. Within the Tool, the Assessment Area, Element and Criteria items are visually displayed as level 1, level 2, and level 3 items within the survey definitions tree view control.
Survey Group	A category of individual raters who have similarities in their positions, their responsibilities, and/or their areas of expertise. Within the GAP Analysis Tool, the tool has the capability to associate a custom list of Criteria from the survey definition, with a defined and named survey group.

6.0 Key Performance Metrics

N/A

7.0 Special Tools and Equipment (If applicable)

N/A

Tools/Equipment	Application
	▪
	▪

Title of Procedure:	Agency Maturity GAP Analysis for Asset Management	Procedure Number		Revision Date
		PR-AD-013		**4/11/17**
Division	Performance Analysis	Revision Level		Original Issue Date
		0		**4/11/17**

8.0 Safety Requirements in the Workplace:

N/A

(Note: SOP Initiator must contact the MDT OFFICE of SAFETY and SECURITY (OSS) for review and guidance if any Safety Requirements are applicable)

9.0 Distribution and Implementation

TransitNet

DTPW **Standard Operating Procedure (SOP)**

Title of Procedure	Condition Assessment	Procedure Number	Revision Date
		PR-AD-014	5/19/17
Division	Performance Analysis	Revision Level	Original Issue Date
		0	5/19/17

Reference Documents:	DTPW's Condition Assessment Guidebook	FTA Guideway Performance Restriction Calculation Guidebook
	Transit Asset Management Final Rule – Federal Register Vol. 81 No. 143	MDT Personal Protective Equipment (PPE) Policy – TAP No. 80
	FTA Facility Condition Assessment Guidebook	Electrical Protective Gloves SOP PR-RS-015
	Miami Dade County Safety Manual	State Safety Oversight (SSO) Final Rule – Federal Register Vol. 81 No. 51

References to other documents, standards or local, state or federal mandates that amplify or reinforce requirements stated are listed here. Note: Reference Standards above need to be "met" or "equaled" for SOP compliance.

REVIEW LOG

Title	Print Name	Signature	Date
Chief, Infrastructure Engineering & Maintenance	Robert McClellan		6/26/17
Chief, Office of Safety & Security	Eric Muntan		7.5.17
Assistant Director, Rail Services	Jerry Blackman		7/10/17
Assistant Director, Bus Services	Derrick J. Gordon		7-12-17
Assistant Director, Transit Engineering	Albert Hernandez	N/A	8-16-17

Interdepartmental reviews by required personnel are listed here.

SOP APPROVAL SECTION

Title	Print Name	Signature	Approval Date
Chief, Performance & Materials Management	Carlos De La Torre		8/24/17
Deputy Director, Operations	Steve Feil		8/29/17

List of Records:	Facility Assessment Forms	
	Rolling Stock Assessment Forms	
	Infrastructure Assessment Forms	

REVISION LOG

Current Rev. No.	Revision Date	Changes	Reason for Change	Initiator
0	5/19/17	Initial Issue	New Format	Adriana Quintero

Title of Procedure	Condition Assessment	Procedure Number		Revision Date
		PR-AD-014		5/19/17
Division	Performance Analysis	Revision Level		Original Issue Date
		0		5/19/17

1.0 Purpose

To measure condition and ensure maintenance requirements are effectively implemented for the State of Good Repair (SGR).

2.0 Scope

To disclose risks, predict failure, identify root causes, ensure assets can meet their level of service requirements, and provide information from which assets can be managed across their life-cycle.

3.0 Responsibility

Individual	Responsibilities
Performance Analysis	• Responsible for oversight of Standard Operating Procedure and Federal Transit Administration data requirements • Condition Assessment document management • Create and manage Condition Assessment schedule • Conduct initial training to ensure conditions are being measured consistently and accurately by asset class and asset type • Ensure staff is trained in computerized system for documentation and data collection • Analyze asset data in computerized system • Report Condition Assessments and action items to corresponding divisions • Review and evaluate assessment questions as required • Periodic review of Program Management
Division Supervisor/Manager/Reviewer or Designee	• Identify Condition Assessors • Ensure Condition Assessors have proper licensing and/or certifications where required • Oversight and approval of condition assessments • Verification of Condition Assessment scores • Document and record data in computerized system • Assign Maintenance to asset(s) as required • Review and evaluate assessment questions as required • Ensure appropriate Personal Protective Equipment is worn as required
Safety & Security (OSS) Designee	• Adherence to all safety requirements • Ensure all safety risks are properly addressed
Condition Assessor	• Maintain licensing and/or certifications where applicable • Perform visual and performance assessments by asset class • Record data in computerized system • Ensure appropriate Personal Protective Equipment is worn as required

Title of Procedure	Condition Assessment	Procedure Number		Revision Date
		PR-AD-014		5/19/17
Division	Performance Analysis	Revision Level		Original Issue Date
		0		5/19/17

4.0 Procedure

The Federal Transit Administration (FTA) Transit Asset Management Final Rule specifies standards for measuring the condition of assets and SGR performance measures (see *4.2 Asset Categories*). An asset must meet the following:

1. Have the ability to perform its designed function;

2. Does not pose an identified unacceptable safety risk; and

3. The life-cycle investment needs have been met or recovered, including all scheduled maintenance, rehabilitation, and replacements.

4.1 Condition Assessment Process

There are varying degrees of industry standards for inspecting and monitoring asset condition. In many cases, only a sampling of an asset class needs to be inspected (i.e. Rolling Stock). The size of the sample and/or frequency of inspection is related directly to the level of risk associated with the asset. Due to the diverse nature of the Department, three (3) different approaches will be used:

1. **Sampling Requirements** address how many of the assets or subcomponents require inspection.

2. **Data Collection Frequency** addresses how often the assessments should occur. Triggers for a condition assessment may be based on a time or mileage interval, criticality or risk, or on performance.

3. **Inspection Approach** can require appropriately trained and credentialed staff for condition inspections for many asset classes. Additionally, the ability to substitute a visual or manual assessment with technology-enabled monitoring (examples: sensors to monitor structural conditions, switch performance, and through the day-to-day maintenance process).

   Note: The Department may utilize multiple approaches to successfully complete the condition assessment and performance target requirements based on the asset category. The assessments should generate a level of detail sufficient to monitor and predict the performance of an asset with minimal subjectivity. Condition assessments are designed to complement the overall preventive maintenance programs.

4.2 Asset Categories

FTA regulations require the Department to include the appropriate inventory of its assets used to provide public transportation, and a condition assessment of the assets for which it has direct capital responsibility. The asset inventory is structured to include a hierarchy of assets. The full description of the asset classes can be found in *DTPW's Condition Assessment Guidebook*.

1. **Rolling Stock** are vehicles used to provide revenue or non-revenue services. This asset category can include heavy rail, buses, paratransit vehicles, service vehicles, supervisor vehicles, and light rail vehicles (automated guideway).

2. **Facilities and Stations** are structures that enclose or support maintenance, operations, administrative, and public spaces. Facilities can include Administrative and Maintenance Facilities as well as Passenger, Parking, and Pedestrian Overpass Facilities.

3. **Infrastructure – Guideway Elements** are structural elements that allow for the movement of fixed guideway vehicles. Guideway assets are broadly categorized into track elements, above-grade structures (bridges), below-grade structures (tunnels), and ancillary structures (i.e. passenger and maintenance access and retaining walls).

4. **Infrastructure – Systems** includes a diverse set of monitoring and control systems that support core operational functions. All of the functions are critical to the transit system, providing power, communications, revenue collection, security and safety controls.

4.3 Conducting and Reporting Condition Assessments

1. Identify Components – Complete inventory listing, dependent on reporting mechanism, as described in table below:

   a. Develop; and

   b. Identify asset classes for condition assessments.

TAM/NTD Crosswalk

Assets	TAM Plan Inventory	TAM Plan Condition Assessment	NTD Inventory & Condition Submittal	SGR Targets
Revenue Vehicles				
Owned	yes	yes	yes	yes
Direct Capital Responsibility	yes	yes	yes	yes
3rd Party Owned (Direct Capital Responsibility)	yes	yes	yes	yes
3rd Party Owned (NO Direct Capital Responsibility)	yes	no	yes*	no
Equipment: Non-revenue Vehicles (regardless of cost)				
Owned	yes	yes	yes	yes
Direct Capital Responsibility	yes	yes	yes	yes
3rd Party Owned	no	no	no	no
Equipment: Over $50,000 in Acquisition Value				
Owned	yes	yes	no	no
Direct Capital Responsibility	yes	yes	no	no
3rd Party Owned	no	no	no	no
Equipment				
Under $50,000 in Acquisition Value	no	no	no	no
Facilities:				
Owned	yes	yes	yes	yes
Direct Capital Responsibility	yes	yes	yes	yes
3rd Party Owned (Direct Capital Responsibility)	yes	yes	yes	yes
3rd Party Owned (NO Direct Capital Responsibility)	yes	no	yes**	no
Infrastructure: Non Rail Fixed Guideway				
Owned	yes	yes	no	no
Direct Capital Responsibility	yes	yes	no	no
3rd Party Owned (Direct Capital Responsibility)	yes	yes	no	no
3rd Party Owned (NO Direct Capital Responsibility)	yes	no	no	no
Infrastructure: Rail Fixed Guideway				
Owned	yes	yes	yes	yes
Direct Capital Responsibility	yes	yes	yes	yes
3rd Party Owned (Direct Capital Responsibility)	yes	yes	yes	yes
3rd Party Owned (NO Direct Capital Responsibility)	yes	no	yes	no
	Included in TAM Plan		*Reported to NTD*	

Title of Procedure	Condition Assessment	Procedure Number		Revision Date
		PR-AD-014		5/19/17
Division	Performance Analysis	Revision Level		Original Issue Date
		0		5/19/17

2. Establish Condition Assessment Language

   a. **Rolling Stock** – Useful Life Benchmark (ULB) takes into account the Department's unique operating environment to determine the acceptable period of use in service.

   Note: FTA has a separate default definition of minimum life.

   b. **Facilities** – Transit Economic Requirements Model (TERM) is a scale comprised of a 1-5 rating; 5 being like new, 3 being around mid-life, and anything rated less than 3 is not in a SGR. See complete table below:

Condition Assessment Rating Scale

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

Note: A photo is required for Rating's under 3, which will be reviewed for confirmation by division designee (below threshold criteria)

   c. **Infrastructure** – Performance Restrictions are reported by mode and type of service as an average length of directional route mileage (DRM). To determine this measure, calculate DRMs (measured to the nearest hundredth of a mile) under performance restrictions at the same time each month (i.e. 9:00 a.m. local time on the first Wednesday of each month). The values calculated each month must be averages, and the average annual value is required to be reported.

   Note: Bridges, tunnels, and ancillary structures are governed under strict regulatory requirements. These inspections will be used in lieu of Condition Assessments.

3. Conduct the Assessment – in conjunction with scheduled maintenance as permitted

   a. Rolling Stock – Fleet Sampling

   b. Facilities – Inspection Approach

   c. Infrastructure – Data Collection

   Note: More than one (1) condition assessor may be required to conduct an assessment as a safety requirement.

Title of Procedure	Condition Assessment	Procedure Number		Revision Date
		PR-AD-014		5/19/17
Division	Performance Analysis	Revision Level		Original Issue Date
		0		5/19/17

4. Calculate Overall Condition

   Calculations (scores) are based upon several elements. Each question on an assessment form falls into a category that has a pre-determined weighted factor. All the questions on a form (when added up) equal a maximum of approximately 100 (see table below for Score to Rating conversion).

   a. **Safety** multiplies a question/item value 3x. It is defined as an item that may cause bodily harm or present a threat to health and safety of users and/or occupants.

   b. **Reliability** multiplies a question/item value 2x. It refers to the reliability of an item, frequency of repairs, and downtime.

   c. **Operational** multiplies a question/item value 2x. It refers to issues that affect the appropriate functioning and operation of the item.

   d. **Aesthetics** multiplies a question/item value .05x. This considers mainly cosmetic damage such as scratches, worn paint, surface cracks, and other blemishes that do not impact item performance.

Condition Rating	Condition	Score
5	Excellent	19 - 0
4	Good	39 - 20
3	Adequate	59 - 40
2	Moderate	79 - 60
1	Poor	100 - 80

   Note: Computerized system will automatically calculate overall Condition Rating.

5. Complete questionnaire (see forms)
6. Record data in computerized system
7. Submit completed assessment
   a. Supervisor/Reviewer's concurrence
   b. Based on findings/data collected, it will be determined if further action will be taken for any rating less than 3 (i.e. re-inspection)
8. Performance Analysis receives data and follows up with appropriate Division for review of any rating below the specified threshold

4.4 Data Requirements

Reporting overall condition of each administrative, maintenance, and passenger facility listed in FTA's National Transit Database (NTD) Asset Inventory Module (AIM) is required. The Moving Ahead for Progress in the 21st Century Act (MAP-21) created a new requirement where direct capital asset inventory is recorded. Facility conditions must be updated tri-annually at a minimum (see note below). The reportable factors for each category are as follows:

1. A rating of the inventoried capital assets (i.e. age; term scale; percentage of residual life);

2. Rating must be sufficiently detailed to monitor performance and plan capital investment;

3. Condition assessment ratings must be consistent in the evaluation of the asset by ensuring that subjectivity is limited; and

4. The assessment of the overall physical condition for the individual asset is comprehensive – covering each of the asset's major components and subcomponents.

   *Note: Performance Restrictions and Rolling Stock (as well as ⅓ of Facilities) are reportable **annually**.*

5.0 Key Performance Metrics

Refer to DTPW Condition Assessment Guidebook for the specified Key Performance Metrics by Asset Category and Asset Type.

6.0 Special Tools and Equipment (If applicable)

Tools/Equipment	Application
Personal Protective Equipment (PPE)	▪ Adhere to all modes of transportation PPE SOP's and PPE TAP
Electrical Protective Gloves (rubber gloves)	▪ Worn to protect wearers from electrical shock; tagged out circuits clearly indicate all electrical potential has been removed
Track Stingers	▪ A multi-conductor cable which is used to power rail/mover vehicles where power rail is not available in the maintenance shop area
Leather Shells	▪ The protective layer for electrical protective gloves, designed to absorb physical damage, which may occur during use

7.0 Safety Requirements in the Workplace:

Adherence to Transit Administrative Policies and Standard Operating Procedures.

Note: SOP Initiator must contact the DTPW OFFICE of SAFETY and SECURITY (OSS) for review and guidance if any Safety Requirements are applicable.

8.0 Definitions

Term	Definition
Condition Assessment	A rating of inventoried assets that should be sufficiently detailed to monitor performance and plan capital investment that is only required for assets with direct capital responsibility.
Condition Assessor	Multi-disciplinary staff with experience relating to specified subjects (may require certification or licensing), not intended to address legal or regulatory requirements, which assess an asset's current physical state or condition considering any flaws, degradation, etc.
Design Speed	The planned speed at time of installation at which vehicles can travel on a segment during normal operation, or the speed at which vehicles can travel on the segment absent any speed restriction on the segment.

Title of Procedure	Condition Assessment	Procedure Number		Revision Date
		PR-AD-014		5/19/17
Division	Performance Analysis	Revision Level		Original Issue Date
		0		5/19/17

Term	Definition
Directional Route Mileage (DRM)	Total mileage in each direction that public transportation vehicles travel during revenue service. Specified for each combination of mode and service with fixed guideway.
Fixed Guideway	A public transportation facility: (1) using and occupying a separate right-of-way for the exclusive use of public transportation; (2) using rail; (3) using a fixed catenary system; (4) for a passenger ferry system; (5) for a bus rapid transit system.
Federal Transit Administration (FTA)	Federal organization which provides financial and technical assistance to local public transit systems, including buses, subways, light rail, commuter rail, trolleys, and ferries.
Moving Ahead for Progress in the 21st Century Act (MAP-21)	A streamlined and performance-based surface transportation program which builds on many of the highway, transit, bike, and pedestrian programs and policies by transforming the policy and programmatic frameworks for investments to guide the system's growth and development.
National Transit Database (NTD)	The FTA's repository of data about the financial, operating, and asset conditions of American transit systems. It supports local, state, and regional planning efforts and helps governments and other decision-makers make multi-year comparisons and perform trend analyses.
Performance Restriction	A performance restriction is defined to exist on a segment of fixed guideway when the maximum permissible speed of transit vehicles is set to a value that is below the guideway's full service speed. The performance restriction can be communicated through operating instructions, route signage, flaggers, or an agency's dispatch system. Performance restrictions may result from a variety of causes, including defects, signaling issues, construction zones, maintenance work, or other causes.
Public Transportation	Regular, continuing shared-ride surface transportation services that are open to the general public or open to a segment of the general public defined by age, disability, or low income.
Segment	Per TAM Final Rule, it is considered one segment to be defined to one one-hundredth of a mile (0.01 mi.). By doing so, calculating the infrastructure performance measure in mileage yields the same result as calculating the measure in segments.
State of Good Repair (SGR)	The condition in which a capital asset is able to operate at a full level of performance. This means the asset: (1) is able to perform its designed function; (2) does not pose a known unacceptable safety risk; (3) has had its lifecycle investments met or recovered.
State of Good Repair Formula Program	The FTA State of Good Repair Program is a formula program that replaced the Fixed Guideway Modernization program. It provides capital assistance to maintain fixed guideway and high intensity buses in a state of good repair.
Transit Asset Management (TAM)	A business model that uses the condition of assets to guide the optimal prioritization of funding at transit properties in order to keep our transit networks in a State of Good Repair.
Transit Asset Management Plan	A plan that includes an inventory of capital assets, a condition assessment of inventoried assets, a decision support tool, and a prioritization of investments.

Title of Procedure	Condition Assessment	Procedure Number		Revision Date
		PR-AD-014		5/19/17
Division	Performance Analysis	Revision Level		Original Issue Date
		0		5/19/17

Term	Definition
Transit Economic Requirements Model (TERM)	FTA's Capital Needs Analysis Tool used to assess the current physical condition and future investment needs of the nation's transit assets/operators.
Useful Life	The Federal financial interest in a capital asset, expected life cycle of a capital asset or the acceptable period of use in service determined by FTA.
Useful Life Benchmark (ULB)	The expected life-cycle or acceptable period of use in service for a capital asset, as determined by a transit provider, or the default benchmark provided by FTA. Useful Life Benchmark is **NOT** the same as the useful life for FTA grant programs.

9.0 Distribution and Implementation

This procedure is published on TransitNet.

Miami-Dade County
Department of Transportation & Public Works

Transit Asset Management Implementation Plan





MIAMI-DADE COUNTY

TABLE OF CONTENTS

The Federal Transit Administration has published a final rule to establish a National Transit Asset Management (TAM) System in accordance with section 20019 of the Moving Ahead for Progress in the 21st Century Act (MAP–21; Pub. L. 112–141 (2012), codified at 49 U.S.C. 5326). The new rule will define the term state of good repair and establish minimum Federal requirements for transit asset management that will apply to all recipients and subrecipients of chapter 53 funds that own, operate, or manage public transportation capital assets. This final rule requires public transportation providers to develop and implement Transit Asset Management (TAM) plans. In response to this requirement, Miami-Dade County Department of Transportation and Public Works (DTPW) approves and adopts the following document as component of the Agency's Transit Asset Management (TAM) Plan.

As hereby certified by:

Alice N. Bravo, P.E.
Director / Accountable Executive
Miami-Dade Department of Transportation and Public Works

Date: 3/20/18

Chief of Performance Analysis or Designee
Miami-Dade Department of Transportation and Public Works

Date: 3/20/18

Review Log

Steve Feil, Deputy Director of Operations — Date: 3/21/18

Alberto Parjus, Deputy Director of Administration — Date: 3/21/18

IMPLEMENTATION ACTION PLAN

Summary

Miami-Dade County Department of Transportation and Public Works (DTPW) is one of the largest transportation agencies in the nation and is the largest transit system in the State of Florida. The Department is responsible for a service area which covers 306 square miles and is composed of 34 individual municipalities with an urbanized population of approximately 2.6 million.

DTPW operates an integrated multi-modal transit system comprised of four (4) modes: Metrobus, Metrorail, Metromover (automated-guideway people mover system), and Special Transportation Services or STS. In addition to the various modes of transportation, DTPW is responsible for the maintenance of approximately 162 individual locations, which include administrative & operations offices, maintenance shops and utilities, ancillary space, Metrorail and Metromover stations, parking facilities, transfer stations, pedestrian walkways and overpasses.

The Agency's Implementation Action Plan is an instructional guide intended to provide an overview of DPTWs methodology for the successful application of the proposed Transit Asset Management Program as stipulated in the Moving Ahead for Progress in the 21st Century Act (MAP-21). In addition, the Plan will outline the initial implementation policy, key steps, associated risks, mitigation strategies, level of impact (high, medium, and/or low) and important timelines for each action.

The core philosophies of asset management are direct; however, implementing changes necessary to become a more 'Mature Asset Management Agency' would require a change in the current culture. The following are important implementation areas for DTPW's Asset Management Program:

- **Develop a Transit Asset Management Program** – The program will encompass defining multi-level organizational roles & responsibilities, governing policies & strategies, and the complete development of the Transit Asset Management Plan.

- **Capital Asset Management** – The development of the capital program requires the defining of required asset inventory, infrastructure and creating a measurable method of determining the assets condition state.

- **Performance Reporting** – A series of methods utilized to measure the effectiveness of the Agency's business processes and maintenance procedures over time. Also, identify areas for potential improvements through previous fiscal year performance targets and through the multiple reporting requirements including the limited submission for the National Transit Database (NTD).

- **Data Driven Decision Support Strategies** – The system which allows the agency to select and prioritize projects, including potential expansion of the transportation system. Develop an investment strategy utilizing data captured and analyzed via an enterprise asset management program.

- **Resource Management** – Identify and develop the human resource approach to asset management through training and development program, increase awareness of the federal strategic approach to improving transportation infrastructure and potential incentives.
- **Asset Management Program Evaluation** – Identify a method of collecting, analyzing and using information to measure the overall impact of the program to provide potential improvements to the Transit Asset Management Program.

It is important to note, the initial Implementation Action Plan is intended to provide a focused approach to asset management; however, this approach is flexible to permit modifications as the Agency's priorities change.

Implementation Action 1.0 – Develop Transit Asset Management Program

The development of the Asset Management Program requires numerous activities to ensure compliance with the Federal Transit Administration's Moving Ahead for Progress in the 21st Century Act (MAP-21) Final Rule.

The Asset Management Program could be a guide to potentially improve customer satisfaction, minimizing the total cost of ownership while increasing performance, optimizing resource allocation, and improved communications. The following are some fundamental principles:

- **Transit Asset Management as defined in 49 CFR Section 625.5** – The strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing capital assets to manage their performance, risks, and costs over their life-cycle, for the purpose of providing, safe, cost-effective, and reliable public transportation.

- **Asset Management Framework (Business Processes)** – The development and implementation of asset management policies, strategies, plans, inventories, condition assessments, capital investments, life-cycle management, and performance modeling.

- **Technology** – Information systems used in organizing data required by the FTA to be submitted for reporting. Fundamental asset management activities and how they are facilitated by the many components of an enterprise asset management system would assist current reliability concerns and future performance targets. In many cases, information systems are cross-functional.

Implementation Action 1.1 – Asset Management Agency Roles & Responsibilities

Establish specific roles, responsibilities and accountabilities that apply at the enterprise, agency and asset class levels. Within the definition of the accountabilities; the management roles will be re-evaluated continuously as asset management evolves within the Agency.

Scope of Work	• Identify functions supporting the asset management initiative • Identify Enterprise Asset Management roles - Program Delivery Committee • Identify the roles of the Asset Program Team • Define the relationships between the Program Delivery Committee, Asset Program Team, and Asset Management Team • Define the roles and responsibilities of Asset Owners
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Consultant
Estimated Duration	• Identify Program Delivery Committee and Asset Program Team: ***Three (3) months*** • Identify Asset Management Team: ***Six (6) months after the identification of the Asset Program Team***

	• Communicate roles and responsibilities to Asset Owners: ***Three (3) to six (6) months concurrent with the identification of the Asset Management Team***
Level of Impact	**High Impact** to Program Compliance & Success

Implementation Tasks	• Define the roles and responsibilities of the Program Delivery Committee
	  ○ Director, Deputy Directors & Assistant Director of Finance
	• Define the roles and responsibilities of the Asset Program Team
	  ○ Program Instructions and Definition
	  ○ Recommend Business Process
	  ○ Liaison for the Program Delivery Committee
	  ○ Asset Owners
	  ○ Recommend Policy and Procedures
	  ○ Recommends Deliverables
	• Define essential functions of the Asset Management Team
	  ○ Coordinate with Asset Owners to ensure program adherence
	  ○ Coordinate with Asset Owners and Program Delivery Committee to ensure the Training Materials are developed
	  ○ Ensure training materials are updated and distributed
	  ○ Performance Metrics by Mode/Class
	• Identify all asset management '*Stakeholders*', including:
	  ○ Financial Services
	  ○ Operations and Maintenance
	  ○ Safety and Security
	  ○ Information Technology
	  ○ Human Resources
	• Document cross-functional coordination and planning processes that support asset management at the enterprise level, ensure all asset management stakeholders are responsible and accountable for each of the defined roles

Risks	• Unsuccessful incorporation of DTPW's Asset Management Program throughout the agency • Failure to obtain support from the Program Delivery Committee, Asset Owners, and Stakeholders to carry out the defined responsibilities • Training, Resources and Funding

Implementation Action 1.2 – Asset Management Policy & Strategies

The Asset Management Policy and Strategies incorporate the fundamental guidelines which builds a foundation for DTPW's Asset Management Program that is intended to incorporate sustainable improvement, enhanced agency-wide reliability, performance management expectations for life-cycle management, investment prioritization, and optimize the use of funds across all asset classes in compliance with federal reporting requirements for the State of Good Repair. These methods are projected to manage all resources (human and capital) necessary to develop and maintain the Agency's Public Transportation Safety Plan and Transit Asset Management Plan.

Scope of Work	• Implement a 'Top Down' approach for asset management improvement, accountability and implementation

	• Develop an Administrative Policy to govern/oversee the Asset Management Program • Develop Standard Operating Procedures outlining key repetitive processes for Asset Owners • Review and define resource allocation • Reinforce all policies governing the control and maintenance of assets, as well as cost effective extension of equipment, fleet, infrastructure and facilities across the useful life • Ensure compliance with a strategic and systematic process of operating, maintaining, and improving capital assets effectively through the entire life-cycle
Recommended Implementation Team	• Accountable Executive • Program Delivery Committee • Asset Program Team • Asset Owners
Estimated Duration	• Develop an Administrative Policy to govern/oversee the Asset Management Program: ***Three (3) to Six (6) months after the identification of the Program Delivery Committee*** • Develop Standard Operating Procedures outlining key repetitive processes for Asset Owners: ***Six (6) months to one (1) year after the approved Administrative Policy is published*** • Review and define resource allocation: ***Three (3) to Six (6) months during the initial development of DTPW's Asset Management Program*** • Reinforce all policies governing the control and maintenance of assets, as well as cost effective extension of equipment, fleet, infrastructure and facilities across the useful life: ***Immediate and On-going through the duration of the MAP-21 regulatory requirements*** • Ensure compliance with a strategic and systematic process of operating, maintaining and improving capital assets effectively through the entire life-cycle: ***Immediate and On-going through the duration of the MAP-21 regulatory requirements***
Level of Impact	**High Impact** to Policy and Strategy establishment for program success

Implementation Tasks	• Develop a method of distributing communications throughout the Agency to ensure awareness of the program
	• Distribute the defined roles of Accountable Executive and Program Delivery Committee
	  ○ Provide outlined strategic vision of Transit Asset Management Program
	  ○ Reinforce the 'Top Down' approach for asset management improvement, accountability and implementation to all Senior Staff
	  ○ Review and approve Asset Management Policy
	  ○ Develop a method to ensure compliance with a strategic and systematic process of operating, maintaining and improving capital assets effectively through the entire life-cycle
	• Define the roles, responsibilities, and essential functions of the Asset Program Team

	○ Asset Management Policy and strategy development, instructions, definition, and presentation ○ Update Policy and Procedures for the control and maintenance of assets, as well as cost effective extension of equipment, fleet, infrastructure and facilities across the useful life ○ Review and approve Asset Management Procedures ○ Ensure compliance with a strategic and systematic process of operating, maintaining and improving capital assets effectively through the entire life-cycle • Define the roles and responsibilities of Asset Management Teams/Asset Owners ○ Technical guidance for Asset Management Program updates ○ Review and approve Asset Management Policy and Procedures ○ Analyze Program deliverables with overall goals, objectives, and strategies ○ Establish Policy and Procedures
Risks	• Unsuccessful incorporation of the Asset Management Policy, strategies, and procedures throughout the agency • Unsuccessful cooperation of Program Delivery Committee, Asset Owners, and Stakeholders to carry out responsibilities • Non-Compliance with the MAP-21 regulatory requirements • Lack of proper identification of Resources and the proper allocation of the resources

Implementation Action 1.3 – Asset Management Plan

The Asset Management Plan will serve as a guide for improving business processes through the identification and management of capital assets, allocation/utilization of current resources and align the Agency with the industry's best practices. In addition, provide a strategic approach of procuring, operating, maintaining and replacement of capital assets.

Additionally, the Plan will describe, implement, and propose improvements to the key elements of the Federal requirements: Asset Inventories (Asset Management Plan Inventory, Condition Assessment Inventory, National Transit Database Inventory, and State of Good Repair Targets Inventory), Reporting (Performance Measures, Annual Targets, National Transit Database Narrative Report, Agency Maturity Report, Agency GAP Analysis, Agency Decision Support, Condition Report, Improvement Report, and Evaluation Plan), Capital Improvement Program including the potential expansion, Identification of Resources, and a List of Key Annual Activities.

Scope of Work	• Review current Agency Business Processes • Define Transit Asset Management Business Process • Develop and define Asset Management Strategies including Agencies approach to the program • Develop an Asset Register • Review Financial and Investment Strategies • Review and Update Life-Cycle Planning • Define the roles and responsibilities - Program Delivery Committee, Asset Program Team, Asset Management Team, and Asset Owners

	• Define Implementation Plan • Develop Risk Register • Define Resource Requirements • Define Information Technology
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Management Team • Consultant
Estimated Duration	• Define Transit Asset Management Business Process – ***Nine (9) months to Two (2) years*** • Develop and define Asset Management Strategies including Agencies approach to the program – ***developed in conjunction with Transit Asset Management Business Process*** • Develop Implementation Actions – ***Five (5) months*** • Develop a Capital Asset Inventory Register – ***Six (6) to nine (9) months after the initial review of the current Agency Process and Identification of Asset Owners*** • Financial and Investment Strategies – ***initial review eight (8) months in conjunction with the development of the Capital Asset Inventory Register*** • Define Information Technology – ***Nine (9) months to one (1) year*** • Develop a Risk Register – ***Six (6) to nine (9) months after completion of initial assessment***
Level of Impact	**High Impact** to Federal Regulatory Compliance **High Impact** on Performance Targets & Metrics **High Impact** to Program Success

Implementation Tasks	• Review Current Agency Process
	  ○ Asset Inventories
	  ○ Capital Improvement Process
	  ○ Operational and Maintenance Process
	  ○ Policies and Procedures
	  ○ Procurement
	  ○ Safety Requirements associated with current business flow
	• Develop Transit Asset Management Business Process
	  ○ Develop a cross-divisional Asset Management Group to outline the business process maps for corresponding functions
	  ○ Create Agency Policies and Procedures
	  ○ Outline Stakeholders Roles and Responsibilities
	  ○ Integration of potential Performance Measures
	  ○ Enhance or procure an Enterprise Asset Management system to maintain, and provide continual data driven support
	  ○ Asset Management Strategies and Approach
	  ○ Procurement Strategies
	• Financial and Investment Strategies
	  ○ Define Capital Planning & Programming
	  ○ Outline Roles & Responsibilities of Budget relating to Asset Management across all Asset Classes
	  ○ Performance Modeling
	• Implementation Plan

	○ Define Asset Management Roles and Accountabilities ○ Develop Asset Management Competencies ○ Communication Plan ○ Training and Development ○ Formalize Plan • Develop Risk Register ○ Identify and define Risk Categories ○ Prioritize and assign weight values to risk categories ○ Analyze Risks by Asset Class & Category ○ Develop a plan to evaluate documented risks ○ Maintain and update Risk Register with notable changes • Life-Cycle Management ○ Asset Information ○ Asset Cost Considerations ○ Define roles of Life-Cycle Management Planning Process ○ Asset Condition Assessment & Monitoring ○ Establish Target Condition and Performance Targets • Decision Support Tools ○ Financial and Accounting Management ○ Capital Programming ○ Human Resource Management ○ Engineering Systems including linear referencing, project management, GIS and Operations/Control systems ○ Asset Management Systems including Inventory, Condition, Facilities/Fleet/Maintenance, Stores/Parts management and Scenario Analysis • Agency Asset Management Maturity (GAP) ○ Define Asset Management Maturity ○ Develop Asset Management Maturity Survey ○ Define Agency Approach ○ Develop Training Recommendations ○ Develop Maturity Report
Risks	• Regulatory Compliance • Unsuccessful implementation of the Plan • Unsuccessful systems integration • Lack of standardized approach and quality focus with greater accountability for frontline staff • Unsuccessful collaboration among Asset Owners • Unsuccessful 'Top-Down' approach with organization acceptance

Implementation Action 2.0 – Capital Asset Management

The implementation of Capital Asset Management is observing an asset over its life span and applying preservation treatments that will prolong the assets remaining useful life. It is generally comprised of several different elements: Asset Inventory includes but is not limited to reported data, year of purchase or construct, and capital replacement costs; Infrastructure inclusive of systems, fixed guideway, power, and structures; and Capital Asset Condition which contributes to monitoring performance and capital investment planning. There are multiple asset preservation methods which could significantly prolong an asset's useful life while keeping performance at the peak optimal level affordable.

DTPW's Capital Asset Management sections will be developed and evaluated independently to meet the needs of the Agency through a variety of techniques. Specifically, the agency intended to develop detailed asset inventories to meet the various federally mandated reporting requirements; outline the infrastructure in a manner that each subcomponent could be individually reviewed; develop a condition assessment program that coincides with the current business standard operating procedures.

Implementation Action 2.1 – Capital Asset Inventory

The Federal regulations has a broad definition of Capital Asset Inventory and the data which must be captured. In addition, the regulations outline multiple formats for reporting the asset inventory. DTPW is a multi-modal transportation agency responsible for thousands of assets used in the provision of public transportation.

DTPW will develop a comprehensive database which would identify all capital assets by classification, the location of the asset, and any important attribute such as age, useful life expectancy, costs, and type of asset. The inventory should be captured in a way that it ensures maintainability including up-to-date asset information (correct categories and hierarchy).

Scope of Work	• Identify Capital Assets • Develop a comprehensive Asset Inventory • Define Asset Maintenance Requirements, Life Expectancy, and Original and/or Replacement Cost • Develop Asset Hierarchy by Class and Mode • Review and/or update current Capital Asset Management Business Policies • Identify an Enterprise Asset Management Software system to maintain the Capital Asset Inventory • Define Capital Asset Inventory Condition • Develop a Communication Process Policy • Develop Quality Control and/or Auditing Procedures • Define and Develop a Documentation/Reporting Process • Identify Asset Owners • Define the relationship between Asset Owners and Asset Program Team
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Owners

	• Asset Management Team
Estimated Duration	• Identify Capital Asset Inventory: ***Six (6) to nine (9) months for initial data gathering*** • Compile a comprehensive database of all inventories by reporting types including all specifications: ***Nine (9) months to eighteen (18) months - in conjunction with the identification of Capital Assets*** • Identify Asset Owners: ***One (1) month*** • Review and update Business Process: ***Four (4) to six (6) months*** • Define and develop individual reporting methods specific to the asset inventory mode***: Ten (10) months to eighteen (18) in conjunction with the Business Process Review*** • Outline Quality Control Methodology for Asset Inventory Verification: ***Immediate and On-going through the duration of the MAP-21 regulatory requirements*** • Define roles and responsibilities including communication flow for Asset Owners, Asset Management Team & Asset Program Team: ***Three (3) months***
Level of Impact	**High Impact** to Federal Regulatory Compliance **High Impact** on Performance Targets & Metrics **High Impact** to Program Success

Implementation Tasks	• Identify all Asset Owners by Category & Class
	  ○ Rolling Stock (Revenue & Non-Revenue)
	  ○ Facilities (Passenger, Maintenance, Administrative & Parking)
	  ○ Infrastructure (Fixed & Automated Guideway)
	  ○ Equipment
	• Outline asset inventory specifications
	  ○ Acquisition Date
	  ○ Acquisition Cost
	  ○ Funding Type / Source
	  ○ Expected Life / Useful Life
	  ○ In-service Date
	  ○ Asset Complete Description
	  ○ Asset Geographical Location / Square Footage
	  ○ Asset Owner
	  ○ Agency Financial Responsibility (Percentage)
	  ○ Other miscellaneous specifications
	• Identify, Define, and Categorize assets by reporting factors
	  ○ Transit Asset Management Plan Inventory
	  ○ Condition Assessment Inventory
	  ○ National Transit Database Inventory
	  ○ State of Good Repair Inventory
	• Identify and define asset inventories quality assurance factors
	  ○ Transit Asset Management Plan Inventory
	  ○ Condition Assessment Inventory
	  ○ National Transit Database Inventory
	  ○ State of Good Repair Inventory
	• Develop a comprehensive database to store all inventory types

	• Develop a communication guide for asset inventory management inclusive of all Asset Owners, Asset Management Team & Asset Program Team
Risks	• Incomplete Asset Inventory • Non-Compliance with Federal Regulations • Increased potential risk to Public Safety • Failure to accurately account for the Agency's true performance • Unsuccessful Transit Asset Management State of Good Repair implementation • Unsuccessful coordination between Asset Owners, Asset Management Team and Asset Program Team • Lack of up-to date expertise for asset classes for the identification of gaps in life-cycle management • Training, Resources and Funding

Implementation Action 2.2 – Infrastructure

DTPW's Infrastructure is comprised of several high-level components: Systems, Fixed Guideway, and Structures.

- **Systems –** The diverse set of monitoring and control systems that support core operational functions. All of the functions are critical to providing power, communications, revenue collection, security and safety controls.

- **Fixed Guideway** - The structural elements that allow for the movement of the agency's fixed guideway vehicles. These assets are roughly categorized into track elements, bridges, tunnels and ancillary structures.

- **Structures** – There are many types and general purpose use structures that will be outlined in this category to include passenger, maintenance, administrative and miscellaneous facilities. All of the structures are used for the purpose of providing public transportation.

This implementation action will afford the agency with a more methodical account of infrastructure maintenance and renovations that encompass safety measures. It will be inclusive of design standards and standardized as well as improved life-cycle management processes to improve functional performance, maintainability, and reliability.

Scope of Work	• Ensure expertise, resources, and coordination are in place to support success of implementation • Review and/or update Life-cycle Management Infrastructure business processes including maintenance, rehabilitation, and replacement procedures • Update and standardize Agency Design Standards, Maintenance Procedures, and Training Documentation on an on-going basis • Develop, adopt and utilize industries 'Best Practices' infrastructure high quality standards • Develop a Complete Inventory to include all lower-level components required to support the infrastructure

	• Coordinate with Professional Engineers to develop strategies for optimizing performance
	• Develop and potentially implement Geographic Information System
	  ○ Analysis of System Requirements
	  ○ Definition of Objectives
	  ○ Final Design
	• Cost-effectiveness Evaluation
	• Implementation of Program
	• Application Testing

Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Management Team • Asset Owners • Consultants
Estimated Duration	• Infrastructure Program Management review: ***Three (3) months to one (1) year in conjunction with developing the Complete Asset Inventory*** • Identify personnel, roles and responsibilities for the development, review, and updating of design standards: ***Three (3) months*** • Identify personnel, roles and responsibilities for Infrastructure Life-Cycle Management processes: ***Three (3) months in conjunction identification of Asset Owners*** • Review existing Design Standards and update/add appropriate standards: ***One (1) to two (2) years after identification of personnel and/or consultants*** • Implement Geographic Information System: ***One (1) to two (2) years after identification of personnel and/or consultants***
Level of Impact	**High Impact** to State of Good Repair Formula Program compliance and success **Moderate Impact** if Geographic Information System is not implemented, results in manual process

Implementation Tasks	• Define the roles, responsibilities, and essential functions of the Asset Program Team
	  ○ Liaison for the Program Delivery Committee
	  ○ Identify Asset Owners
	  ○ Oversight of Federal data requirements
	  ○ Review of Infrastructure Program Management
	• Define the roles and responsibilities of Asset Management Teams/Asset Owners
	  ○ Identify personnel, roles and responsibilities for the establishment, review and updating of design standards and technical specifications
	  ○ Ensure effective condition inspection process is in place
	  ○ Review and update existing Design Standards
	  ○ Identify and develop additional Design Standards as required
	  ○ Develop documentation standards to track life-cycle management planning for agency infrastructure

	○ Coordinate the incorporation of asset management and life-cycle management considerations into design specifications and maintenance contract documentation ○ Update standard design specifications ○ Develop track inventory and update track inspection and preventive maintenance procedures ○ Develop a strategic plan to cost-effectively upgrade and modernize Power Distribution and Signals ○ Evaluate current organizational approach to facilities maintenance programs and procedures • Research, if required
Risks	• Unsuccessful incorporation of any changes in the business process as it relates to the infrastructure of the Agency • Lack of communications between Asset Management Team and Asset Owners • Insufficient interaction between Asset Program Team, Asset Owners and Design Engineer Support • Current resources presently responsible for multiple tasks outside their core function and therefore not 100% dedicated to infrastructure program • Lack of resources (staffing, time, and funding)

Implementation Action 2.3 – Capital Asset Condition

Capital Asset Condition Assessments are a rating of inventoried assets that will be sufficiently detailed to monitor performance and plan capital investment. It should measure condition and ensure maintenance requirements are effectively implemented for the State of Good Repair. There are varying degrees of industry standards for inspecting and monitoring asset condition. Due to the diverse nature of the Agency, three (3) different approaches are suggested to be used: sampling requirements, data collection frequency, and inspection approach. In many cases, only a sampling of an asset class is required to be inspected (i.e. Rolling Stock). The size of the sample and/or frequency of inspection should be directly related to the level of risk associated with the asset. It is recommended for Condition Assessments to be designed to complement the existing overall preventive maintenance programs.

Scope of Work	• Establish comprehensive asset inventories of record that include asset condition, performance, and criticality • Determine and Define all Asset Classes by Mode • Identify Asset Owners by Asset Class • Define roles and responsibilities • Develop a comprehensive Scope of Work • Establish a Condition Assessment Training Program • Ensure assets can meet their level of service requirements • Establish effective life-cycle management • Disclose risks • Develop a Program Evaluation Procedure • Predict and identify root causes of failures
Recommended Implementation Team	• Asset Program Team • Consultant

	• Asset Management Teams • Asset Owners for each Asset Class
Estimated Duration	• Appointment of Asset Program Team and Consultant: ***One (1) to three (3) months*** • Complete repository of all Capital Assets: ***One (1) year after appointment of Asset Program Team and Identification of Asset Owners*** • Identification of Condition Assessors: ***One (1) to three (3) months after completion of the Capital Asset Inventory, Development of Assessment Questionnaires, Identification of Asset Owners and Completion of Training Program*** • Develop and Implement Condition Assessments: ***Six (6) months to one (1) year after Complete Inventory and Identification of Asset Owners*** • Identify Condition Assessors: ***One (1) month after Development of Assessment Questionnaires, Identification of Asset Owners and Completion of Training Program***
Level of Impact	**High Impact** to State of Good Repair Formula Program compliance and success **High Impact** to Performance Metrics **Moderate Impact** to Capital and Operational Budget

Implementation Tasks	• Define the roles of Accountable Executive and Program Delivery Committee
	  ○ Review and approve Condition Assessment Program
	  ○ Review and approve Condition Assessment Standard Operating Procedure
	• Define the roles, responsibilities, and essential functions of the Asset Program Team
	  ○ Condition Assessment instructions and definition
	  ○ Recommend Business Processes
	  ○ Liaison for the Program Delivery Committee
	  ○ Identify Asset Owners
	  ○ Develop Policy and Procedures
	  ○ Recommend deliverables
	  ○ Oversight of Federal data requirements
	  ○ Condition Assessment Document Management
	  ○ Establish a Condition Assessment schedule
	  ○ Initial Condition Assessment training(s)
	  ○ Review of Program Management
	• Define the roles and responsibilities of Asset Management Teams/Asset Owners
	  ○ Identify Condition Assessors (including authentication of licenses or certifications)
	  ○ Ensure effective condition inspection process is in place
	  ○ Develop Condition Assessment training to ensure consistency and accuracy by asset class and type
	  ○ Adherence to Condition Assessment schedules, in conjunction with scheduled maintenance
	  ○ Verify Condition Assessment scores

	○ Document and record data and assign maintenance as required ○ Perform visual and performance assessments by asset class ○ Disclosure of risks ○ Failure predictions
Risks	• Unsuccessful cooperation of Program Delivery Committee, Asset Owners, Asset Management Teams, and Stakeholders to carry out responsibilities • Unsuccessful incorporation of the State of Good Repair Formula Program throughout the Department • Unsuccessful incorporation of any changes in the business process • Lack of familiarity with new/upgraded software can lead to inefficiencies • Lack of resources (staffing and time)

Implementation Action 3.0 – Performance Reporting

Performance reporting, setting performance targets and agency reporting are critical elements of DTPW's Asset Management Program. DTPW will be required to report data externally and internally to a large number of entities. For example, external reporting would include the Federal Transit Administration, National Transit Database, Transportation Improvement Plan (TIP), State Transportation Improvement Plan (STIP) and other organizations. Internal reporting would include entities such as the Board of County Commissioners (BCC), Transportation Planning Organization (TPO), Accountable Executive (DTPW Director) as well as appropriate executive staff. There are various reporting requirements, report types, deliverables, timeframes and methods of providing data to the aforementioned organizations and staff.

The Final Rule elements require transit agencies to develop performance measures, set performance targets, conduct condition assessments, report infrastructure performance restrictions and prepare various evaluation reports.

- **Performance Reporting** – A series of performance measures and targets by 'Asset Class', 'Asset Mode', and 'Asset Ownership' that could outline the minimum standards for transit operators. Asset targets would be set specifically for assets with direct capital responsibility. Additionally, the targets could be utilized to update and/or strengthen DTPW's Asset Management Strategies. Performance reporting increases accountability, improves transparency and enhances progressive decision-making through better informed planning and programming.

- **Agency Reporting** – The reporting performed by DTPW is a collection of data comprised of varying performance measures, targets, processes, procedures, and goals covering many disciplines which provides the wide array of desired information essential to meet any requirement.

Implementation Action 3.1 – Performance Targets

The Federal Transit Administration requires transit agencies to establish performance targets for the State of Good Repair. The targets must be established and reported annually. Performance targets are only for assets types specifically referenced in the federal register. The following performance targets are set annually by asset class and asset category:

- **Rolling Stock** – Includes all types of passenger carrying rolling stock, including bus and rail. Targets will not include emergency contingency vehicles.

- **Equipment:** - Three (3) classes of vehicles will be collected and used for targets: Automobiles, Trucks & Other Rubber Tire Vehicles, and Steel Wheel Vehicles.

- **Facilities –** Includes two (2) of the four (4) classes of facilities: Administrative/Maintenance and Passenger/Parking facilities with partial or full capital replacement responsibility.

- **Infrastructure –** This area of transportation will be limited to track with full or partial capital replacement responsibility.

DTPW would develop and recommend performance targets which would go through an internal review process. The Accountable Executive would certify the performance targets and presents to the Transit Mobility Committee (TMC), Transportation Planning Committee (TPC), and Transportation Planning Organization (TPO) for review and approval.

Scope of Work	• Identify goals, objectives, targets, measures, and strategies consistent with DTPW's vision and mission • Identify Key Asset Management Performance Metrics for each asset class • Establish and set Performance Targets for each mode • Review and/or modify existing Performance Measures and Targets to include new reporting requirements • Establish comprehensive asset inventories of record that include asset condition, performance, and criticality • Develop dashboard, snapshot, trend, narratives, facts and assumptions for each measure to create technical performance report • Define the roles and relationships between the Program Delivery Committee, Asset Program Team, Asset Management Team and Asset Owners for setting performance targets and reporting • Define the roles and responsibilities of Asset Owners for performance reporting • Identify all asset management stakeholders (i.e. capital and operating budget planners, purchasing and materials management, IT and human resources)
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Management Team • Asset Owners • National Transit Database Data Validation Analyst • Information Technology Department
Estimated Duration	• Identify Program Delivery Committee, Asset Program Team, Asset Owners, and Performance Report Manager: ***Three (3) months in conjunction with implementation task 1.1*** • Define and communicate roles and responsibilities: ***Three (3) to six (6) months in conjunction with implementation task 1.1*** • Develop a Comprehensive Reporting Structure with deliverables: ***Three (3) months*** • Evaluate Performance Metrics Baseline: ***Six (6) months in conjunction with implementation task 1.1*** • Develop a Performance Metrics Improvement Plan: ***Six (6) months to one (1) year in conjunction with implementation task 1.1*** • Develop Reportable Asset Inventories: ***Six (6) months***
Level of Impact	• **High Impact** to Performance Metrics • **High Impact** to Life-cycle Management

	• **Moderate Impact** to Investment Prioritization • **Moderate Impact** to Program Compliance and Success

Implementation Tasks	• Establish and set performance targets for each mode
	• Implement revised performance measures and targets
	• Implement ongoing review process for maintaining the asset inventories
	• Implement performance reporting dashboard, snapshot, trend, narratives, facts and assumptions
	• Implement performance target reporting team tasks
	• Develop baselines for established performance targets
	• Develop performance reporting business processes for the Asset Management Program
	• Establish ongoing reporting coordination with other asset management stakeholders (i.e. capital and operating budget planners, purchasing and materials management, IT and human resources)
	• Develop improvement strategies
	• Establish a full-time Technology Manager position for the State of Good Repair database and Decision Support Tool development
	  ○ Designate appropriate staff resources to support the Technology Manager
	  ○ Determine Technology and Infrastructure needs
	  ○ Hire vendor to develop State of Good Repair database and Decision Tool system
	  ○ Test business processes and overall system performance
	  ○ Redefine performance measures as needed and as performance management evolves
	  ○ Identify funding for additional resources (positions, technology, and training)

Risks	• Unsuccessful collaboration between implementation teams to carry out responsibilities • Failure to receive timely Asset Condition Data • Inefficient Data Collection and Analysis • Inaccurate Risk Data • Lack of staff knowledge / skills related to Asset Management • Unsuccessful implementation of new business processes

Implementation Action 3.2 – Agency Reporting

Transit Asset Management information is reported to a vast number of entities. Various reporting methods are required for internal and external transit stakeholders and organizations. As previously mentioned, external agency reporting is not limited to the Federal Transit Administration and National Transit Database, DTPW reports Asset Management data to several other organizations such as the Transportation Improvement Plan (TIP) and State Transportation Improvement Plan (STIP). Some examples of internal stakeholders are but not limited to the Board of County Commissioners (BCC), Transportation Planning Organization (TPO), and the Accountable Executive as well as members of the Executive Staff.

Scope of Work	• Identify new and existing report requirements, timelines and due dates • Identify all reporting expectations and responsibilities • Develop and define all potential reports • Develop a schedule to meet reporting deadlines • Identify technology potentially required to be consistent with report requirements • Define roles and relationships between the Asset Program Team, Asset Management Team and Asset Owners for reporting • Identify Report Managers • Identify and define the roles and responsibilities of Report Managers • Identify all Asset Management Stakeholders (i.e. capital and operating budget planners, purchasing and materials management, IT and human resources) and include in reporting process • Identify funding for additional resources (positions, technology, and training)
Recommended Implementation Team	• Asset Program Team • Asset Management Team • Report Managers • Information Technology Department
Estimated Duration	• Review, evaluate and update current reports: ***Four (4) to eight (8) months*** • Develop reporting mechanism for new and existing report requirements: ***Four (4) to eight (8) months in conjunction with the review of current reporting processes*** • Define the roles and responsibilities of Report Managers: ***Three (3) months*** • Develop an approval process for initial reporting, major updates and decision points: ***Six (6) months initially and intermittent thereafter*** • Integration with State of Good Repair database, Decision Support Tool and reporting systems: ***One (1) to three (3) years after the identification of all reports*** • Improve report data quality: ***Ongoing***
Level of Impact	• **High Impact** to Performance Metrics • **High Impact** to Transit Asset Management Program • **Moderate Impact** to Capital and Operational Budget Planning • **Moderate Impact** to Program Compliance and Success • **Moderate Impact** to Performance Targets
Implementation Tasks	• Review current and new report requirements • Compare and add new requirements to existing report • Review current performance reporting data and resources for data collected, data sources and data maturity • Review ongoing initiatives related to performance reporting • Review and analyze report results

	• Validate State of Good Repair database's business architecture with Asset Owners to ensure realism of model / assumptions and accuracy of input data • Develop method to track accuracy and timeliness of reports • Collect feedback regularly and monitor performance • Refine and comprehensively update technical performance report as new data becomes available • Review State of Good Repair database and Decision Tool report data to identify issues and gaps
Risks	• Insufficient resources (staffing and time) to develop and implement new reporting requirements • Non-compliance with all federally required reports • Lack of effective coordination and interfacing of State of Good Repair database, Decision Support Tool and other reporting systems • Lack of quality input data received from asset owners

Implementation Action 4.0 – Data-Driven Decision Support Strategies

To fully exploit data and analytics requires three (3) mutually supportive capabilities. DTPW must be able to identify, combine, and manage multiple sources of data. Next, DTPW would need the capability to build advanced-analytics models for predicting and optimizing outcomes. And lastly, Agency Management must possess the influence to transform the organization, so the data models could yield enhanced decisions.

These business practices join financial, contractual and inventory functions together to help support life-cycle management and strategic decision-making for the Information Technology environment. Therefore, to ensure the data models yield better decisions, the Agency could transform the organization through the following approaches:

- **Technology** – Information systems used in organizing data required by the FTA to be submitted for reporting. Fundamental asset management activities and how they are facilitated by the many components of an enterprise asset management system would assist current reliability concerns and future performance targets. In many cases, information systems are cross-functional.

- **Investment Prioritization & Strategies** – Financial aspects that focus on the management of assets and life-cycle, including planning and managing under a comprehensive understanding of the different investment approaches required.

Implementation Action 4.1 – Technology

A set of business practices that join financial, contractual and inventory functions to support life-cycle management and strategic decision making for the Information Technology environment. These assets should include all elements of software and hardware that are found in the business environment.

Scope of Work	• Identify stakeholders and committee members to review potential technology solutions • Research Potential Technological Solutions • Integrate software solutions for all modes of transportation • Support day-to-day operations and maintenance throughout the asset's life-cycle • Provide real-time risks factors • Produce reports and fact sheets based on data • Manage systems and measurements enabled by the agency such as risk, cost, control compliance and business performance objectives established • Ensure system recovery strategies to avoid disruption of business
Recommended Implementation Team	• Asset Program Team • Asset Owners • Program Delivery Committee

	• Information Technology
Estimated Duration	• Research and identify technological solutions: ***Six (6) to nine (9) months*** • Procure selected technological solution: ***Nine (9) months to one (1) year in conjunction with the research and identification of technological solution*** • Install, test and implement software: ***One (1) to Two (2) years after software section process*** • Evaluation of risk factors: ***One (1) month after software go-live*** • Review and update: ***Annually***
Level of Impact	• **High Impact** to the Fiscal Aspects of Information Technology Assets • **Minimal Impact** to Transit Asset Management Requirements

Implementation Tasks	• Outline the key roles and responsibilities of Asset Program Team, Asset Owners and Information Technology
	• Outline the key roles and responsibilities of the Program Delivery Committee
	  ○ Director, Deputy Directors, and Assistant Director of Finance
	• Outline the key roles and responsibilities of the Asset Program Team
	  ○ Asset Owners
	  ○ Liaison for Program Delivery Committee
	  ○ Recommend Project Deliverables
	  ○ Recommend Policy and Procedures
	• Provide a clear strategy for how to use data and analytics to complete
	• Deploy the appropriate technology architecture and capabilities
	• Track risk management, resource and budget allocation, and accountability of assets
	• Reduce financial and residual risk due to non-compliance with contracts and licenses
	• Increase Information Technology operational flexibility and responsiveness
	• Increase value from vendors and their solutions through proactive contract and vendor management
	• Increase value from investments in Information Technology assets and services
	• Improve service delivery and passenger satisfaction

Risks	• Limited value to business • Improper disposal or removal of an asset (lost) throughout the asset life-cycle • Transfer of contractual agreement or insurance policy to another company (e.g. vendor and/or business partner) • Highly dependent on the accountability of the asset life-cycle • Lack of quality and timely data

	• Audit discrepancies of incorrect physical data entered for Information Technology assets and inventory

Implementation Action 4.2 – Investment Prioritization Strategies

In accordance with MAP-21, investment prioritization requirements provide strategic guidance for improving the condition of assets through both consideration of life-cycle costs and itemization of the actions necessary to achieve desired asset conditions. A framework to evaluate and prioritize capital investments by combining condition assessment, expected asset life, and criticality to identify the highest priority repair and/or replacements. Additionally, the identified activities would be based on the assets current and target conditions. Results must be incorporated into the next resource allocation cycle to assure all return is consistent with the strategic goals and objectives of the Agency. Moreover, it is intended to ensure investments are targeted to provide most value to the business and maintenance workers do their jobs more effectively.

DTPW currently utilizes several financial plans; an Infrastructure Renewal Program (IRP), Transit Development Plan, MDT10Ahead and multiple other financial tools that incorporate several levels of Investment Prioritization. Therefore, it is assumed that minimum updates would be required to ensure the investment prioritization strategies are in full compliance with all federal regulations outlined in MAP-21.

Scope of Work	• Review and potentially update Financial Plans as it relates to Investment Prioritization • Identify projects to improve the State of Good Repair (SGR) • Estimate funding levels and sources • Consider requirements under 49 CFR 37.161 and 37.163, maintenance of accessible features • Develop investment strategy plans for each asset class
Recommended Implementation Team	• Accountable Executive • Financial Services • All Federal, State and Local Reportable Agencies • Program Delivery Committee • Asset Program Team
Estimated Duration	• Identify Investment Priorities*: **Six (6) to nine (9) months in conjunction with all financial plans*** • Improve Backlog: ***One (1) to eight (8) years once all backlog has been identified initially*** • Infrastructure Replacement Program: ***Annually*** • Investment Priorities: ***Ten (10) years (DTPW10Ahead)***
Level of Impact	• **High Impact** to Service Reliability and Customer Satisfaction • **Moderate Impact** to Development of Investment Strategies • **Moderate Impact** to Program Compliance

Implementation Tasks	• Outline the key roles and responsibilities of the Program Delivery Committee
	  ○ Director, Deputy Directors, Assistant Director of Finance, Information Technology
	• Monitor and report at the asset component and sub-component level
	• Support departmental investment strategies
	  ○ Identify new comprehensive initiatives
	• Reduce the total life-cycle cost of each asset and improve system reliability
	  ○ Lessons learned from past projects
	  ○ Evaluate problem with current system/processes
	• Support future capital and maintenance decisions
	  ○ Acquisitions (including leases or rentals)
	  ○ Operations
	  ○ Maintenance
	  ○ Disposal
	  ○ Funding
	  ○ Risk assessment and management
	• Create strategic Asset Management Plan
	• Support future capital and maintenance decisions
	• Life-cycle Analysis (cost to maintain and replace)
	  ○ Asset expected life-cycle (years)
	  ○ Maintenance cost trending and forecasting
	  ○ Estimated replacement value
	• Project Prioritization and Budget Approval Process

Risks	• Limited information restricts decision-making process • Incomplete analysis limits effective decisions at enterprise-approval level • Lack of collaboration on project objectives affects project success and accountability • Deteriorating assets

Implementation Action 5.0 – Resource Management

Resources are the Agency's most valuable assets, which could measure the maturity of the agency's asset management practices, and is a lead indicator of future needs. Effectively managing enterprise resource capacity to meet incoming demand is typically an organization's biggest challenge. An informed decision on how to best manage the agency's capital assets and ensure recommendations are based on the condition and age of the asset. Hence, properly managing resources makes it an important element because it reveals the extent of the difference between current and target levels of asset management within the agency. It also identifies improvement actions that can lift performance to the target level.

- **Asset Management Maturity** – A process for establishing policy, strategy and business plans, as well as connecting to the agency's performance management, capital request program and risk management processes.

- **Training and Development** - An agency's strategic plan for developing asset management policy, strategy and business plans which provides the vision, mission and values of the organization, along with organizational goals, policies and strategies.

Implementation Action 5.1 – Asset Management Maturity

The knowledge and information within Asset Management acts as our primary base for advancing and communicating a deeper understanding of asset management. It can be described as the ability of the Agency to foresee and respond to our environment through the management of assets, while continuing to meet the needs of our stakeholders. Asset Management Maturity requires DTPW to deliver outcomes such as customer service, profit, safety and assurance, with the allocated resources and within the requisite delivery period. It is dynamic and should be able to respond to both the changing business environment and stakeholder needs in a manner that aligns with the other various functions within the organization. Furthermore, Asset Management Maturity provides a level to which leadership, culture, human performance and the asset management system are integrated into the whole organization.

Scope of Work	• Identify GAP Committee • Define Roles and Responsibilities • Evaluate the Agency's Asset Management Knowledge and Practices • Define and Develop an Asset Management Knowledge-based Evaluation Tool • Establish Asset Management Policies, Objectives and Processes • Define the Modules of the Asset Management System • Develop a Training Program designed around improving the Agency's Asset Management Knowledge
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Owners • Information Technology • Consultant

Estimated Duration	• Identify Committee: ***Thirty (30) days*** • Identify and Develop knowledge-based program: ***One (1) to five (5) months after the identification of committee*** • Research potential software for distribution of asset management knowledge-based assessment: ***One (1) to three (3) months in conjunction with program development*** • Perform Knowledge-based Analysis: ***Thirty (30) days to two (2) months after the development and approval of program*** • Collect and Analyze Data: ***Three (3) months after assessment has been completed and performed every three (3) years thereafter*** • Develop Knowledge Assessment Report**: *Submitted every three (3) years***
Level of Impact	• **Moderate Impact** to Agency comprehension

Implementation Tasks	• Outline the key roles and responsibilities of the Program Delivery Committee
	  ○ Director, Deputy Directors, and Assistant Director of Finance
	• Outline the key roles and responsibilities of the Asset Program Team
	  ○ Asset Owners
	  ○ Liaison for Program Delivery Committee
	  ○ Recommend Project Deliverables
	  ○ Recommend Policy and Procedures
	• Perform an analysis of the Agency's maturity through basic elements
	  ○ Processes (Structured)
	  ○ Governance
	  ○ Assets
	  ○ Culture (Structuring)
	• Perform a GAP Analysis
	  ○ Develop a GAP Analysis Survey to identify areas of improvements needed
	  ○ Identify Target Assessment Areas
	  ○ Develop an Asset Management Rating Scale Process
	  ○ Survey Outreach
	• Update data on maturity level for the Asset Management Program
	• Improve Agency Awareness
	  ○ Develop communication strategies
	  ○ Develop knowledge based information system strategies
	  ○ Set realistic goals and improvement objectives
	  ○ Meet current and future needs of stakeholders
	• Update GAP Analysis Report
	• Provide maturity level results to the Program Delivery Committee
	  ○ Identify past strengths and areas for improvement
	  ○ Highlight areas in which a revised Plan improves upon previous iterations

	• Identify the current Mission Statement and Level of Service Targets • Submit approved results for Self-Certification
Risks	• Divided decision-making in management • Disabled projects and programs across the Agency • Reduction in the value that an asset provides • Negative work environment, with low productivity • Lack of consistency between results predicted and/or achieved

Implementation Action 5.2 – Training and Development

Establishing an Asset Management Training and Development Program is essential to enhance asset management competencies and life-cycle management capabilities for DTPW employees. The Training and Development Program should be designed and developed in a systematic approach to accomplishing overall training and development goals related to the Asset Management Program. Identification of required skills and knowledge gaps are essential to core life-cycle management activities for each asset class. It is critical to ensure that existing positions, job descriptions and essential job functions are updated with Asset Management Program requirements and critical gaps are identified and corrected.

Scope of Work	• Identify Asset Management Program areas that require training and development • Develop a Transit Asset Management Training and Development Program • Review, determine and update existing trainings related to asset management • Update existing asset management trainings related to life-cycle management activities (procurement, maintenance and rehabilitation, engineering and analysis, etc.) • Identify potential skills and knowledge gaps relative to Asset Management Program • Develop training performance measures and targets • Develop a process to ensure accountability for ongoing refresher training • Define the roles and relationships between Asset Program Team, Asset Management Team, Human Resources, and Training Team • Identify potential technology needs • Identify funding for additional resources (positions, technology, and training)
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Management Team • Asset Owners • Training and Development • Human Resources • Consultants (if required)
Estimated Duration	• Identify Asset Management Training and Development Implementation Team: ***Three (3) months*** • Review and update existing trainings related to asset management: ***Three (3) to seven (7) months***

	• Develop Asset Management training programs: ***Eight (8) months initially after the review of existing training program*** • Identification of potential skills and knowledge gaps for asset class life-cycle management activities: ***Nine (9) to twelve (12) months*** • Develop a process to update training materials: ***Three (3) months*** • Conduct Asset Management Training: ***Annually*** • Update and/or add job descriptions as necessary: ***Ongoing***
Level of Impact	• **High Impact** to Training and Development Program • **High Impact** to Asset Management Knowledge • **High Impact** to Asset Reliability • **Moderate Impact** to Capital and Operational Budget • **Moderate Impact** to Program Compliance and Success • **Moderate Impact** to Employee Satisfaction

Implementation Tasks	• Define critical skill sets for each asset class to support life-cycle management activities
	  ○ Operating and Maintenance Strategies
	  ○ Policies and Procedures
	  ○ Reliability Process
	  ○ Planning and Scheduling
	  ○ Risk Management
	  ○ Commission and Decommission Plans
	  ○ Performance Targets, Baselines and Dashboards
	• Update the current training programs to address potential gaps
	• Establish a standard curriculum covering subjects such data analysis, software use, performance improvement methods:
	  ○ Managers and asset management support staff
	  ○ Stakeholders
	  ○ Asset Owners
	  ○ Frontline Support
	• Develop an introductory training course on asset management, covering overall goals and process and skills like problem-solving, performance improvement methods, Asset Management State of Good Repair database and Decision Tool use, statistical analysis, and life-cycle cost analysis
	• Establish a method to address general asset management training issues and program feedback
	• Monitor training performance and ongoing performance issues
	• Review training effectiveness periodically
	• Conduct Asset Management refresher training courses as needed

Risks	• Lack of capability to develop high quality, asset management training programs • Lack of resources to develop effective, targeted Asset Management Training and Development Programs • Lack of oversight to ensure training execution and quality

Implementation Action 6.0 – Asset Management Program Review

The Asset Management Program Review looks beyond the theory of what the program is supposed to do and instead evaluates how the program is being implemented along with impacts or effects of the program. The review determines whether the components identified as critical to the success of the program are being implemented and/or achieved. It also determines whether performance targets are reached or exceeded and if the Agency is compliant with Federal Regulations.

The Program Review also determines the causal effects of the program. This involves measuring the program's intended outcome. There are two kinds of outcomes along with the program effect:

- **Outcome Level** refers to the status of an outcome at some point in time;
- **Outcome Change** refers to the difference between outcome levels at different points in time; and
- **Program Effect** refers to the portion of an outcome change that can be attributed uniquely to a program as opposed to the influence of some other factor.

Through an improvement process, incremental progress can be reached as a result of the Asset Management Program Review. Focusing on increasing the effectiveness and/or efficiency of the Agency; there can be improvements in business strategy, business results, customer satisfaction, and capital improvement.

Implementation Action 6.1 – Evaluation Plan

The Asset Management Evaluation Plan is a systematic method of collecting, analyzing and using information to answer questions about the overall impact of the program. The program evaluation initially will focus around this definition. As a result of the evaluation, important considerations often include how much the program costs, how the program could be improved, whether the program is worthwhile, whether there are better alternatives, if there are unintended outcomes, and whether the program goals are appropriate and useful. To ensure these questions are correctly addressed, the evaluation should be a joint project between the Program Evaluation Team and all Stakeholders.

Scope of Work	• Define Roles and Responsibilities for Program Evaluation Team Members from all of the Asset Management disciplines • Evaluate established Performance Management and Measures • Assess the Asset Management Program Compliance with Federal and State Regulations • Evaluate Agency State of Good Repair across all Asset Categories • Review Risk Register • Assess Agency Asset Management Maturity • Develop Program Overall Status Report including GAP Analysis
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team • Asset Management Team • Asset Owners

Estimated Duration	• Identify Program Evaluation Team – ***Six (6) months after the completion of the Asset Management plan*** • Review and Assess Program Performance Measures – ***Three (3) months to four (4) months at the end of the fiscal year*** • Verification of the Agency Maturity Training Development Program – ***One (1) year*** • Evaluation of the overall program – ***initially Six (6) month upon completion of each phase of the project***
Level of Impact	• **Moderate Impact** to Performance Targets & Metrics • **High Impact** to Federal Regulatory Compliance

Implementation Tasks	• Develop a progress monitoring and evaluation schedule that ensures the Asset Management Program is regularly reviewed and updated
	• Identify subject matter experts and additional resources as needed to support the Asset Management Program
	• Determine the data required to monitor and assess key aspects of the Program:
	  ○ Communication and feedback loops
	  ○ Inspection activities
	  ○ Asset Inventory Condition Rating and Assessments
	  ○ Performance Measures and Targets
	  ○ Agency Enhancements or Expansions
	  ○ Funding Requirements
	  ○ Regulatory Requirements
	• Assess Resource Allocation
	  ○ Functional Teams, Trainers, and Managers
	• Assess the current computerized system and provide potential recommendations
	• Determine GAP with unmet Capital Improvements including funded but have not commenced projects

Risks	• Non-Compliance with Federal Regulations • Unsuccessful Transit Asset Management State of Good Repair implementation

Implementation Action 6.2 – Improvement Plan

The Improvement Plan provides for the control and monitoring of Asset Management Program activities. It's a mechanism to ensure the overall program stays on track and progresses at an acceptable pace. The Plan will include all supporting data required to initiate action.

Scope of Work	• Develop and Implement an Improvement Plan • Define Roles and Responsibilities for Improvement Team Members from all of the Asset Management disciplines • Define Performance Management and Measures Revision • Improve overall Asset Management Knowledge • Define a mechanism to reduce GAP in Capital Assets
Recommended Implementation Team	• Program Delivery Committee • Asset Program Team

	• Asset Management Team • Asset Owners
Estimated Duration	• Improvement Plan – ***Two (2) months upon completion of each phase of the project initially***
Level of Impact	• **Moderate Impact** to Performance Targets & Metrics • **High Impact** to Federal Regulatory Compliance

Implementation Tasks	• Develop an Improvement Plan that addresses:
	  ○ Improved Communication and Information dissemination
	  ○ Training and technical assistance
	  ○ Potential adjustments in Agency structures, data and system support
	  ○ Activities on potential expansion (scale-up) and sustainability.
	• Identify subject matter experts and additional resources as needed to support the Asset Management Program
	• Develop an improvement monitoring and evaluation schedule that ensures the Asset Management Program is regularly reviewed, updated and improved
	• Determine mechanisms for keeping stakeholders and the frontline apprised of progress
	• Develop an improvement goal for identified GAPs with Capital Improvement Projects including items that are funded but have not commenced

Risks	• Non-compliance with Federal Regulations • Unsuccessful Implementation of DTPW's Asset Management Program

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Miami-Dade County
Department of Transportation & Public Works

Asset Management Maturity GAP Analysis

Prepared with support from:

PMA Consultants

MIAMI-DADE COUNTY

TABLE OF CONTENTS

The Federal Transit Administration has published a final rule to establish a Transit Asset Management System in accordance with section 20019 of the Moving Ahead for Progress in the 21st Century Act (Pub. L. 112–141 (2012), codified at 49 U.S.C. 5326). As part of the requirements of this final rule for developing and implementing a Transit Asset Management Plan, the Miami-Dade County Department of Transportation and Public Works conducted a GAP Analysis to define the agency's Maturity level regarding Transit Asset Management practices and requirements. As a result, the Miami-Dade County Department of Transportation and Public Works approves and adopts the following document as the agency's Transit Asset Management GAP Analysis Report.

As hereby certified by:

Date: 5-31-17

Alice N. Bravo, P.E.
Director / Accountable Executive
Miami-Dade County Department of Transportation and Public Works

REVIEW LOG

Carlos De La Torre, Chief, Performance and Materials Management — Date: 5/2/17

Jerry Blackman, Assistant Director, Rail Services — Date: 5/3/17

Derrick J. Gordon, Assistant Director, Bus Services — Date: 5-8-17

Steve Feil, Deputy Director of Operations — Date: 5/22/17

EXECUTIVE SUMMARY

Introduction

In accordance with the Moving Ahead for Progress in the 21st Century Act ("MAP-21" – the Federal Transportation Administration (FTA) signed into law on July 6, 2012), the Miami-Dade County Department of Transportation and Public Works (DTPW) began developing its first ever Transit Asset Management (TAM) Plan in 2016. This Plan is a collaborative effort, guided by County Subject Matter Experts (SME), representatives from the Information Technology Department (ITD), DTPW Division of Operations and Maintenance - as the business liaisons for the Asset Management Program, as well as the agency's senior leadership.

The TAM Plan will establish the requirements for managing transit assets as mandated by the Federal Transit Administration (FTA). It will identify and analyze processes needed for decision-making where the use of limited funding can be applied for the most critical State of Good Repair (SGR) projects. As a result of this process, DTPW will improve its stewardship over its physical assets, identify risks, reduce maintenance and life-cycle costs, make better informed capital investment decisions and enhance quality of service by implementing the procedures and tools in its TAM Plan. The Plan will address the following asset classes: Metrobus, Metrorail, Metromover, and Facilities.

DTPW currently employs monthly operations reports and various other reporting mechanisms related to asset management practices and focused on performance including the difference, or gap, between state of good repair levels and future target levels.

The purpose of a gap analysis is to identify and prioritize areas in which the agency is not performing at the desired level of maturity. These "gaps" in performance represent elements of the agency's asset management program that are not well understood, are not well supported, or are not fully integrated into the decision-making process. Gathering a cross-section of agency representatives to discuss the results of the gap analysis will help agency leadership better understand the factors contributing to each gap and the resources that would be needed to address the gap. This discussion should culminate in the development of an Asset Management Implementation Plan that identifies the actions that will be taken, the individuals responsible for completing each activity, and the completion schedule. The Implementation Plan should be reviewed periodically and agency reassessments, using the GAP Analysis Tool, should be an integral part of an agency's asset management culture.

The gap analysis was not an exercise in rule compliance; it was the first task in gathering a snapshot of a transit agency's level of maturity in TAM development and implementation.

TAM GAP ANALYSIS PROCESS

GAP Analysis

Transportation Asset Management is most successful when an agency's goals and objectives are closely aligned with investment decisions that consider agency risk, strategies to reduce life-cycle costs, and customer demands. The implementation of asset management is a continuous progression that occurs over time as a result of a series of incremental steps. Throughout that process it is important to periodically conduct an objective assessment to identify areas of strength and weakness and to provide clear direction for enhancements that are needed to improve the decision-making process, enhance the data and tools that support the process, or build capacity and support for asset management both internally and externally. This type of assessment is referred to as a gap analysis because strengths and weaknesses are evaluated in terms of 'gaps' between desired practices and the agency's current state-of-the- practice. A gap analysis is commonly used in the TAM community to identify areas of improvement, to assess the level of maturity of a TAM program, and to benchmark against best practices.

The TAM Gap Analysis provided an opportunity to evaluate agency's knowledge of Asset Management practices as they relate to a fully mature TAM plan. This would include an inventory of capital assets, a condition assessment of inventoried assets, a decision support tool, and a prioritization of investments. The goal of this effort was to identify areas where DTPW can develop opportunities for integrating processes and activities for the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life-cycles, for the purpose of providing safe, cost-effective, and reliable public transportation.

This effort provides insight of the agency's current TAM awareness and serves as a tool for continuous improvement that can enhance the development and implementation of the TAM plan. Finally, it also provides a baseline condition of the agency's documented commitment to achieving and maintaining a state of good repair for all of its capital assets and definition of TAM objectives, roles and responsibilities for meeting those objectives. This self-assessment process is required to be performed every three (3) years as part of the implementation of the TAM plan to help monitor the progress of the agency towards its goals.

The Transportation Asset Management Guide – A Focus on Implementation published by the American Association of State Highway and Transportation Officials (AASHTO) describes the gap analysis objective as a process that determines areas of improvement and provides a basis for prioritizing improvements so that resources are allocated effectively. A gap analysis is considered part of the on-going TAM improvement cycle, providing a means of evaluating current and desired capabilities and establishing a plan for making necessary enhancements.

The Publicly Available Specification (PAS) PAS 55:2008 and The Transportation Asset Management Gap Analysis Tool and User's Guide published by the Transportation Research Board (TRB) were used as references to develop and execute the gap analysis.

PAS 55:2008

PAS 55:2008 is an internationally recognized standard for asset management applicable to any organization where physical assets are key or a critical factor in achieving its business goals. Initiated by and supported worldwide through the Institute of Asset Management (IAM), PAS 55:2008 provides objectivity across twenty-eight (28) aspects of good asset management, from life-cycle strategy to everyday maintenance (cost/risk/performance) and integrates all aspects of the asset life-cycle: from the first recognition of a need to design, acquisition, construction, commissioning, utilization or operation, maintenance, renewal, modification and/or ultimate disposal.

PAS 55:2008 also provides a common language for cross-functional discussion and provides the framework for understanding how individual parts fit together, and how the many mutual interdependencies can be handled and optimized. The expectations of good asset management include integration awareness, and require the management of assets at levels of detail appropriate to value contribution or business criticality.

PAS 55:2008 provides a questionnaire addressing several topics related to asset management and it is conducted through a self-assessment process.

Self-Assessment Methodology (SAM)

As established by the IAM, to undertake a self-assessment as part of the development of the TAM Plan, DTPW:

a. Appointed a coordinator, also known as the Tool Administrator, responsible for all matters concerning the assessment, including:
    i. Organizing the people within the organization who will be respondents to the questions;
    ii. Arranging for all information to be captured within the tool;
    iii. Reporting on the results of the assessment to the organization;
b. Confirmed the scope of the asset management system to assess;
c. Confirmed the survey questionnaire format as the assessment process;
d. Arranged appropriate 'vertical and horizontal' cross-sections of its workforce to act as respondents for the assessment exercise;
e. Provided appropriate pre-assessment communication and introductory training to ensure that the respondents were aware of the assessment process and their peart within it;
f. Identified the questions to be asked for each survey group;
g. Agreed why the assessment is being undertaken and how the output will be used; and
h. Considered all internal stakeholders.

Objectives of Self-Assessment Methodology

An asset management assessment is designed to provide an organization with the following:

- Quantified empirical evidence to assist its understanding of its current level of application of asset management processes, tools and techniques, including any significant gaps in application calibrated against a recognized scale;

- A baseline and benchmark upon which it can build action plans to address key gaps and monitor progress over time, and which can be used to compare its own asset management capability against other organizations; and
- A better understanding of good practice in asset management to aid in the preparation of an improvement program or action plan.

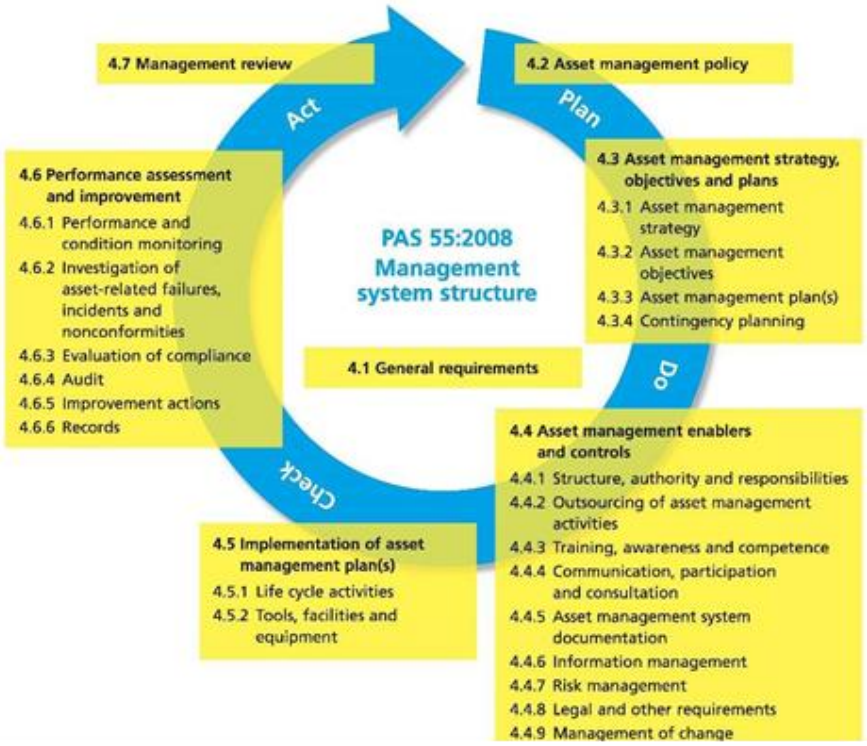
Assessment Questionnaire

The Self-Assessment Methodology Question sheet for PAS 55 provides one hundred and twenty-one (121) questions covering each of the twenty-eight (28) elements of PAS 55:2008. A gap questionnaire was developed based on this framework and adjusted to cover the following Assessment Areas:

A. Policy Goals and Objectives
B. Transportation Asset Management (TAM) practices
C. Performance & Condition, Corrective & Preventive, and Investigation
D. Asset Inventory, Continual Improvement and Change Management
E. Information Management, System Documentation and Records
F. Outsourcing and Communication
G. Risk Management, Audit & Compliance, and Management Review
H. Training, Competence and Equipment, Facilities

The figure below illustrates the different areas of focus for PAS 55:2008.

PAS 55:2008 Management System Structure Assessment Areas



Each question set comprises of five (5) possible indicators describing the performance criteria associated with each level of maturity. Therefore, an organization's conformance to the elements of PAS 55:2008 is measured using five (5) levels of maturity as compared to the goal level. The answers are recorded and weighted equally to assess the maturity level of each area. The maturity answers are provided to help the organization determine its level of maturity, or conformance, with the requirements of PAS 55:2008.

Using the customized gap questionnaire the GAP Analysis Tool was used to perform an agency-wide survey, document responses as to the current knowledge of TAM practices, identify the gaps based on the differences between the agency's assessment of its targeted and current practices and analyze strengths and weaknesses to prioritize the implementation of TAM at DTPW.

GAP Analysis Tool

The 2011 AASHTO Guide introduced an Excel-based GAP Analysis Tool to illustrate the application of a gap analysis to identify and prioritize needed enhancements. While the tool served as a good starting point for several agencies, improvements to the functionality, flexibility, and user experience were needed for it to be widely used. These changes and enhancements were addressed under National Cooperative Highway Research Program (NCHRP) Project 08-90, which developed a new TAM Gap Analysis Tool. The User's Guide supported the operation and use of the Excel-based tool that was developed under the research study.

DTPW used the tool to construct the survey and request feedback throughout the agency. This platform allowed an agency-wide self-assessment of asset management in compliance with the industry's best practices. It helped collect the data and calculate the maturity levels and gaps for analysis. The results from these surveys can create specific action plans to move the agency towards its maturity goals and close the knowledge gaps between the State of Good Repair (SGR) levels and future targets as identified in the gap analysis.

The GAP Analysis Tool provides a framework for its data structure and a maturity rating scale to provide gap calculation and facilitate analysis.

Gap Analysis Data Structure

The tool has been designed to evaluate current and desired asset management capabilities at three (3) different levels.

Level 1: Assessment Areas are a broad category of a key transportation asset management for which a strategic assessment is to be conducted. The highest level of assessment is the Assessment Area and consists of eight (8) topic areas that include:

A. Policy Goals and Objectives
B. Transportation Asset Management practices
C. Performance & Condition, Corrective & Preventive, and Investigation
D. Asset Inventory, Continual Improvement and Change Management
E. Information Management, System Documentation and Records
F. Outsourcing and Communication
G. Risk Management, Audit & Compliance and Management Review
H. Training, Competence and Equipment, Facilities

Level 2: Elements. Each Assessment Area has been subdivided into two or more Elements, which can be considered subsets of each of the eight (8) broad topic areas. Each of the twenty-three (23) Elements has a list of Criteria associated with it. The TAM Elements table below lists the individual Elements included under each of the Assessment Areas in the tool. The Elements include related topics that make up the Assessment Areas and provide a greater level of detail. They help outline specific subjects to offer greater insight of where improvement is most needed and guide maturity improvement efforts.

TAM Elements	
A.	**Policy Goals and Objectives**
A.1	Goals & Objectives
A.2	Agency Policies
B.	**Transportation Asset Management Plan**
B.1	TAM Strategy
B.2	Structure, Authority and Responsibilities
B.3	Asset Management Plan
B.4	Life-Cycle Management
C.	**Performance & Condition, Corrective & Preventive, and Investigation**
C.1	Performance and Condition monitoring
C.2	Corrective & Preventive Action
C.3	Investigation of Asset-Related Failures, Incidents and Non-conformities
D.	**Asset Inventory, Continual Improvement and Change Management**
D.1	Asset Inventory
D.2	Continual Improvement
D.3	Management of Change
E.	**Information Management, System Documentation and Records**
E.1	Information Management
E.2	Asset Management System Documentations
E.3	Records
F.	**Outsourcing and Communication**
F.1	Outsourcing of Asset Management Activities
F.2	Communication, Participation and Consultation
G.	**Risk management, Audit & Compliance and Management Review**
G.1	Risk Management, Methodology, Identification, Assessment and Risk Information
G.2	Audit and Compliance
G.3	Management Review
G.4	Legal and Other Requirements
H.	**Training, Competence and Equipment, Facilities**
H.1	Training, Awareness and Competence
H.2	Tools Facilities and Equipment

Level 3: Criteria. Within each Element, there are two (2) or more criteria that are used to evaluate current and desired practices. Each Criteria is presented as a statement representing a particular aspect of good practice that is individually assessed and weighted to determine the gap between targeted and current scores. Raters are asked to evaluate how much knowledge or awareness they possess regarding that item

and their agency's adherence to that Criteria to determine gaps. The full list of the one hundred and seventeen (117) Criteria is provided in the TAM Criteria Maturity Levels table in the Appendices section.

Criteria serve as the basis for identifying gaps and are comprehensive enough to consider all aspects of an asset management program and representative of what is considered best practices. The Criteria Level possesses the specific statements to be rated by respondents, it is the only level in the tool where actual maturity level scores are entered. Using the Criteria as the input level provides a level of detail to identify specific issues or root causes of deficiencies.

Response at the Criteria Level are accumulated with other Criteria within an Element to obtain the average Element maturity level score. Element cumulative scores are also used to determine their corresponding average Assessment Area score and in turn, Assessment Areas scores are combined to determine the overall maturity level and gap. This data structure in the tool allows for results to be evaluated at any of the three (3) levels: Assessment Area, Element, or Criteria. In addition, an overall maturity score that considers all Assessment Areas can be calculated.

Maturity Rating Scale

The tool uses a 5-point scale for evaluating current and desired capabilities. The Scale was developed based on the TAM Maturity Scale introduced in the 2011 AASHTO Transportation Asset Management Guide – A Focus on Implementation.

The AASHTO Guide expanded on these definitions and provided a table that described characteristics associated with each of the five maturity levels in six different areas: 1) processes; 2) frequency; 3) sub-element emphasis; 4) process formality; 5) data and technology; and 6) outputs and results (AASHTO 2011). The table below provides guidance for assessing the differences between each of the maturity levels within each area.

Maturity Rating Scale

Maturity Scale	Processes	Frequency	Sub-element Emphasis	Process Formality	Data & Technology	Outputs & Results
1	Initial stages of inquiry; focus is on literature search and peer reviews/calls	Occasionally do this	Receives minimal emphasis; some efforts underway	Done informally only; ad hoc procedures; minimal documentation; no organizational integration	Manual system exists: plans for automated system in place	Minimal results; long way to go
2	Identify nature/extent of capital assets; prompted by new financial reporting	Sometimes done on an as-needed basis for critical programs and activities	Moderately emphasized; try to adhere to this	Semiformal process; some routine procedures exist; limited organizational integration	Automated system exists; meets basic needs	Some results; still below expectations
3	Processes identify, assess, and value infrastructural assets; focus on preservations and replacement/ rehabilitation	Often do this on many programs and activities	Generally emphasized; something that is done and checked	Formal process exists; modestly documented; good but still evolving; some organizational integration	Good system in place; widely available; meets all key user needs	Good results; getting there
4	Processes extend to life-cycle development and preservation	Usually do this; omitted only in exceptional circumstances	Strongly emphasized; used to measure and reward by	Formal documented process; well-tested and well followed; considerable organization integration	Strong system in place; fully integrated; meets nearly all user needs	Excellent results; still some room for improvement
5	Fully integrated processes; across all functions; flexible to change	Always do this; standard operating procedure	Heavily emphasized; one of the principles by which business is done	Mastery of formal processes; well-documented; standardized; full organizational integration	State-of-the-art system in place; always seeking betterment	Unparalleled results; fully engaged organization; a total success

As noted previously, no prior training on asset management practices and methods was given to the staff in an effort to obtain an unbiased response, the maturity levels for this survey have been adapted to focus on the level of knowledge of asset management practices as described in the table below. The provided survey was to be evaluated based on minimal to complete knowledge for each of the one hundred and seventeen (117) criteria.

TAM Maturity Level Scale

5	I have **THOROUGH (COMPLETE)** knowledge/understanding
4	I have **ABOVE AVERAGE** knowledge/understanding
3	I have **AVERAGE** knowledge/understanding
2	I have **BELOW AVERAGE** knowledge/understanding
1	I have **MINIMAL** knowledge/understanding

Using the customized tool and the Maturity Scale described above, DTPW worked with consultants to survey the agency and identify the level of asset management knowledge and understanding. This process will provide priorities for implementing the TAM Plan and identify gaps and areas of improvement for asset management.

Survey Groups

The questionnaire was developed in an Excel-based GAP Analysis Tool and distributed during the months of October and November of 2016. Surveys from two hundred and forty-one (241) respondents were received from the following DTPW groups:

Survey Groups		Respondents
1.	Senior Staff	8
2.	Finance	4
3.	Transit Asset Management	8
4.	Safety	1
5.	Human Resources	5
6.	Procurement	3
7.	Metrobus	5
8.	Metromover	0
9.	TMPC	11
10.	Infrastructure and Maintenance	2
11.	Metrorail	1
12.	Facilities	2
13.	Frontline Staff	191
Total Respondents		**241**

The previous list indicates the respondents from the different Survey Groups. Frontline Staff was the largest group engaged with 191 respondents while Metromover did not provide any survey response. Assessment Areas, Elements or Criteria with no responses have been marked as not available (N/A) in the maturity level tables in the following sections of this document.

RESULTS

The results have been grouped for Assessment Areas, several Elements within each Assessment Area and various Criteria per Element. The broader Assessment Area category allows for a summarized view of maturity levels per the main TAM topics.

The survey included thirteen (13) different groups within the agency from senior to frontline staff. This provided a diverse and inclusive assessment to gauge the agency-wide asset management knowledge.

The answers were recorded and weighted equally to assess the maturity level of each area. The answers are provided to help the organization determine its level of maturity, or conformance, with the requirements of a TAM Plan. The results from this process are illustrated in the following tables and figures.

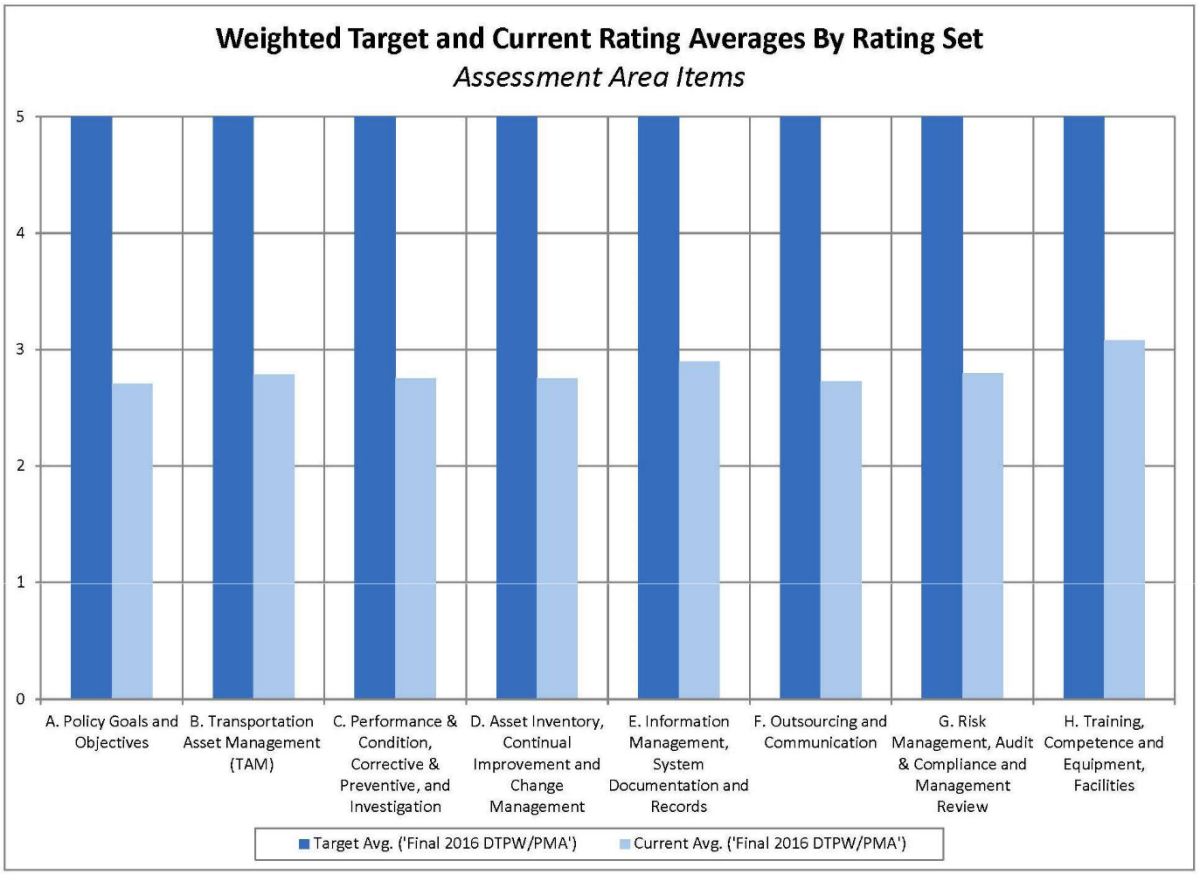
TAM Assessment Areas Maturity Levels

Maturity Level per Assessment Area

	TAM Assessment Areas	Maturity Level (Avg)	Gap
A.	Policy Goals and Objectives	2.70	2.30
B.	Transportation Asset Management	2.79	2.21
C.	Performance & Condition, Corrective & Preventive, and Investigation	2.75	2.25
D.	Asset Inventory, Continual Improvement and Change Management	2.76	2.24
E.	Information Management, System Documentation and Records	2.90	2.10
F.	Outsourcing and Communications	2.72	2.28
G.	Risk Management, Audit & Compliance and Management Review	2.80	2.20
H.	Training, Competence and Equipment, Facilities	3.08	1.92
Overall DTPW Average TAM Maturity Level		**2.81**	**2.19**

The bar chart below highlights the agency's maturity level versus the target goal for each Assessment Area. The difference of current level and target goal equals the gap as illustrated in the chart below.

Bar Chart



Assessment Results for Survey Groups

The included matrix of Survey Group Maturity Levels per Assessment Areas reflects the current TAM knowledge of the various survey groups at DTPW with respect to:

A. Policy Goals and Objectives
B. Transportation Asset Management Practices
C. Performance & Condition, Corrective & Preventive, and Investigation
D. Asset Inventory, Continual Improvement and Change Management
E. Information Management, System Documentation and Records
F. Outsourcing and Communication
G. Risk Management, Audit & Compliance and Management Review
H. Training, Competence and Equipment, Facilities

According to the results from the GAP Survey, DTPW has an overall score of 2.81 with the lowest scoring group in Facilities and the highest scoring group in Infrastructure and Maintenance. At an agency-wide level, the highest TAM awareness is in Assessment Area H while the lowest maturity level is for

Assessment Area A. Other groups with the next highest scores include Finance and Senior Staff as they deal mostly with the overall management of the agency and are aware of the various elements and how they connect. Areas with a more focused role within the agency such as Facilities, Metrobus and Human Resources, demonstrated a lower maturity level.

In the table below, the green shaded cells highlight the highest score for each assessment area and the tan shaded cells underline the lowest score documented. The figure in parenthesis next to each survey group title is the amount of respondents from each group. A total average score for each group is also tabulated at the far right column of the table below. The actual gap figure can be obtained by subtracting the goal maturity level rating of 5 minus the listed score.

Survey Group Maturity Levels per Assessment Areas

SURVEY GROUPS	ASESSMENT AREAS								
	A.	B.	C.	D.	E.	F.	G.	H.	Total
Senior Staff (8)	3.39	3.27	3.41	3.00	3.63	3.08	3.03	4.00	**3.35**
Finance (4)	3.89	3.41	4.00	3.44	4.25	N/A	3.43	N/A	**3.74**
Transit Asset Management (8)	3.09	2.73	3.24	2.85	3.14	2.92	2.54	3.21	**2.97**
Safety (1)	3.00	3.00	3.00	3.00	N/A	3.00	3.00	N/A	**3.00**
Human Resources (5)	1.73	1.69	2.13	1.70	N/A	N/A	1.86	2.24	**1.89**
Procurement (3)	2.85	2.88	N/A	2.67	N/A	N/A	2.50	N/A	**2.73**
Metrobus (5)	1.48	1.86	2.23	1.47	2.20	1.30	1.99	2.54	**1.88**
Metromover (0)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**N/A**
TMPC (11)	3.31	3.34	3.94	3.39	4.18	3.13	3.39	4.18	**3.61**
Infrastructure and Maintenance (2)	4.05	3.70	4.67	4.33	4.00	4.25	4.30	4.80	**4.26**
Metrorail (1)	1.55	1.98	2.67	1.00	4.00	2.83	2.20	3.30	**2.44**
Facilities (2)	1.54	2.07	1.58	1.17	1.50	1.50	1.20	2.20	**1.60**
Frontline Staff (191)	2.54	2.46	2.59	2.42	2.47	2.47	2.54	2.48	**2.50**
All (241) / Avg	**2.70**	**2.79**	**2.75**	**2.76**	**2.90**	**2.72**	**2.80**	**3.08**	**2.81**

RECOMMENDATIONS

The gaps highlighted in the previous section represent elements of the agency's asset management program that present an opportunity for improvement through better understanding, additional support and increased integration into the decision-making process. First steps should involve gathering a cross-section of agency representatives to discuss the results of the gap analysis to help agency leadership better understand the factors contributing to each gap and the resources that would be needed to address the gap. This process involves interpreting the analysis results and prioritizing gaps that should be addressed. The maturity levels are used to identify high priority items and actions that will help to close the gap and bring the agency's practices closer to the targeted level. Given the results of the analysis the prioritization process can be assisted by considering the potential risk to the agency if the gap is not addressed, the relevance of a particular item to the agency's performance objectives, the resources required to reduce the gap, regulatory requirements, or the length of time it would take to reduce the gap.

This discussion should culminate in the development of an Asset Management Implementation Plan that identifies the actions that will be taken, the individuals responsible for completing each activity, and the completion schedule. The Implementation Plan should be reviewed periodically and agency reassessments, using the GAP Analysis Tool, should be an integral part of an agency's asset management culture.

General Recommendations

The compliance with current reporting requirements of the transportation system have provided the agency with familiarity to assess management practices. However, the results of the gap analysis, the agency's knowledge of TAM is limited to reporting requirements. As indicated in the first Transit Asset Management GAP Analysis Survey conducted at DTPW, the overall maturity level is **2.81**. The desired maturity level is 5 resulting in a gap of **2.19** that should be addressed moving forward for a successful implementation of a TAM program.

The gap analysis was conducted without prior training on asset management to any of the groups surveyed. This was purposely conducted to obtain a "raw" assessment of the agency's current maturity level.

DTPW began to develop its TAM Plan during the first quarter of 2016 and has conducted various tasks to develop the framework for integrating TAM practices at DTPW. Presenting to all the departments and divisions of these efforts and sharing the TAM Plan should immediately help to improve the level of maturity throughout the agency.

General recommendations that can increase the agency's overall maturity levels and reduce the gap between current and best practices include:

1. Present and distribute the TAM plan throughout the agency;
2. According to the Gap Analysis, Policy Goals & Objectives is the Assessment Area with the lowest maturity level. The development of a TAM Policy as well as distributing the TAM plan can address this area;
3. Define Asset Management roles and responsibilities within the agency;

4. Create and implement cross-functional Asset Management Business Units as indicated in the TAM Plan:
    a. Program Delivery Committee ;
    b. Asset Program Team;
    c. Asset Management Team;
5. Discuss and provide training in TAM practices;
6. Expand reporting to account for all asset modes and integrate it to asset management practices;
7. Engage survey groups that did not participate in the GAP Analysis Survey (i.e. Metromover);
8. Integrate performance reporting capabilities with asset management strategies and goals;
9. Perform agency-wide risk management;
10. Inform City, County and other Local Government officials on the agency's efforts on Asset Management; and
11. Conduct a Condition Assessment and collect reliable data for a complete and current asset inventory.

The survey was conducted without prior training on asset management concepts. Therefore a gap analysis should be performed within three (3) years from the Transit Asset Management Plan introduction to reassess the agency's maturity and prioritize future enhancements.

Assessment Areas

Potential recommendations for each Assessment Area are listed below:

Policy Goals and Objectives

- Review the process used to establish agency goals and look for ways to better incorporate asset management practices
- Evaluate whether performance measures are tied to agency objectives
- Establish an Asset Management Policy

Transportation Asset Management

- Document existing business processes and look for areas of improvement
- Confirm the agency's objectives for asset management
- Establish links between asset management and executive leadership
- Update the Transit Asset Management Plan
- Identify strategies for accounting for maintenance trade-offs associated with capital investments

Performance & Condition, Corrective & Preventive, and Investigation

- Document existing business processes and look for areas of improvement
- Evaluate appropriateness of current performance measures and targets
- Identify data needed to improve these functions

Asset Inventory, Continual Improvement and Change Management

- Prioritize data needs based risk and other key factors

- Develop a quality plan to improve the quality of available data
- Establish a data governance plan

Information Management, System Documentation and Records

- Review the current capabilities of existing management system and prioritize needed enhancements
- Improve and develop performance models
- Incorporate a range of treatments into existing management systems

Outsourcing and Communication

- Establish a communications plan for asset management
- Include a representative from the Public Information Office on the Asset Management Committee

Risk Management, Audit & Compliance and Management Review

- Review the TAM Plan to confirm it meets legislated requirements
- Review existing performance measures and targets to determine suitability

Training, Competence and Equipment, Facilities

- Define asset management roles and responsibilities
- Identify skills needed at each position
- Develop a training plan

CONCLUSION

The final product of the gap analysis process is the development of an Implementation Plan that outlines the short- and long-term actions that will be taken to close the gaps, the individuals responsible for each action, and the timeline for its completion. As a result this will introduce an element of accountability to the process that helps ensure that the actions will be completed.

It is important to recognize that a TAM Implementation Plan is part of a continuous program of incremental enhancements that evolve based on each agency's policies and practices. As a result, the Implementation Plan should be updated on a regular basis to ensure that the agency's asset management practices continue to support the agency's overall objectives. Because DTPW is in an early stage of implementation, the agency may find it important to revisit the Implementation Plan every eighteen (18) to twenty-four (24) months and update the plan with any significant changes as they occur. Regardless of how often the Plan is updated, a gap analysis should be considered one of the first steps in the process to both identify and prioritize enhancements.

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APPENDIX

TAM Elements Maturity Levels

TAM Elements		Maturity Level (Avg)	GAP
A.	**Policy Goals and Objectives**	**2.70**	**2.30**
A.1	Goals & Objectives	2.80	2.20
A.2	Agency Policies	2.52	2.48
B.	**Transportation Asset Management Plan**	**2.79**	**2.21**
B.1	TAM Strategy	2.79	2.21
B.2	Structure, Authority and Responsibilities	2.81	2.19
B.3	Asset Management Plan	2.86	2.14
B.4	Life-Cycle Management	2.69	2.31
C.	**Performance & Condition, Corrective & Preventive, and Investigation**	**2.75**	**2.25**
C.1	Performance and Condition Monitoring	2.68	2.32
C.2	Corrective & Preventive Action	2.61	2.39
C.3	Investigation of Asset-Related Failures, Incidents and Non-conformities	2.98	2.02
D.	**Asset Inventory, Continual Improvement and Change Management**	**2.76**	**2.24**
D.1	Asset Inventory	N/A	N/A
D.2	Continual Improvement	2.63	2.37
D.3	Management of Change	2.88	2.12
E.	**Information Management, System Documentation and Records**	**2.90**	**2.10**
E.1	Information Management	3.22	1.78
E.2	Asset Management System Documentation	2.83	2.17
E.3	Records	2.64	2.36
F.	**Outsourcing and Communication**	**2.72**	**2.28**
F.1	Outsourcing of Asset Management Activities	2.62	2.38
F.2	Communication, Participation and Consultation	2.82	2.17
G.	**Risk Management, Audit & Compliance and Management Review**	**2.80**	**2.20**
G.1	Risk Management, Methodology, Identification, Assessment and Risk Information	2.68	2.32
G.2	Audit and Compliance	2.97	2.03
G.3	Management Review	2.87	2.13
G.4	Legal and Other Requirements	2.67	2.33
H.	**Training, Competence and Equipment, Facilities**	**3.08**	**1.92**
H.1	Training, Awareness and Competence	2.47	2.53
H.2	Tools Facilities and Equipment	3.69	1.31
Overall DTPW Average TAM Maturity Level		**2.81**	**2.19**

TAM Criteria Maturity Levels

The scores listed are the average maturity levels received from the responses to the GAP Survey and do not reflect the actual GAP score. To obtain the GAP rating, the listed figures need to be subtracted from the goal maturity level of 5.

A.	Policy Goals & Objectives	Maturity Level (Avg)
A.1	**Goals & Objectives**	
A.1.1	The organization has established its asset management objectives.	2.75
A.1.2	The organization's asset management objectives are measurable.(i.e. capable of being demonstrated as achieved through objective assessment)	2.78
A.1.3	The organization takes account of asset-related risk to ensure its asset management objectives.	3.05
A.1.4	The organization ensures legal, regulatory, statutory, stakeholder and business requirements are considered when establishing and reviewing its asset management objectives.	3.08
A.1.5	The organization communicates its asset management objectives to relevant stakeholders, including service providers, who need to be aware of the objectives in order to meet their obligations.	2.80
A.1.6	Asset management objectives demonstrate the organization's commitment to continuous improvement.	2.64
A.1.7	Are you aware of a review process for the asset management objectives? How is this managed, and how is the need for changes to the objectives identified and implemented?	2.48
A.2	**Agency Policies**	
A.2.1	The organization has established an asset management system.	2.61
A.2.2	The organization has defined the scope of its asset management system to ensure it is appropriate to its asset management activities.	2.78
A.2.3	Has an asset management policy been documented, authorized and communicated?	2.45
A.2.4	The organization's overall asset management policy aligns with its organizational strategic plan.	2.00
A.2.5	Asset management policy aligns with other organizational policies including mandatory, statutory and regulatory requirements.	2.67

A.2.6	The organization has ensured its overall asset management policy aligns with its overall risk management framework.	2.44
A.2.7	The organization's overall asset management policy demonstrates a commitment to continual improvement in asset management and asset management performance.	2.67

B.	Transportation Asset Management Plan	Maturity Level (Avg)
B.1	**TAM Strategy**	
B.1.1	The organization's asset management strategy takes account of the life-cycle of the assets, asset types and asset systems.	3.15
B.1.2	The asset management strategy states the desired future function, performance and condition of the assets.	2.63
B.1.3	The asset management strategy enables specific asset management objectives and plans to be produced, optimized and prioritized.	2.63
B.1.4	The asset management strategy is reviewed periodically to ensure it remains effective and consistent with asset management policy, organizational strategic plan, and other policies and strategies.	2.75
B.2	**Structure, Authority and Responsibilities**	
B.2.1	Management demonstrates ownership of the organization's asset management system.	2.57
B.2.2	The organization has appointed members of its management team to be responsible for ensuring the assets meet the requirements included with asset management strategy, objectives and plans.	3.88
B.2.3	Does the organization's top management identify and monitor the requirements and expectations of its stakeholders?	2.89
B.2.4	The organization's top management ensures the asset management policy and strategy is consistent with the organizational strategic plan.	2.90
B.2.5	Top management has provided sufficient resources for asset management.	2.42
B.2.6	Top management considers the adverse impacts the asset management system might have on other parts of the organization and vice versa.	2.82
B.2.7	Top management communicates the importance of meeting its asset management requirements.	2.60

B.2.8	Management ensure asset-related risks are identified, assessed and controlled as a part of the overall risk management framework.	2.44
B.2.9	The organization's top management ensures the viability of the asset management strategy, objectives, targets, and plans.	2.75
B.3	**Asset Management Plan**	
B.3.1	The organization establishes and documents its asset management plan(s) across the life-cycle activities of its assets and asset systems.	2.88
B.3.2	The organization has communicated its plan(s) to all parties appropriate to the receiver's role in the delivery of asset management.	2.63
B.3.3	Are you aware of asset management plan(s) that document tasks and activities?	3.25
B.3.4	Are designated responsibilities for delivery of asset plan actions documented?	2.63
B.3.5	Does the organization ensure that its asset management plan(s) are optimized and prioritized?	3.00
B.3.6	The organization ensures appropriate arrangements are made available for efficient and cost effective implementation of the plan(s).	2.63
B.3.7	The organization ensures that its asset management plan(s) remain effective and consistent with its asset management strategy, objectives and targets.	3.00
B.4	**Life-Cycle Management**	
B.4.1	The organization has established, implemented and maintained process(es) for implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. (i.e design, modification, procurement, construction and commissioning activities)	2.71
B.4.2	The organization has ensured that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during the creation, acquisition or enhancement of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance.	2.70
B.4.3	The organization has ensured that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during utilization (operation) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance.	2.65
B.4.4	The organization has ensured that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance/inspection of assets are sufficient to ensure activities are carried out	2.75

	under specified conditions, consistent with asset management strategy and control, risk, and performance.	
B.4.5	The organization has ensured that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during the decommissioning and/or disposal of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance.	2.74
B.4.6	The organization has ensured that functional policies, standards, process(es)/procedure(s), resources and enabling support throughout the organization are utilized for the efficient and cost effective delivery of the asset management plan(s).	2.60

C.	**Performance & Condition, Corrective & Preventive, and Investigation**	**Maturity Level (Avg)**
C.1	**Performance and Condition Monitoring**	
C.1.1	The organization measures the performance and condition of its assets.	2.73
C.1.2	The organization measures the performance of its asset management system.	2.65
C.1.3	The organization has determined parameters for monitoring asset performance and condition, the extent of data to be recorded, and the frequency of collecting it.	2.69
C.1.4	The organization has established controls to monitor and measure the performance or condition of its assets, and the performance of the asset management system.	2.63
C.2	**Corrective & Preventive Action**	
C.2.1	The organization provides appropriate corrective and/or preventive actions to eliminate or prevent the cause of identified poor performance and non-conformance.	2.63
C.2.2	The organization takes into account the risk in determining what corrective or preventive actions to take and appropriate timescales.	2.56
C.2.3	The organization records details of correctives & preventive actions, and communicate them to relevant stakeholders.	2.63
C.2.4	The organization ensures necessary changes arising from corrective and/or preventive actions are made to its asset management system.	2.60
C.3	**Investigation of Asset-Related Failures, Incidents and Non-conformities**	

C.3.1	The organization ensures responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non-conformances is clear, unambiguous, understood and communicated.	3.11
C.3.2	The investigation phase of any incident, failure or non-conformance is carried out in a timely manner.	2.79
C.3.3	The organization determines the need for appropriate preventive actions to avoid failures, incidents and non-conformities from occurring.	2.77
C.3.4	The organization communicates results of investigations and/or corrective or preventive actions to relevant stakeholders.	3.26

D.	**Asset Inventory, Continual Improvement and Change Management**	**Maturity Level (Avg)**
D.1	**Asset Inventory**	
D.1.1	The agency maintains an inventory of state-maintained pavement assets that is complete, accurate, and current.	N/A
D.1.2	The agency maintains an inventory of state-maintained bridge assets that is complete, accurate, and current.	N/A
D.1.3	The agency maintains an inventory of other state-maintained assets that is complete, accurate, and current.	N/A
D.1.4	Critical components of an asset type have been established to assist in identifying critical maintenance needs and risks.	N/A
D.1.5	Asset tiers (e.g. primary, secondary, tertiary) have been established to assist with project prioritization and high-level investment strategies.	N/A
D.1.6	Location-based data collection practices (such as Global Positioning Systems or GPS) are widespread in the agency to support data integration.	N/A
D.1.7	The agency applies the appropriate mix of data collection technology to ensure high quality inventory and condition information is available and to provide the level of coverage and confidence needed to cost-effectively maintain the quality of the data.	N/A
D.1.8	The right level of detail for identifying and categorizing assets has been established considering maintenance costs, accuracy, and criticality of the asset in terms of safety and risk to the traveling public.	N/A
D.1.9	Inventory information is updated at least annually to reflect system changes.	N/A

D.2	**Continual Improvement**	
D.2.1	The organization achieves continual improvement in the combination of costs, asset-related risks and the performance & condition of assets, and asset systems across the whole life-cycle.	2.69
D.2.2	The organization achieves continual improvement in the performance of its asset management system.	2.49
D.2.3	The organization has acquired knowledge about new asset management related technology and practices, and evaluated their potential benefit to the organization.	2.71
D.3	**Change Management**	
D.3.1	Risks to asset management activities associated with changes to the asset management system is managed. (i.e. policy, strategy, objectives, plan(s), process(es))	2.94
D.3.2	Risks to asset management activities associated with the "Management of Change" to the organizational structures, roles or responsibilities are governed.	2.82

E.	**Information Management, System Documentation and Records**	**Maturity Level (Avg)**
E.1	**Information Management**	
E.1.1	The organization has determined what its asset management information system(s) should contain to support its asset management system.	2.48
E.1.2	The organization's asset management information system ensures the data held within it is of quality, accurate, and consistent.	3.50
E.1.3	The asset management information system is relevant to the organization's needs.	3.75
E.1.4	The organization ensures the information acquired from the asset information management system is maintained, accurate, and controlled, where appropriate.	3.00
E.1.5	The organization has appropriate asset management information available to relevant employees and stakeholders, including service providers.	3.25
E.1.6	The organization identifies and archives records to be retained for legal or knowledge preservation purposes.	3.58
E.1.7	The organization secured its asset management related information.	3.00

E.2	**Asset Management System Documentation**	
E.2.1	The organization has established documentation to describe the main elements of its asset management system and its interactions.	2.49
E.2.2	The organization's documentation provides direction which is related to the main elements of the asset management system.	2.88
E.2.3	The organization has determined what documented procedure(s), operating criteria, and records it requires to ensure it achieves its asset management policy, asset management strategy, asset management objectives and control identified asset management risks.	3.13
E.3	**Records**	
E.3.1	The organization has identified documents that are necessary to demonstrate compliance to the requirements of its asset management system. (i.e. maintain for accuracy, identifiable, and traceable)	2.64

		Maturity Level (Avg)
F.	**Outsourcing and Communication**	
F.1	**Outsourcing of Asset Management Activities**	
F.1.1	Where the organization has outsourced some of its asset management activities, has it ensured that appropriate controls are in place for the compliant delivery of its organizational strategic plan, and its asset management policy and strategy?	2.69
F.1.2	Where the organization has outsourced some of its asset management activities, has it ensured documented safeguards are in place?	2.64
F.1.3	Where the organization has outsourced some of its asset management activities, has it ensured that effective information and knowledge sharing activities are in place.	2.54
F.3	**Communication, Participation and Consultation**	
F.3.1	The organization has ensured appropriate consultation with respect to the development of its asset management strategies, objectives and plan(s).	3.00
F.3.2	The organization has ensured appropriate consultation with respect to the development of its functional policies, engineering standards, process(es) and/or procedure(s).	3.25
F.3.3	The organization has ensured appropriate consultation with respect to incident investigation.	2.55

F.3.4	The organization has ensured appropriate consultation with respect to the continual improvement of its asset management system.	2.50

G.	Risk Management, Audit & Compliance and Management Review	Maturity Level (Avg)
G.1	Risk Management, Methodology, Identification, Assessment and Risk Information	
G.1.1	The organization documents process(es) and/or procedure(s) for the identification and assessment of asset, and asset-related risks throughout the asset's life-cycle.	3.18
G.1.2	The organization documents process(es) and procedure(s) for the identification and implementation of risk control measures throughout the life-cycle of the assets.	2.94
G.1.3	The organization has ensured it's risk management methodology(s) is proportionate to the risk levels under consideration, and is consistent with the organization's operating experience within the capabilities of its control measures.	2.64
G.1.4	The organization has ensured the scope, nature, and timing of it's risk management methodology(s) is defined to provide a proactive approach which considers how risks can change with time and/or usage.	2.58
G.1.5	The organization has ensured their risk management methodology(s) provides for risk classification and the identification which are to be avoided, eliminated or controlled by asset management objectives and plans.	2.60
G.1.6	Does the organization's risk management methodology(s) provide for the monitoring of required actions to ensure both the effectiveness and timeliness of their implementation?	2.58
G.1.7	The organization ensures probability and/or frequency of an event is considered when conducting risk assessments.	2.66
G.1.8	The organization ensures the consequences of an event are considered when conducting risk assessments.	2.78
G.1.9	The organization ensures comprehensive coverage of the various types of risk within it's risk assessments. (i.e. physical, operational, natural, external, stakeholder, life-cycle)	2.54
G.1.10	The organization ensures risk assessment results provide input into the asset management strategy(s), objectives, and plan(s).	2.64

G.1.11	The organization ensures risk assessment results provide input into the identification of adequate resources, training, and competency needs.	2.57
G.1.12	The organization ensures risk assessment results provide input into the organization's overall risk management framework.	2.56
G.1.13	The organization ensures risk identification, assessments and controls are kept up to date and documented.	2.55
G.2	**Audit & Compliance**	
G.2.1	The organization has established its asset management audit program.	3.10
G.2.2	The organization has established procedure(s) for the audit of its asset management system/process(es).	3.10
G.2.3	The organization ensures its asset management audits effectively cover all elements of its asset management system.	2.95
G.2.4	The organization ensures results from its asset management audits are communicated to management.	2.65
G.2.5	The organization ensures appropriate individuals manage the audits of its asset-related activities.	3.10
G.2.6	The organization demonstrates compliance with their legal, regulatory or absolute requirements.	2.92
G.3	**Management Review**	
G.3.1	Does the organization's management regularly review its asset management system (including asset management policy, strategy, objectives and plan(s)) to ensure its continuing suitability, adequacy and effectiveness?	2.97
G.3.2	During management reviews of the asset management system, different factors are considered.	3.00
G.3.3	The organization uses the output from management reviews to continually improve its overall asset management system.	2.75
G.3.4	The organization ensures relevant output from management reviews is made available for consideration during updates of its strategic plan.	2.60
G.3.5	The organization maintains records of the management reviews and communicate relevant information to employees, contracted service providers, and other stakeholders.	3.03
G.4	**Legal and Other Requirements**	

G.4.1	The organization identifies and provides access to its legal, regulatory, statutory, and other asset management requirements which are incorporated into its asset management system.	2.64
G.4.2	The organization communicates relevant information on legal and other requirements.	2.54
G.4.3	The organization maintains information on legal and other requirements.	2.82

H.	**Training, Competence and Equipment, Facilities**	**Maturity Level (Avg)**
H.1	**Training, Awareness and Competence**	
H.1.1	The organization has developed plan(s) for additional resources required for asset management activities - including the development and delivery of asset management strategy, process(es), objectives, and plan(s).	2.48
H.1.2	The organization has identified competency requirements, plans, and documents the training necessary to achieve the required competencies.	2.48
H.1.3	The organization ensures staff under its direct supervision has the appropriate level of competency as related to asset management related activities. (i.e. education, training or experience)	2.30
H.1.4	The organization ensures staff working under its supervision is aware of asset management related risks associated with their work activities and the asset management benefits of personal performance.	2.43
H.1.5	The organization ensures staff working under its supervision is aware of their roles and responsibilities, importance of complying asset management policy, process(es) and procedure(s), and potential consequences.	2.65
H.2	**Tools, Facilities & Equipment**	
H.2.1	The organization ensures facilities, equipment, and tools are maintained and calibrated as required to implement the asset management plan, achieve required asset functions, and/or effectively monitor performance or condition.	3.69

GLOSSARY & ACRONYMS

Glossary

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

Assessment Area - A broad category of a key transportation asset management area for which a strategic assessment is to be conducted. These are referred to as level 1 items within a survey definition.

Asset Category - A grouping of asset classes, including a grouping of equipment, a grouping of rolling stock, a grouping of infrastructure, and a grouping of facilities.

Asset Class -A subgroup of capital assets within an asset category. For example, buses, trolleys, and cutaway vans are all asset classes within the rolling stock asset category.

Asset Inventory – A register of capital assets, and information about those assets.

Asset Management - A strategic approach to managing transportation infrastructure. It focuses on business processes for resource allocation and utilization with the objective of better decision making based upon quality information and well-defined objectives.

Asset Management Implementation Plan - A product developed at the conclusion of a gap analysis listing the agency's strengths and weaknesses (from a gap analysis), areas of improvement, and actions that will be taken to close the gaps.

Criteria - Specific statements or questions that are individually assessed and weighted in order of importance (if desired) to determine the gap between targeted and current scores. These are referred to as level 3 items within a survey definition.

Element - A subset of the Assessment Area that has a list of Criteria associated with it. These are referred to as level 2 items within a survey definition.

Gap – The difference between a target and a current rating for a given survey definition item.

Gap Analysis - A formal process used in an asset management program to identify areas of improvement, to assess the program's level of maturity, and to benchmark against best practice. A gap analysis typically concludes with an Asset Management Implementation Plan for addressing the necessary enhancements.

Life-Cycle Cost - The cost of managing an asset over its whole life.

Performance Measure –An expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets

Performance Target – A quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period.

Rating Set – A named container within the GAP Analysis Tool that stores individual imported user rating data. They are important from an analysis standpoint because: 1) aggregated results are always summarized by rating set, and 2) the GAP Analysis Tool allows the user to compare aggregated results between sets.

Results Group - A named set of one or more survey groups. The concept of results group was introduced in the tool to provide the Tool Administrator with the ability to compare the results between individual survey groups, or combined groups survey groups.

State of Good Repair (SGR) – A formula program that replaced the Fixed Guideway Modernization program. It provides capital assistance to maintain fixed guideway and high intensity bus systems in a state of good repair. These fund reflect a commitment to ensure that public transit operated safely, efficiently, reliably and sustainably, so that communities can offer balanced transportation choices that help to improve mobility, reduced congestion, and encourage economic development.

Survey - A user-defined list of Criteria that are organized further into broader categories of Element and Assessment Area. Within the Tool, the Assessment Area, Element, and Criteria items are visually displayed as level 1, level 2, and level 3 items within the survey definition tree view control.

Survey Group - A category of individual raters who have similarities in their positions, their responsibilities, and/or their areas of expertise. Within the GAP Analysis Tool, the tool has the capability to associate a custom list of Criteria from the survey definition with a defined and named survey group.

TERM Scale - The five (5) category rating system used in the Federal Transit Administration's Transit Economic Requirements Model (TERM) to describe the condition of an asset: 5.0—Excellent, 4.0—Good; 3.0— Adequate, 2.0—Marginal, and 1.0— Poor.

Transit Asset Management (TAM) - the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life cycles, for the purpose of providing safe, cost-effective, and reliable public transportation.

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Miami-Dade County
Department of Transportation & Public Works

Transit Asset Risk Management Plan

Prepared with support from:

PMA Consultants

MIAMI-DADE COUNTY

Table of Contents

The Federal Transit Administration has published a final rule to establish a National Transit Asset Management (TAM) System in accordance with section 20019 of the Moving Ahead for Progress in the 21st Century Act (MAP–21; Pub. L. 112–141 (2012), codified at 49 U.S.C. 5326). The new rule will define the term State of Good Repair (SGR) and establish minimum Federal requirements for transit asset management that will apply to all recipients and subrecipients of chapter 53 funds that own, operate, or manage public transportation capital assets. This final rule requires public transportation providers to develop and implement Transit Asset Management (TAM) plans. In response to this requirement, Miami-Dade County Department of Transportation and Public Works (DTPW) approves and adopts the following document as component of the Agency's Transit Asset Management (TAM) Plan.

As hereby certified by:

Date: 3/24/18

Chief of Performance Analysis or Designee
Miami-Dade Department of Transportation and Public Works

EXECUTIVE SUMMARY

Background

In July 2012, the Moving Ahead for Progress in the 21st Century (MAP-21) Act became law. The primary objectives of MAP-21 are to increase the transparency and accountability related to investment of federal taxpayer dollars into transportation infrastructure and services nationwide. MAP-21 requires U.S. Transportation Agencies to integrate risk management into their asset management plans to systematically apply management policies, procedures and practices seamlessly to manage risks from multiple sources across the organizational hierarchy. It includes the management of risks both across and along asset hierarchies to effectively manage potential threats and opportunities.

Transit Asset Risk Management is the process of identifying, analyzing, evaluating, mitigating, implementing and monitoring risks and opportunities for Miami-Dade County Department of Transportation and Public Works (DTPW) assets. It is the process of improving safety, security, operations, the environment, reducing potential liabilities and financial outlays. Risk-based Transit Asset Management (TAM) Plans acknowledge, identify, assess, and prioritize risks that could affect performance. Risk management monitors assets throughout their life-cycle, from acquisition or enhancement through to decommissioning and disposal. The outputs from successful risk management include enhanced decision-making, assurance, and compliance. This risk-based framework allows DTPW to make the best use of existing resources while improving safety and maintaining a State of Good Repair (SGR).

Risk Management Definitions

The International Organization of Standardization (ISO) 3100 standards define risk as "the effect of uncertainty on objectives" and notes that uncertainty could be positive or negative. Other definitions equate risk to variability or to the chance that desired outcomes will not be achieved. Risk is "the chance of something happening that will have an impact on objectives. It is measured in terms of a combination of the likelihood of an event and its impact".

Risks are divided into Threats and Opportunities:

Threat - An uncertain event or condition that, if it occurs, has a **negative effect** on project objectives such as scope, schedule, cost or quality.

Opportunity - An uncertain event or condition that, if it occurs, has a **positive effect** on project objectives such as scope, schedule, cost or quality.

It is important to note that risks are impactful events that may occur as opposed to issues. Issues are active occurring events and refer to risks that have already materialized. Therefore, issues must be addressed differently than risks and should not be included in this process.

Risk events are characterized in terms of probability of occurrence and the consequences of each potential risk event. Therefore, risk management provides a comprehensive framework for documenting, analyzing and evaluating risks, documenting decisions and identifying approaches to risks. It specifically addresses variability, uncertainty, and potential issues that are often beyond an agency's control. Furthermore, risk management does not eliminate threats to performance or asset management goals yet provides a logical, transparent framework for dealing with them. It is a systematic process to identify risks that may impact the organization's objectives, analyze their consequences and develop ongoing measures to address them.

DTPW's Transit Asset Risk Management Plan

Based on the reports developed by the Federal Highway Administration (FHWA) Office of Asset Management, this Transit Asset Risk Management Plan defines risk, risk management, and its implementation of the Transit Asset Management Plan for DTPW. The risk management process will focus on the following areas:

- Establish the Context;
- Risk Identification;
- Risk Analysis;
- Risk Evaluation;
- Risk Treatments; and
- Monitor and Control Risks.

Key Risk Management Plan Steps

1. **Establish the Context** — Involves understanding and documenting the social, cultural, legal, regulatory, economic, and natural environment critical to DTPW. Identification of the Agency's asset management goals, objectives, and targets are also addressed as well as the most relevant issues in DTPW's asset management environment. By documenting the context, risk management can be customized to the Agency's needs and circumstances.

2. **Risk Identification** — DTPW identifies the risks that could affect its asset management objectives. These can be external such as price changes, legislative actions or can be internal such as operational failures, data failures, conflicting internal program objectives or a lack of trained personnel for key tasks. All risks will be recorded in a Risk Register.

3. **Risk Analysis** — Evaluates the probability of risk and its impact.

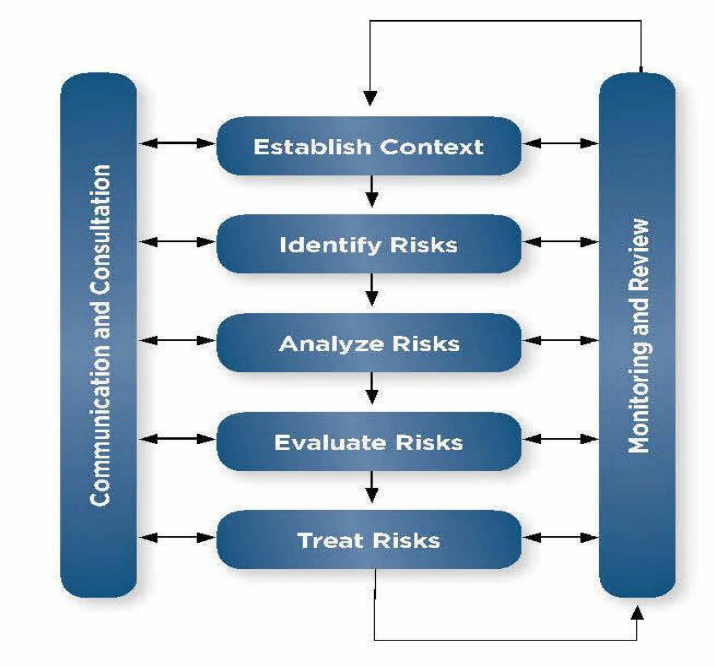
4. **Risk Evaluation** — Supports decision-making by comparing the magnitude of the risks identified in the preceding two steps with the Agency's risk tolerance.

5. **Risk Treatment** — Applies various approaches to risk including: treat, tolerate, terminate/avoid, share, enhance, transfer or take advantage of the risk.

6. **Risk Monitoring & Control** — Ensures the execution of risk response plans and evaluating its effectiveness in reducing risk. Risk monitoring and control is an ongoing process.

This process, as described by the International Organization for Standardization (ISO), is illustrated in **Figure 1**.

Figure 1 – ISO Risk Management Framework



Source: International Standards for Risk Management (Principles and Guidelines) ISO 31000:2009

DTPW will follow and incorporate the risk management process steps into its asset management processes to comply with TAM Plan requirements. Risk Management will provide the Agency with additional information to assist in prioritizing asset management and enhance the decision-making process.

Risk management is a flexible, policy-based framework that actively involves senior leadership with DTPW's strategic asset management objectives. It is an enterprise-wide effort to improve all types of decision-making. When risk management is embedded into management practices, it enables continuous improvement in decision-making and performance and is an essential element of good corporate governance.

INTRODUCTION

The emergence of Federal Risk-based Asset Management Plans expands the requirements for transportation agencies to incorporate risk in their decision-making processes as a means of showing due diligence. The Transit Asset Risk Management Plan provides DTPW with a documented process aimed at establishing the standards, processes and accountability structure. These directives are used to identify, assess, prioritize and manage asset management risks. It is focused on leveraging the knowledge of all asset classes, facilities and infrastructure at DTPW to define risks that may impact asset management practices agency-wide. The results will be incorporated as an additional tool for the decision-making process for future asset management investments.

Risk Management Planning

To plan for risk management, DTPW starts by reviewing organizational policies and procedures; identifies a risk management team; and develops a framework to continually monitor risks. As asset management evolves, requirements change and information increases in quantity and quality.

As part of this planning process, DTPW will:

- Identify, assess/analyze, and develop responses to major risks;
- Create a Risk Register with a list of opportunities and threats;
- Continually monitor project risks and response actions; and
- Update the Transit Asset Risk Management Plan and evolving risk profiles.

The outcome from this process seeks to replace general and vaguely defined contingencies with explicitly defined risk events for the Agency to make informed decisions. The goal is to inform decision-makers of the uncertainty and risk associated with asset management. As part of the framework for risk management, DTPW will incorporate the following into their asset management practices:

- Determine the level of risk assessment;
- Incorporate risk management activities into asset management practices;
- Make risk management an agenda item for regularly scheduled team meetings;
- Communicate the importance of risk management to the entire team and other key stakeholders;
- Establish expectations that risk will be managed, documented, and reported;
- Incorporate a budget for risk assessment, risk management, and risk response activities;
- Update Risk Register along with performance review processes; and
- Define the Agency's tolerance for asset management risk.

Risk Management Process

To perform risk management, the process begins with the use of various tools and techniques to collect and generate risks with the primary of focus on compliance, safety and service. It will provide an output to develop risk response(s) and monitor any potential risks. Risk assessment determines what incidents could occur that would cause a risk or opportunity to assets. Identification of the cause and determining the most effective way to mitigate the risk or exploit the opportunity is vital to the risk management process. Risk management attempts to recognize and manage potential and unforeseen events; it is proactive rather than reactive. The process is designed to ensure that opportunities are capitalized on and negative consequences associated with undesirable events are minimized. The following includes examples of various items to consider for Inputs, Tools & Techniques and expected Outputs:

Inputs

- Transit Asset Management Plan;
- Federal, State and Local Transit Asset Management Requirements;
- Asset Management Objectives; and
- Assessment Metrics.

Techniques and Tools

DTPW uses various methods and tools to assist in collecting risk data. These tools and techniques provide scalability and flexibility for the agency to meet specific needs and levels, which include:

- Risk Survey (slip form);
- Risk Register; and
- Impact and Probability Matrix for Qualitative Risk Analysis.

Output

- Completed Risk Register;
- Identified and categorized risks;
- Qualitative analysis of impact and probability of risks;
- Prioritized risks;
- Approaches to risks;
- Risk responses to address risks;
- Owner of strategies for each approach to risks; and
- Recommendations to changes in asset management practices and/or policies.

Risk Management Objectives

Risk management's objective is to assure uncertainty does not deflect from DTPW's business goals. Therefore, coordination of resources to minimize, monitor, and control the probability or impact of unforeseen events and to maximize the realization of opportunities is critical to a successful risk management plan. A prioritization process of risks with the greatest impact and probability occurring are handled first, and risks with lower probability of occurrence and lower loss are handled in descending order. Knowing in advance what events can cause damage will lead to more creative and efficient planning of projects and operations. DTPW's goal is to identify the risks and determine if they may be avoided, reduced, spread, transferred or prevented. Key objectives that were considered highly critical to achieving and improving asset management within the Agency were established and are used to define the impact of identified risks:

- **Safety** of the public and users as well as DTPW personnel;
- **Compliance** with public regulations at the Federal, State, and local levels; and
- **Service** reliability which depends on consistency to maintain and update standards after an event occurrence.

These key objectives address concerns for performance management of physical assets which applies to all aspects of the system, including: operations, safety, congestion relief/reliability, environmental concerns, and vital organizational performance such as project delivery and customer service. This objective clearly highlights DTPW's focus on threats and identifies opportunities that could affect asset management or performance management objectives.

ESTABLISH CONTEXT

To develop an effective Transit Asset Risk Management Plan, DTPW focused on setting a scope for the risk management process. As part of the context setting, a risk management vision and risk management structure was developed. The vision is articulated through the policies that establish the risk management program. The structure involves the assignment of roles and responsibilities stratified at the project, program, and agency level. To develop the context, DTPW focused on understanding asset management with respect to:

- Key activities;
- Objectives of each activity;
- Key stakeholders; and
- Factors that could have a positive or negative effect on achieving objectives.

These items assisted in identifying the goals of the organization, the environment in which it operates, and the stakeholders with whom it interacts. It provided the main objectives, or risk criteria, by which to measure the success of transit asset management and its potential risks. These objectives provide a clear metric that is applicable across the Agency to measure the impact of risks for transit asset management:

- **Safety** of passengers, the public, and employees;
- **Compliance** to meet Federal, State, and Local requirements is high priority as compliance or lack thereof can have a direct impact on funding to the Agency, which could impact its ability to provide service and safety; and
- **Service** to the public emphasizing its continuity and limiting its interruption.

Risk Management Structure

The risk management framework provides the foundation and organizational arrangements for a continually improving risk management process. Risk-based asset management is best achieved when there is alignment in the management of risks associated with assets from the top to the lowest level of an organization. The management of asset risk affects all levels within the Agency. Risk can occur at any stage in the asset life-cycle from concept through planning, design, construction/manufacturing/assembly, testing, operation, maintenance, retirement, decommissioning, and disposal phases.

The Transit Asset Risk Management Plan is applicable to all DTPW employees who have a direct or indirect association with the Agency's assets including the management, maintenance and operation of assets; the development of capital and operating budgets; the procurement of assets; and quality assurance and safety inspections. This plan is also applicable to all outsourced processes or activities.

To maintain consistency and continuity between asset management and risk management, the Agency's Internal Asset Management Business Structure proposed in the TAM Plan, also known as the Asset Program Team (APT), will be also used as the Risk Management Framework. This structure establishes the roles and responsibilities at the agency, program and project level to manage risks and the communication protocols for an effective agency-wide risk management.

Program Delivery Committee (PDC) - The PDC is to be headed by the Director and consisting of executive-level/senior leaders and other key staff, to provide identification of the agency's highest-level strategic risks.

Asset Program Team (APT) - The APT provides enterprise-wide leadership on risk management policies, practices, tools, and investments. This team is to be directed by the Chief of Performance and Materials Management or designee, Subject Matter Experts (SME), Division Chiefs for Metrobus, Metromover, Metrorail,

Facilities, Finance, Procurement, and consultants. This linkage has been established to foster connection between program development and program delivery.

Asset Management Teams (AMT) - Asset Management Teams (AMT) have been established for specific asset classes and functions: Metrobus, Metromover, Metrorail, Facilities, and various other divisions. A charter that clearly articulates the assets managed, mission, purpose, composition, meeting frequency, and roles and responsibilities will be established for each team.

Risk Management Strategy

DTPW's strategy is to conduct a risk analysis for asset management efforts at the agency and at the program levels. Risk analysis will also be performed for projects which may impact an asset class or transportation network. Project risk analysis may also be evaluated on a case-by-case basis if the previous parameters have not been met. DTPW plans to proactively assess and respond to any risks that may affect the achievement of the Agency's strategic performance-based objectives and their intended outcomes. In addition, the strategy directs employees to support the efforts to identify, share, and manage risk across all organizations and functions.

DTPW will establish a requirement to conduct risk-based asset management for all its asset classes. Surveys and workshops will be employed to deliver a Risk Register, risk responses and provide information to help control the scope, cost, schedule, and manage risks associated with asset management. This reaffirms the requirement that a Transit Asset Risk Management Plan is a key component of the Transit Asset Management Plan.

Risk Management Strategy Development Process

To foster the comprehensive application of risk management which leads to a "learning process" where the results of risk mitigation and opportunity identification feedback into the strategy setting process for continuous improvement, a strategic plan may be drafted by an Asset Program Team (APT), an organizational unit, or a temporary task force. In the case of a temporary task force, a member of the APT will be identified to champion the effort, and will be responsible to inform the APT on the status of the assignment.

Once the strategic plan is drafted, it is reviewed internally by the APT and any internal stakeholders. The internal review process utilizes the resources of DTPW's Asset Management Business Structure. This framework provides middle management through executive level review that will be needed to obtain full support for the strategic plan and its implementation. Although DTPW's asset management structure contains representatives from several of the asset classes, to assure their full buy-in, it is recommended that Division Chiefs and Program Managers be briefed on the content and purpose of changes impacting their programs through normal organizational channels of communication. After addressing the comments of the internal reviewers to the APT's satisfaction, the strategic plan is approved with the signature of the Chief of Performance and Materials Management or designee.

If the strategic plan impacts external stakeholders, a minimum of thirty (30) days will be provided for external review and comment. The APT will oversee the collection of comments and develop any necessary revisions. Following revisions from external review, the draft is resubmitted to APT and then to Program Delivery Committee (PDC) for approval. Lastly, the agency-wide strategic plan will be approved by the Director's signature.

Risk Management Communication Framework

Communicating potential risks involves evaluating, organizing and prioritizing risks, and how DTPW plans to manage them. After the development of the Risk Register, key internal and external groups will be consulted on how risks could affect asset management. The Risk Register will be shared and discussed with senior leadership for publication outside of DTPW to key stakeholders such as Miami-Dade County Board of County Commissioners, Transportation Planning Organizations and Legislators to broaden awareness of risks. Senior leadership support will be essential in the effectiveness of communicating risks outside of the Agency as they govern the external communication process.

To continue to create awareness of risk management within DTPW, the Transit Asset Risk Management Plan will also form part of the Transit Asset Management Plan. As part of internal communication efforts, the APT will continue to implement the risk process at the program level and may use the process within each asset class for future iterations. Periodic application of the process is encouraged as implementation will become a key element to communicate its relevance throughout the Agency.

Internal

The development of the Risk Register will be a combination of surveys to different stakeholders. Updates to the Risk Register is the responsibility of the APT. The Risk Register will be managed following the asset management strategy development process as described previously. Under the APT's direction, agency-wide teams discuss risks and the status of mitigation strategies as part of regular meetings. As changes to risks or mitigations strategies that impact the Risk Register emerge, the Agency-wide team will notify the APT. The APT is responsible for making necessary changes to the Risk Register and recommending new or modified mitigation strategies to the PDC. Quarterly, the APT will review the Risk Register and make changes as necessary. The APT may assign a working group or sub-team to track the register as well. Any changes requiring PDC approval will be presented at regularly scheduled PDC meetings.

External

DTPW will prepare and publish a yearly Risk Report highlighting the agency and program risks identified during the year. Analysis, evaluation and treatment of risks will be part of the report and will include a Risk Matrix. The Risk Report will serve to foster awareness of high level risk DTPW is considering and its mitigation plans. Opportunities will also be presented indicating how the Agency has capitalized. The reports will be made available to the public upon request.

RISK IDENTIFICATION

Risk identification is the process of listing potential risks and their characteristics. It also determines which risks may affect assets and will be documented in the Risk Register. A list of identified risks along with their sources, potential risk responses, and risk categories are used for risk analysis, which in turn will support creating risk responses. The purpose of risk identification is to minimize the negative impact of setbacks and threats, to maximize the positive impact of opportunities, and to ensure that all potential risks are identified. This section will discuss the process of identifying risks that could affect DTPW's ability to achieve its objectives. It will also provide examples of risks across different levels of transit asset management within the organization.

Identifying Risks

To identify risks, DTPW assembled a diverse cross-functional team to capture a wide array of risks. The focus of the cross-functional team was to identify short and long-term risks including those beyond the ten (10) years such as sea-level rise or seismic risks. The team also looked to identify threats and opportunities to asset management initiatives throughout the various asset classes.

Risk identification were performed via surveys to facilitate collection of risks from various Division SME's and gather initial thoughts on potential risks and probabilities. Other methods to collect risks include:

- **Group Workshops** – Informal workshops or formal meetings composed of the project team and/or key project team members and other participants (such as specialty groups involved with critical items) is an effective way to perform risk management and actualize risks.

- **Brainstorming** – Formal and informal brainstorming sessions with project team members, specialty groups, stakeholders, and regulatory agency representatives is a technique for risk identification. This technique can be scaled for use on the simplest to the most complex projects.

- **Other Methods** –Interviews, checklists, and examination of the work breakdown structure for the project with appropriate specialty groups; and asking "what if" questions.

To maintain consistency and simplicity in the description of risks, a questionnaire was developed which required risks to be written in meta-language. For threats and opportunities, the following formula was used:

Due to "X" (CAUSE), then "Y" (EFFECT) may occur, which could lead to "Z" (IMPACT)

Opportunities were requested to be drafted in the following format:

If "X" (CAUSE) is done, then "Y" (EFFECT) could lead to "Z" (IMPACT)

Structuring all risks to be documented in the same language allows for clear communication of risks which leads to effective prioritization and management of identified risks. The outcome provided a list of risk statements with subjects, verbs, and objects describing a risk topic, its immediate impact, and its long-term results.

Risk Register

The Risk Register is a tool that organizes risk information to fully categorize and track risks throughout the asset life-cycle. It is used to identify potential risks and monitor potential issues that can derail intended outcomes. The Risk Register is an Excel spreadsheet that will summarize risk management activities identified through a qualitative risk analysis. This key tool documents the identified risks, approach to risks, risk ratings, the response actions determined, and the owners of the risk as well as other important risk information. It serves as a central repository for all asset management risks and captures agency-wide concerns that can be discussed in team meetings as well as easily published.

The Risk Register will systematically enumerate all potential risk factors affecting the safety and reliability objectives of DTPW, determine the consequences, and the impact of their severity. It will also assess the likelihood of the occurrence of these consequences and select the best course of action to contain and control risks to meet the specified project objectives. Potential risks will be assessed and evaluated for response actions to control and manage the identified risks to satisfy the predetermined safety and reliability objectives. The Risk Register can be found in Appendix II and it will document the following information:

- **Risk Identification Number** – Assign a unique number to each risk for tracking purposes as part of the Risk Breakdown Structure (RBS);
- **Risk Date** – Document the date the risk was identified;
- **Name of Risk (does the risk pose a threat or present an opportunity?)** – Include identified risk name and nature of the risk with respect to project objectives (threat or opportunity);
- **Risk Detailed Description** – Provide information that is specific, measurable, attributable (a cause is indicated), relevant, and time-bound (SMART). Provide a clear and thorough description understandable to others;
- **Risk Trigger** – Include the risk trigger(s) (warning of imminent threat or opportunity);
- **Risk Type** – Determine whether identified risk affects objectives; and
- **Potential Responses to Identified Risk** – Document possible response actions to the identified risk—can the identified threat be avoided, transferred, or mitigated, or is it to be accepted? Can the identified opportunity be exploited, shared, or enhanced?

The initial approach to identify risks at DTPW focused on those which may impact the implementation of transit asset management practices across the agency and involved various divisions and asset classes. As a result, the risks identified concentrate mostly at the program level. However, risks identified by the cross-functional team can also include agency and/or project level risks.

Agency Level Risks

Agency level risks include internal and external risks due to factors such as the economy, business environment, community issues, financial environment, natural disasters, climate change and other environmental issues. The agency level risks affect the successful achievement of strategic transportation objectives. These also include risks to agency resources or risks to the achievement of important public policies. Although agency level risk management is about implementing planned actions to take advantage of opportunities and

proactively address threats, often risks cannot be eliminated and trade-offs should be made while ensuring that risks do not exceed DTPW's acceptable tolerance limits.

Agency level risks are generally stratified based on their severity, likelihood, and potential consequences; sphere of impact or influence; period of impact; and effect on its ability to accomplish its strategic objectives. Senior executives are generally the owners and most likely are responsible for the policy or strategic threats that can include:

- Physical loss of major assets;
- Failure to meet public safety objectives;
- Overall financial risk caused by rising costs and declining asset investment revenue;
- Lack of direction due to leadership or political changes;
- Negative media coverage, loss of credibility for failing to comply with regulations, failure to deliver projects or meet other asset condition and performance goals;
- Failure to manage their physical assets for the long-term as official policy;
- Legislative mandates such as "worst first" that could detract from sound asset management;
- Internal bureaucratic resistance to asset management that can be addressed only by senior leadership;
- Price Volatility – Impact of the instability of construction costs
- Political Risk - Decisions made by political leadership at the national or state level that can impose risks at various levels.
- Risks from Loss of Institutional Knowledge - Losing institutional knowledge due to personnel retirements, layoffs, delayed training and implementation of new technologies coupled with the inability to hire new staff.
- Information Risk - An Agency level risk in information needed for decision-making. Antiquated data systems, lack of system integration and insufficient resources to upgrade or integrate data systems which can result in inconsistent information that can hamper effective decision-making.
- Tax Revenue Risk - The uncertainty and fluctuation in the expected revenues pose risks to long term transportation planning that is necessary for sustaining the performance and condition of transportation assets.
- Aging Infrastructure Risk - The concerns about aging infrastructure and other transportation asset risks have been at the forefront of executive thinking and decisions.
- Climate Change
- Natural Disaster Risk

Key Strategic Risks:

- Political, economic, social, environmental, and technological factors in the external environment;
- Culture, structure, people, and system factors in the internal environment.

Opportunities include:

- Addressing mobility;
- Continuing to address safety to decrease casualties and injuries on national roads;
- Deploying innovations and accelerating technology to continue to shorten project delivery periods, and;
- Increasing transparency and fiscal accountability in investment decisions affecting condition and performance of the transportation system.

Documenting and formalizing risk management at the agency level helps provide the strategic vision necessary for agency-wide consistent and sustainable risk-based asset management. This formal approach is helpful in the continuation of strategic objectives during periods of change in senior leadership. It also facilitates cross collaboration and alignment across organizational silos in the treatment of risks. Additionally, it helps dispersed staff understand what is expected of them and what actions need to be performed to mitigate these high level risks. Agency level risk management provides guidance, tools and strategies that help to anticipate challenges and proactively addresses them. The development of a documented formal agency level risk management process will better equipped DTPW to anticipate, prepare for and address challenges, as well as better ability to minimize the impact to the Agency's mission and credibility.

Transit Asset Management Program Level Risks

Transit Asset Management Programs have various risks because of multiple factors including program type, environmental factors, and program complexity. Management of asset risks at the program level considers the impact of other programs and risks due to changes to resource allocation, competition for limited resources, changes to the program's priority in relation to other programs, organizational strategy issues, and the political environment.

- **Program Level Forecasting Risks -** A program level risk is the inability to do reasonably accurate forecasting. Understanding the past, current, and future condition, performance, and overall health of transportation assets is important to forecasting potential risks.

- **Data Access Risks to Programs** - Lack of easy access to reasonably priced, good quality data: a critical input to transparency in decision-making that is being demanded of transportation executives by Congress and the public.

- **Skilled Personnel Risk -** Lack of skilled personnel to conduct risk analysis. Transportation agencies need to understand the application of risk management at multiple levels. This will require development of additional skills needed to successfully extend risk management routinely used by agencies at the project level to the program and enterprise level.

Some risks include:

- Lack of internal support or authority for TAM at the program level;
- Lack of staff or resources for complex TAM tasks;
- Lack of sufficient internal infrastructure such as data systems and asset inventories;
- Overall lack of adequate funds for asset programs;
- Premature asset failures;
- Chance failures caused by unpredicted events;
- Abrupt failures caused by climatic or environmental factors such as flooding, landslides, and corrosion;
- Wear-out failures caused by inadequate maintenance programs;
- Decision failures caused by inaccurate data or models;
- Resource failures caused by reductions in appropriations or increases in prices;
- Operational failures caused by process breakdowns; and
- Demand failures caused by unanticipated vehicle loadings.

RISK ANALYSIS

After risk identification is performed, each risk is analyzed with respect to the probability of its occurrence and the level of impact on program objectives. Risk analysis identifies possible negative risk conditions or events, determines the cause and effect relationship of the probability of the event happening, assesses the magnitude of the possible risk event, and assesses the likely outcome. The two methods for analyzing and assessing risk are quantitative and qualitative.

Quantitative Risk Analysis

Quantitative risk analysis is based on a simultaneous evaluation of the impacts of all identified and quantified risks. Using this type of analysis, the probability of occurrence and consequence if the risk event occurs must also be documented. Quantitative risk analysis is driven by specific project data and it is a software driven analysis of risks which is best suited as:

- As an initial screening or review of risks;
- When a quick assessment is desired;
- When there is not much detail available;
- To assess risk at the agency or program levels; or
- As the preferred approach where robust and/or lengthy quantitative analysis is not necessary.

Quantitative risk analysis is rarely used at the enterprise and program risk management levels due to the lack of detail. However, it is mostly used at the project level for large investments. Since the focus of the Transit Asset Risk Management Plan is at the program level, DTPW will ***not*** engage in quantitative risk analysis.

Qualitative Risk Analysis

Qualitative risk analysis refers to observations that do not involve measurements and numbers which are subjective elements of a risk. It utilizes relative degrees of probability and consequence for each identified risk event in descriptive non-numeric terms.

The Transit Asset Risk Management Plan addresses the TAM Plan at the program level, DTPW focuses on qualitative risk analysis to assess the impact, likelihood of identified risks, and prioritize risks for further analysis or direct mitigation. As part of this process, the APT assesses each identified risk including a thorough description of the risk and risk triggers, it can be characterized in terms of probability of occurrence and the consequence if it does occur. As part of the process of conducting Qualitative Risk Analysis, DTPW performs the following:

- Conducts a team meeting to discuss risk and utilizes the Qualitative Risk Matrix (Table 1) defining the terms to use (Very High, High, Medium, Low, etc.);
- Reviews the risk information from the risk identification step;
- Discusses the risk with the group;
- Evaluates the likelihood of the risk occurring by surveying the participants separately and discussing the results as a group before documenting them;
- Evaluates the consequences if the risk does occur by asking the group, “What will be the impacts if this risk does occur?” Record the results that the group agrees on; and
- Prioritizes the risks based on the results of the qualitative analysis.

Executing Qualitative Risk Analysis

DTPW collected risk data through surveys across all asset classes. Responses to the surveys were collected and risks were added to the Risk Register. As mentioned previously, the APT developed the project objectives and established the impact ranges for each risk. Developing these as a cross-functional team ensures understanding and buy-in from all those involved. This process will be performed periodically to monitor and control risks in later phases of risk management.

Table 1. Risk Rating Table

Probability	L	Impact	I
Almost Certain	0.9	Extreme	0.9
Highly likely	0.7	Very high	0.7
Likely	0.3	Medium	0.3
Unlikely	0.1	Low	0.1
Rare	0.01	Negligible	0.01

Table 2. Risk rating for item

L		I	Rating
0.9	X	0.7	.63

Table 3. Probability Matrix

Defined Conditions for Probability Scales of a Risk					
	Very Low	Low	Medium	High	Very High
Probability	0 - 0.1	.11 - 0.30	.31 - 0.50	.51 - 0.89	>0.90

Impact ranges were developed by the APT for each objective as listed in Table 4. These ranges help establish criteria that could be understood and applicable to all asset classes involved in asset management.

Table 4. Impact Matrix

Defined Conditions for IMPACT Scales of a Risk on Major Project Objectives					
Project Objective	Very Low	Low	Medium	High	Very High
Compliance	< $499K withheld funding	$500K - $999K withheld funding	$1M – $1.9M withheld funding	$2M – $2.9M withheld funding	> $3M withheld funding
Safety	No Injury	Minor Injury	Serious Injury	Severe Injury	Death
Service	< 30 minutes of operations shutdown	31-60 minutes of operations shutdown	61-90 minutes of operations shutdown	91-120 minutes of operations shutdown	> 121 minutes of operation shutdown

RISK EVALUATION

Risk evaluation is the outcome of combining results from previous risk analysis and determining priorities based on the consequences to the asset management objectives. During the evaluation, risk tolerance will be determined. Defining risk tolerance is critical as it will determine the threshold to engage or tolerate risks. DTPW evaluates risks and looks to identify opportunities to combine risks, find synergies between mitigation strategies, and adjust priorities.

Combining Risks: It is likely that a given risk can impact several programs and asset classes at the program and agency level. In such cases, the same risk may be identified by multiple business groups. The APT identifies such redundant risks and determines how best to include the risk in the comprehensive Risk Register. The APT can eliminate duplicate risks, edit the description of risks, and revise the prioritization of the remaining risks. The APT may also delegate this role to representatives of the other asset classes.

Synergies in Mitigation Strategies: In some cases, a single strategy such as a policy change may act to mitigate multiple risks. When reviewing the asset class Risk Registers, the APT looks for opportunities to mitigate multiple risks with a single strategy. This is done by looking for similar mitigation strategies proposed by multiple asset classes or by deciding to handle some program level risks with agency level mitigation strategies.

Adjusting Overall Priorities: Initially, the combined register is sorted according to the scores assigned by the original asset classes. The APT then reviews the list comparing each risk to the risks immediately above and below determining if adjustments need to be made in the overall priority. If the APT determines an adjustment is needed, they may change the score of any specific risk as necessary to achieve the appropriate overall priority. This process is done only to adjust the relative priority of risks identified by different asset classes.

Risk Tolerance

Risk Tolerance is the degree or amount of risk that an organization can withstand, it can be dynamic or changing. DTPW will define its risk tolerance threshold as a group to maintain consistency throughout the Agency. The definition of thresholds will outline which risks are addressed or which will remain on a "watch list".

Organizations commonly plot their risks on a heat map, which allows the relative level of risks to be easily visualized. Table 5 illustrates an example of a Threshold Matrix. In this table, multiple risk levels have been grouped into color-coded categories. Each category is associated with a decision that needs to be made to manage the risk – for example:

- The red category indicates risks that must be treated;
- The yellow category represents risks that will be treated if the benefit exceeds the cost; and
- The green category represents risks that are acceptable without further treatment.

These categories can also be associated with escalation points. For example, a business rule could be set so that all red category risks are to be escalated to the Executive Staff.

Table 5. Threshold Matrix

		A	B	C	D	E
		Negligible	Minor	Moderate	Significant	Severe
E	Very Likely	Low Med	Medium	Med Hi	High	High
D	Likely	Low	Low Med	Medium	Med Hi	High
C	Possible	Low	Low Med	Medium	Med Hi	Med Hi
B	Unlikely	Low	Low Med	Low Med	Medium	Med Hi
A	Very Unlikely	Low	Low	Low Med	Medium	Medium

RISK RESPONSE

Following the identification and analysis of risks, a response must be developed. Risk response determines how to reduce the overall risk or lower the effect of the risk by reducing the probability of occurrence or impact of the risk. Focus would be directed toward risks of most significance as determined by the risk tolerance. DTPW will develop mitigation plans for top priority risks and identify approaches for monitoring risks. Special attention will be paid to high-impact, low-probability risks such as security threats and acts of nature. Team awareness and conscious monitoring of these risks can be accomplished via team meetings, informing upper management, and seeking counsel from appropriate experts.

Actions in Response to Risks

Risks can come from various sources including accidents, natural causes and disasters, or events of uncertain or unpredictable cause. Negative events can be classified as risks while positive events are classified as opportunities. Strategies to manage threats typically include avoiding the threat, reducing the negative effect or probability of the threat, transferring all or part of the threat to another party, and even retaining some or all the potential or actual consequences of a threat, and the opposites for opportunities. Various responses to risk or risk treatment are: treat, tolerate, terminate, transfer, or take advantage of the risk. The list below includes other risk responses and divides them as a reply to a threat or an opportunity:

Threats	Opportunities
1. Terminate/Avo	1. Take Advantage
2. Transfer	2. Share
3. Treat/Mitigate	3. Enhance
4. Tolerate	

TERMINATE/AVOID (threats)

Avoidance actions include: changing the project scope to eliminate threat, clarifying requirements, obtaining information, improving communication, or acquiring expertise.

There are two types of actions:

(1) Remove the cause of the risk (risk trigger), or

(2) Execute them in a different way while still aiming to achieve objectives. Not all risks can be avoided or eliminated, and for others this approach may be too expensive or time-consuming, but this should be the first strategy considered for each risk.

TAKE ADVANTAGE (opportunities)

Ensure a positive impact, or realize an opportunity and take action to make the opportunity happen.

TRANSFER (threats)

Transferring a threat displaces its ownership and responsibility to another party. It involves finding another party who is willing to take responsibility for its management, and who will bear the liability of the risk should it occur. The aim is to ensure that the risk is owned and managed by the party best able to deal with it effectively.

SHARE (opportunities)

Sharing a positive risk involves allocating ownership to a third party who is best able to capture the opportunity for the benefit of the project.

TREAT/MITIGATE (threats)

Risk mitigation implies a reduction in the probability and/or impact of an adverse risk event to an acceptable threshold. Mitigation or acceptance are the strategies most often used since the number of threats that can be addressed by avoidance or transfer are usually limited. Preventive responses are better than curative responses because they are more proactive and if successful, can lead to risk avoidance. Preventive responses tackle the causes of the risk; where it is not possible to reduce probability, a mitigation response should address the adverse impact, targeting the drivers that determine the extent of the severity.

ENHANCE (opportunities)

This response modifies the "size" of an opportunity by increasing probability and/or impact. Seeking to facilitate or strengthen the cause of the opportunity, and proactively targeting and reinforcing its trigger conditions. Impact drivers can also be targeted, seeking to increase the project's susceptibility to the opportunity.

TOLERATE (opportunities and threats)

These are risks that remain after response actions and/or for which response is not cost-effective are accepted. Risks that are uncontrollable (no response actions are practical) are also accepted.

After risks have been identified, documented and analyzed, the output from the analysis provides a ranked Risk Register with the risks of greatest significance to objectives determined. The team will focus on developing adequate response actions to significant risks that are cost-effective and realistic. Critical risks must be met with strong response actions; lower-ranking risks should receive response actions commensurate with their significance.

Response actions will be documented in the Risk Register with their description of the action, work activities impacted, and the cost of the response action. It will also identify the person(s) responsible for successful implementation of the response action.

RISK MONITORING AND CONTROL

Risk monitoring and control is an iterative process focused on actively monitoring significant risks. Risks should continually be identified, mitigated and monitored throughout the entire risk management process to ensure that controls are effective and efficient. Identify changes to new and existing risks, evaluate costs and benefits, review trends, successes and failures, and determine if safety and performance targets are being met. This includes high-impact, low-probability risks, identifying new risks, executing and controlling the responses to identified risk events, and evaluating the effectiveness of risk responses. Risks evolve through time which alters the conditions of documented information. Periodical reviews of risks and updates are necessary to maintain a current profile of risks and their action plan.

To effectively control risks, DTPW will continually monitor trends to anticipate potential risks from impacting the project. To do so, the APT will meet periodically to discuss the Risk Register and update any changes to the probability and impact of identified risks, include new risks, and discuss the effectiveness of risk responses in reducing risk. The monitoring and controlling of risks will evaluate:

- Assumptions of risks and current relevance;
- Changes to risk rating;
- Adherence to risk management policies and processes; and
- Review and adjustment of contingency reserves.

To ensure that risk management is operating as intended, the monitoring and review process implemented will:

- Ensure that risk treatments are implemented as planned;
- Assess whether risk treatments are effective;
- Continually review risk information on the Risk Register to ensure that it remains relevant to the Agency as risks do change; some are no longer applicable and new risks emerge; and
- Periodically measure the Agency's progress against the risk management plan.

It is important to note that risk monitoring is intended to be a daily, on-going process across the entire asset management life-cycle. Team members and stakeholders should be vigilant in looking for risk symptoms, as well as for new project risks. Continual monitoring and review of the entire risk management process serves to evaluate how risk management is adding value to DTPW's decision-making, business planning, resource allocation, and operational management processes. This practice will also assist in identifying any changes that should be made to the risk management process and ensure that it is in compliance with DTPW policies and external laws and regulations.

GLOSSARY

The following definitions are provided within the context of asset management at DTPW:

Asset Management Asset class – The groups, teams and committees identified in the TAM Plan as being active in the development and execution of asset management policy. Examples include the PDC, APT, and asset management teams.

Qualitative - Observations that do not involve measurements and numbers; for example, the risk of a heavy rainstorm affecting our erosion control is "Very High."

Qualitative assessment - An assessment of risk relating to the qualities and subjective elements of the risk—those that cannot be quantified accurately. Qualitative techniques include the definition of risk, the recording of risk details and relationships, and the categorization and prioritization of risks relative to each other.

Risk - The chance of something happening that will impact infrastructure or the DTPW's ability to manage the infrastructure, measured as a combination of the likelihood an event will occur and the event's impact.

Risk Assessment - The combination of likelihood and impact that defines the significance of a risk to the infrastructure or DTPW's ability to manage that infrastructure. Risk assessment is established in the risk analysis process that culminates in the development of a Risk Register. It is a structured approach to identifying and analyzing the uncertainties that exist in meeting Agency's objectives. Risk assessment consists of three stages: risk identification, risk analysis and risk evaluation.

Risk Context – The risk categories to which the comprehensive program is sensitive. The context allows risk management to be tailored to DTPW's needs and circumstances. Context is represented by categories established in DTPW's risk management policy.

Risk Level - Risks can have impacts on an agency at various levels. Some risks may impact the entire Department; others may impact a single asset type or a single route. For the TAM Plan, risks are categorized into the levels of: Agency, Program or Project.

Risk Management - The identification, assessment, and prioritization of risks followed by coordinated and efficient application of resources to monitor risks, mitigate threats and maximize the realization of opportunities.

APPENDICES

Appendix I – Risk Survey

Appendix II – Risk Register

Appendix III – Impact & Probability Matrix

Risk Assessment Questionnaire

Full Name:	**Department/Functional Area:**

- **List up to five (5) potential *risks* that may affect asset management in your functional area**
- **Definition of Risk –** An uncertain event or condition that, *if it occurs*, has a negative effect on objectives

Please list each risk using the following language: Due to "X" (CAUSE), then "Y" (EFFECT) may occur, which could lead to "Z" (IMPACT) **Example:** Due to limited availability of personnel, then condition assessments may not be performed as required which could lead to inaccurate analysis of asset maintenance or replacement needs		How likely is this to occur? **Probability** (Very High, High, Medium, Low, Very Low)	What kind of impact would this risk have with respect to: **Impact** (See legend below)		
			Compliance	**Safety**	**Service**
1		Select One	Select One	Select One	Select One
2		Select One	Select One	Select One	Select One
3		Select One	Select One	Select One	Select One
4		Select One	Select One	Select One	Select One
5		Select One	Select One	Select One	Select One

Legend

Defined Conditions for IMPACT Scales of a Risk on Major Project Objectives					
Project Objective	**Very Low**	**Low**	**Medium**	**High**	**Very High**
Compliance	< $499K withheld funding	$500K - $999K withheld funding	$1M – $1.9M withheld funding	$2M – $2.9M withheld funding	> $3M withheld funding
Safety	No Injury	Minor Injury	Serious Injury	Severe Injury	Death
Service	< 30 minutes of operations shutdown	31-60 minutes of operations shutdown	61-90 minutes of operations shutdown	91-120 minutes of operations shutdown	> 121 minutes of operation shutdown

Risk Assessment Questionnaire

Full Name:	**Department/Functional Area:**

- **List up to five (5) potential *opportunities* that may affect asset management in your functional area**
- **Definition of Opportunity –** A risk event that, *if it occurs,* will have a *positive* effect on achievement of objectives

	Please list each risk using the following language: Due to "X" (CAUSE), then "Y" (EFFECT) may occur, which could lead to "Z" (IMPACT) **Example:** If condition assessments for facilities are performed, then better asset information can be collected to improve assessment of maintenance needs.	How likely is this to occur? **Probability** (Very High, High, Medium, Low, Very Low)	What kind of impact would this risk have with respect to: **Impact** (See legend below)		
			Compliance	**Safety**	**Service**
1		Select One	Select One	Select One	Select One
2		Select One	Select One	Select One	Select One
3		Select One	Select One	Select One	Select One
4		Select One	Select One	Select One	Select One
5		Select One	Select One	Select One	Select One

Legend

Defined Conditions for IMPACT Scales of a Risk on Major Project Objectives					
Project Objective	**Very Low**	**Low**	**Medium**	**High**	**Very High**
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Service	< 30 minutes of operations shutdown	31-60 minutes of operations shutdown	61-90 minutes of operations shutdown	91-120 minutes of operations shutdown	> 121 minutes of operation shutdown

IMPACT AND PROBABILITY MATRIX

Impact Definitions					
Rating -->	**Very Low**	**Low**	**Moderate**	**High**	**Very High**
Cost Impact of Threat	Insignificant cost increase	<5% cost increase	5-10% cost increase	10-20% cost increase	>20% cost increase
Cost Impact of Opportunity	Insignificant cost reduction	<1% cost decrease	1-3% cost decrease	3-5% cost decrease	>5% cost decrease
Schedule Impact of Threat	Insignificant slippage	<1 month slippage	1-3 months slippage	3-6 months slippage	>6 months slippage
Schedule Impact of Opportunity	Insignificant improvement	<1 month improvement	1-2 months improvement	2-3 months improvement	>3 months improvement
Probability	1–9%	10–19%	20–39%	40–59%	60–99%

Risk Matrix						
Probability Rating	**5 - Very High**	**5**	**10**	**20**	**35**	**50**
	4 - High	**4**	**8**	**16**	**28**	**40**
	3 - Moderate	**3**	**6**	**12**	**21**	**30**
	2 - Low	**2**	**4**	**8**	**14**	**20**
	1 - Very Low	**1**	**2**	**4**	**7**	**10**
		1	**2**	**4**	**7**	**10**
		Very Low	**Low**	**Moderate**	**High**	**Very High**
		Impact Rating				

DTPW RISK REGISTER

PROJECT NAME		TEAM MEMBERS		BEGIN DATE	
DATE PREPARED		DEPARTMENTS		END DATE	
VERSION NUMBER	0.0.0	POINT OF CONTACT		DURATION	

RISK LOG

OVERVIEW						ASSESSMENT						RESPONSE			
RISK ID	DESCRIPTION	THREAT / OPPORTUNITY	CATEGORY	REPORT DATE	LAST UPDATED	IMPACT	IMPACT DESCRIPTION	PROBABILITY	RISK RATING (I X P)	RISK TRIGGER	RISK RESPONSE	RISK RESPONSE DESCRIPTION	COMPLETED ACTION	RESPONSE STATUS	DATE CLOSED
R101	Due to the lack of support from senior management, the importance of converting from a manual process to a more innovative automated software may lead to continuous bad data.	THREAT	MANAGEMENT			HIGH - 4		VERY HIGH - 5	20		ACCEPT	invest in updated information systems		RISK OPEN	
R102	Due to the lack of standard operating procedure, tracking the work and performance of subcontractors can be challenging. Which could lead to...	THREAT	MANAGEMENT	issue		MEDIUM - 3		LOW - 2	6		TRANSFER	Monitor budget, prepare contingency program strategies		RISK CLOSED	
R103	Due to inefficient management structure, the decision-making and review process will lead to delays in major projects.	THREAT	MANAGEMENT	issue		VERY LOW - 1		VERY LOW - 1	1		MITIGATE	invest in updated asset inventories		RISK ESCALATED TO ISSUE	
R104	Due to budget cuts, proactive maintenance technicians as well as productivity will decrease tremendously.	THREAT	FINANCIAL	issue		VERY HIGH - 5		VERY HIGH - 5	25		SHARE	increase training, audit maintenance processes			
R105	If technology is accepted, the agency will have the ability to connect, communicate and collaborate in a timely manner.	OPPORTUNITY	TECHNOLOGY	techonology							ENHANCE	Monitor bid prices monthly and prepare contingencies			
R106	If capital projects resources are available, then reporting requirements will display an increase maintenance	OPPORTUNITY	MANAGEMENT									institute succession planning, training, mentoring			
R107	Due to unforeseen weather conditions, assets may get damaged or destroyed which could lead to loss of investment, production and revenue.	THREAT	ENVIRONMENTAL	good example								Monitor legislation. Inform legislators of impacts			
R108	Due to the vast amount of assets stored in various locations, some assets may get misplaced or unaccounted for if a proper asset tracking system isn't being adhered to.	THREAT	MANAGEMENT									Monitor economic activity and plan contingencies			
R109	Due to possible user lack of understanding of the assets design capabilities and how best to operate within its ranges, an assets life-cycle can be adversely affected by either operating below or above the design range.	THREAT	PERSONNEL									sustain robust public information processes			
R110	Due to improper input of assets into EAMS may result in loss of staff time as well as generate additional responsibilities to research and locate assets including repetitive site visits.	THREAT	MANAGEMENT									train staff to comply with standards. Conduct audits.			
R111	If an existing and future project list is prioritized and categorized based on risk scoring, it can possibly identify key upgrades which may mitigate risks.	OPPORTUNITY	MANAGEMENT									train mid-level staff. Ensure compliance with TAM.			
R112	If a historical review of the agency's past and current risk practices is conducted, it can provide a baseline for monitoring and evaluating asset performance as well identify future improvement needs.	OPPORTUNITY	MANAGEMENT												
R113	If risk consequences and effects are developed for extreme events, it will ensure a more streamlined emergency response plan as well as take into account the effects of climate change.	OPPORTUNITY	MANAGEMENT												
R114	If performance or availability-based maintenance contracts with the manufacturer or another qualified vendor are available, it can possibly improve and enhance the assets life-cycle.	OPPORTUNITY	MANAGEMENT									Monitor interest rates. Time bond issues accordingly.			
R115	Due to Force Majeure - Limitless possibilities to negatively affect assets	THREAT	OPERATIONAL									flash storm event gauges. Countermeasures at scour-prone			
R116	Due to hiring restrictions that prevent hiring knowledgable, skilled and experienced workers, which negatively affects the ability to preserve the condition of assets. Hiring practices related to positions represented by the Transport Workers Union (TWU), continues to degrade knowledge, skills, experience and ability of personnel. Hiring to TWU positions limits the applicant pool to TWU members, based on seniority.	THREAT	MANAGEMENT									Develop contingency planning for detours, emergency repairs.			
R117	Due to Budget Restrictions affecting both parts and labor, scheduled maintenance and the replacement of parts/components due at the end of the life cycle could affect the ability to preserve the condition of assets.	THREAT	FINANCIAL									None			
R118	Due to lack of funding related to long term Budget forecasting, systems and subsystems replacement may not be scheduled	THREAT	FINANCIAL									Review the hiring process to procure qualified staff			
R119	Implementing systems such as EAMS, that are not specifically designed for Rail Transit asset management and the resultant distorted work-arounds/fixes/operations, results in poor data collection and wasted time.	THREAT	TECHNOLOGY												
R120	If a Petition to the Department of Labor to overturn the stand alone agreement between the County and the TWU, pursuant to 13c, is granted, then this would result in the ability to hire personnel with knowledge, skill, experience and ability in the trade for which they are hired.	OPPORTUNITY	PERSONNEL												
R121	The Transit part of DTPW could become an Agency or Authority with different funding mechanism to provide better and dedicated funding to ensure long term viability	OPPORTUNITY	POLITICAL												
R122	Not having knowledgeable and qualified staff for structural inspections creates a situation in which recognizing structural elements and their conditions is a challenge, therefore compromising the accuracy of the structural inventory and the actual condition of the inventory; which affects safety.	THREAT	PERSONNEL												
R123	Having to perform street and highway lane closures for inspection creates risks to the inspection team by operating equipment close to life roadway lanes and under tight schedule conditions and therefore creating unnecessary safety hazards for the inspection team	THREAT	SAFETY												
R124	Absenteeism or the inability to hire staff when positions become vacant affects the timely performance of inspections as planned therefore delays the proper and timely preparation of the inspection reports and can delay the action on safety-to-life structural issues in the field	THREAT	PERSONNEL												
R125	Having more technology available for inspection minimizes the needs for having staff doing dangerous street and highway closures, therefore creating a safer inspection altogether	OPPORTUNITY	TECHNOLOGY												
R126	Due to the loss of the Quality Assurant Specialist position in 2016, Field monitoring has become a difficult task without neglecting other key areas of operations. Moreover, using other classifications to attempt field monitoring falls outside of their job skills and thus lacking the ability to properly assess a potential situation or hazard. It is a vital component for the Division due to the nature of the Special Transportation Service (STS) and its provision through a private Contractor to have skilled personal conduct field inspections. The Division is unable to monitor field operations accurately and properly fulfill Contract enforcement.	THREAT	PERSONNEL												
R127	Additional personnel to assign to the Division's Certification Unit is required to respond to the increasing demand of STS applicants. Staff shortage makes it extremely difficult for the Division to keep up with the requirements for Americans with Disabilities Act (ADA) Certification.	THREAT	PERSONNEL												

LOG DROPDOWN KEYS

IMPACT LEVEL
VERY HIGH - 5
HIGH - 4
MEDIUM - 3
LOW - 2
VERY LOW - 1

RESPONSE STATUS
ACCEPT
AVOID
TRANSFER
MITIGATE
TAKE ADVANTAGE
SHARE
ENHANCE

THREAT/ OPPORTUNITY
THREAT
OPPORTUNITY

RESPONSE STATUS
RISK OPEN
RISK CLOSED
RISK ESCALATED TO ISSUE

CATEGORY
MANAGEMENT
ENVIRONMENTAL
FINANCIAL
PERSONNEL
POLITICAL
TECHNOLOGY
OPERATIONAL
SAFETY
ENVIRONMENTAL
ENVIRONMENTAL
ENVIRONMENTAL
ENVIRONMENTAL

R128	Paratransit Field Operations staff will enable the Division to monitor the Contractor's provision of STS service and enforce contractual as well as Federal, State, and Local requirements to meet the Department's goals and objectives	OPPORTUNITY	PERSONNEL												
R129	Additional staff in the Certification Unit will allow the Division to comply with ADA policy requiring all new STS applicants to be interviewed within 21 days after completed STS application is received.	OPPORTUNITY	PERSONNEL												
R130	Due limited availability of safety personnel, then currently required regulatory tasks may not be completed, which could lead a regulatory penalties including loss of funding.	THREAT	PERSONNEL												
R131	If safety personnel were increased, then more time could be spent with each work location/division which could lead to a decrease in losses due to accidents and injuries.	OPPORTUNITY	SAFETY												
R132	Due to the lack of personnel, then maintenance of equipment may not be performed as required which could lead to continuous lack of operation of equipment.	THREAT	TECHNOLOGY												
R133	Due to potential disasters (i.e. Hurricanes, flooding, tornadoes), the equipment and facilities assessment may not be performed effectively, which could lead to the delay in repairs and/or	THREAT	TECHNOLOGY												
R134	Due to the limited knowledge base of personnel, then the condition assessments may not be performed as required which could lead to overall potential inaccuracies of documentation.	THREAT	PERSONNEL												
R135	If there is a better tracking system of PMs and work orders, then it could lead to obtaining and gathering accurate reports.	OPPORTUNITY	TECHNOLOGY												
R136	If we obtain parts and materials efficiently, then it could lead to better assessment and implementation of repairs and/or replacement of equipment in a timely manner.	OPPORTUNITY	TECHNOLOGY												
R137															
R138															
R139															
R140															

Department of Transportation and Public Works

Complete Rolling Stock Asset Inventory

Manufacturer	Model	Year	Active	Inactive	Fuel Type	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Original Cost	Anticipated Replacement Year
FLEXIBLE CORPORATION	FLX 94 DDA50	1994	0	1	Diesel	24	*	1994	24	*	Date Unavailable
NABI	40LFW-02-02	1998	0	6	Diesel	20	12	1999	19	$246,995	2010
NABI	40LFW-02-02	1999	33	35	Diesel	19	12	1999	19	$292,580	2011
NABI	40LFW-17.02	2000	61	27	Diesel	18	12	2000	18	$292,580	2012
BLUE BIRD	Blue Bird B5.9	2001	0	2	Diesel	17	10	2007	11	*	2011
NABI	40LFW-17.02	2002	88	13	Diesel	16	12	2002	16	$274,798	2014
NABI	40LFW-17.06	2003	81	19	Diesel	15	12	2003	15	$288,934	2015
NABI	40LFW-17.04	2004	100	9	Diesel	14	12	2004	14	$292,292	2016
NABI	40LFW-17.07	2005	108	0	Diesel	13	12	2005	13	$311,128	2017
MCI	D4500	2006	11	1	Diesel	12	14	2006	12	$492,996	2020
NABI	40LFW-17.08	2006	75	1	Diesel	12	12	2006	12	$322,226	2018
OPTIMA	LFB-32	2006	3	69	Diesel	12	10	2007	11	$289,962	2016
EL DORADO	M-12	2009	2	0	*	9	*	2014	4	*	Date Unavailable
NABI	40LFW-48 Hybrid	2009	13	0	Hybrid	9	12	2010	8	$553,747	2021
NEW FLYER	DE60LFA	2009	25	0	Hybrid	9	12	2010	8	$843,451	2021
GILLIG	G30D102N4	2010	5	0	Diesel	8	12	2010	8	$620,189	2022
EL DORADO	EZ-RIDER 2	2011	8	0	Diesel	7	10	2011	7	$298,161	2021
GILLIG	G27E102N2	2011	3	0	Diesel	7	10	2012	6	$400,282	2021
GLAVAL	Commute	2012	1	0	Diesel	6	10	2012	6	$89,930	2022
FREIGHTLINER	BRTL	2012	20	0	Diesel	6	10	2012	6	$191,582	2022
GILLIG	29' REPLICA	2012	1	0	Diesel	6	10	2012	6	$424,816	2022
MOTOR COACH	D4500	2012	9	0	*	6	14	2012	6	*	2026
FREIGHTLINER	BRTL	2013	4	0	Diesel	5	10	2013	5	$179,560	2023
GILLIG	G27E102N4	2014	5	0	Diesel	4	12	2015	3	$447,370	2026
GILLIG	30GDFF	2014	30	0	Hybrid	4	12	2015	3	$683,935	2026

Metrobus
As of May 2018

Legend: *- Pending Information
Green - Replace < 5yrs
Yellow - Replace > 5yrs
Red - Past Useful Life

Department of Transportation and Public Works

Complete Rolling Stock Asset Inventory

Manufacturer	Model	Year	Active	Inactive	Fuel Type	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Original Cost	Anticipated Replacement Year
NABI	40LFW-57D-02	2015	15	0	Diesel	3	12	2016	2	$542,642	2027
NABI	60BRT-20 Hybrid	2015	43	0	Hybrid	3	12	2015	3	$979,106	2027
NEW FLYER	XDF60	2016	11	0	Hybrid	2	12	2016	2	$979,614	2028
GILLIG	G27D102N4	2016	5	0	Diesel	2	12	2017	1	$529,678	2028
NEW FLYER	XDE60	2017	10	0	Hybrid	1	14	2017	1	$979,619	2031
CHEVROLET	4500	2017	13	0	*	1	10	2017	1	*	2027
FORD	E450	2017	15	0	*	1	10	2017	1	*	2027
INTER	*	2017	2	0	*	1	10	2017	1	*	2027
NEW FLYER	*	2018	36	6	CNG	0	12	2018	0	*	2030

Metrobus
As of May 2018

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Department of Transportation and Public Works

Complete Rolling Stock Asset Inventory

Manufacturer	Model	Year	Active	Inactive	Fuel Type	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Original Cost	Anticipated Replacement Year
BUDD COMPANY	DCTA	1982	134	2	Electric	36	30	1985	33	*	2012
HITACHI RAIL	*	2017	16	8	Electric	1	30	2017	1	*	2047
AEG WESTINGHOUSE	VM Motor Sport	1994	0	17	Electric	24	20	1995	23	*	2014
BOMBARDIER TRANS	MDTA	2007	12	0	Electric	11	20	2008	10	*	2027
BOMBARDIER TRANS	MDTA	2010	17	0	Electric	8	20	2010	8	*	2030

Metrorail/Metromover
As of May 2018

Legend: *- Pending Information
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Manufacturer	Model	Year	Fleet Size	Fleet Age	Useful Life	Anticipated Replacement Year
CHEVROLET	IMPALA	2012	8	6	7	2019
CHEVROLET	IMPALA	2013	2	5	7	2020
CHEVROLET	IMPALA	2014	1	4	7	2021
CHRYSLER	200 TOURING	2012	1	6	7	2019
CHRYSLER	200 TOURING	2015	2	3	7	2022
DODGE	AVENGER	2012	7	6	7	2019
DODGE	AVENGER	2013	66	5	7	2020
DODGE	AVENGER	2014	9	4	7	2021
DODGE	MINIVAN	2012	1	6	7	2019
DODGE	MINIVAN	2013	2	5	7	2020
DODGE	MINIVAN	2014	4	4	7	2021
FORD	ECONOLINE	2011	8	7	7	2018
FORD	ECONOLINE	2012	27	6	7	2019
FORD	ECONOLINE	2013	108	5	7	2020
FORD	ECONOLINE	2014	14	4	7	2021
FORD	E350	2013	1	5	7	2020
FORD	E350	2014	1	4	7	2021
FORD	E450	2013	1	5	7	2020
FORD	E450	2015	1	3	7	2022
FORD	T-150	2015	2	3	7	2022

Paratransit
As of March 2018

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FORD	T-350	2015	5	3	7	🟡	2022
FORD	TRANSIT	2015	8	3	7	🟡	2022
FORD	E350	2016	1	2	7	🟢	2023
FORD	TRANSIT	2016	1	2	7	🟢	2023
FORD	T-150	2016	2	2	7	🟢	2023
FORD	T-250	2016	1	2	7	🟢	2023
FORD	T-350	2016	2	2	7	🟢	2023
FORD	T-150	2017	1	1	7	🟢	2024
FORD	T-350	2017	2	1	7	🟢	2024
HYUNDAI	SONATA	2012	1	6	7	🟡	2019
HYUNDAI	SONATA	2013	1	5	7	🟡	2020
HYUNDAI	SONATA	2014	7	4	7	🟡	2021
HYUNDAI	SONATA	2015	6	3	7	🟡	2022
HYUNDAI	SONATA	2016	8	2	7	🟢	2023
HYUNDAI	SONATA	2017	12	1	7	🟢	2024
KIA	SEDONA	2017	2	1	7	🟢	2024
TOYOTA	CAMRY	2012	3	6	7	🟡	2019
TOYOTA	CAMRY	2013	14	5	7	🟡	2020
TOYOTA	CAMRY	2014	20	4	7	🟡	2021
TOYOTA	CAMRY	2015	13	3	7	🟡	2022
TOYOTA	PRIUS	2012	6	6	7	🟡	2019
TOYOTA	PRIUS	2013	1	5	7	🟡	2020

Paratransit
As of March 2018

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TOYOTA	PRIUS	2014	2	4	7	2021
TOYOTA	PRIUS	2015	3	3	7	2022

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Department of Transportation and Public Works

Complete Non-Revenue Asset Inventory

Manufacturer	Model	Year	Fleet Count	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Anticipated Replacement Year
DODGE	STRATUS	1999	3	19	8	2013	5	2007
DODGE	STRATUS	2000	1	18	8	2000	18	2008
DODGE	STRATUS	2001	3	17	8	2001	17	2009
DODGE	STRATUS	2002	7	16	8	2002	16	2010
DODGE	STRATUS	2003	1	15	8	2003	15	2011
DODGE	STRATUS	2004	9	14	8	2004	14	2012
TOYOTA	PRIUS	2004	1	14	8	2004	14	2012
TOYOTA	PRIUS	2007	13	11	8	2009	9	2015
FORD	C-MAX	2015	56	3	8	2016	2	2023
JEEP	LIBERTY	2002	3	16	8	2002	16	2010
FORD	E250	2001	6	17	8	2001	17	2009
FORD	E250	2003	1	15	8	2003	15	2011
FORD	E250	2005	2	13	8	2005	13	2013
FORD	E350	2004	2	14	8	2004	14	2012
FORD	E350	2005	3	13	8	2004	14	2013
FORD	E350	2006	14	12	8	2012	6	2014
DODGE	STD CARGO	1999	5	19	14	1999	19	2013
DODGE	STD CARGO	2003	1	15	14	2004	14	2017
DODGE	3500 MAXI CARGO	2002	7	16	14	2002	16	2016
DODGE	3500 MAXI CARGO	2003	2	15	14	2003	15	2017
DODGE	3500 MAXI CARGO	2004	2	14	14	2004	14	2018
DODGE	3500 MAXI CARGO	2005	2	13	14	2005	13	2019
FORD	F350	1994	1	24	14	1995	23	2008
FORD	F351	2000	2	18	14	2000	18	2014

Non-Revenue Vehicles
As of October 2017

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Department of Transportation and Public Works

Complete Non-Revenue Asset Inventory

Manufacturer	Model	Year	Fleet Count	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Anticipated Replacement Year
FORD	F352	2003	7	15	14	2003	15	2017
DODGE	CARAVAN	2007	9	11	14	2012	6	2021
DODGE	FREESTAR	2006	3	12	14	2013	5	2020
FORD	F650	2007	3	11	14	2007	11	2021
FORD	F650	2008	1	10	14	2008	10	2022
STERLING	ACTERRA	2007	8	11	14	2007	11	2021
FREIGHTLINER	M2106	2014	4	4	14	2014	4	2028
MOBILITY VENTURE	LLC DX	2016	6	2	14	2017	1	2030
FORD	F800	1995	3	23	14	1996	22	2009
CHEVY	EXPRESS 2500	2002	5	16	14	2002	16	2016
CHEVY	EXPRESS 2500	2003	5	15	14	2003	15	2017
GMC	TOPKICK	1991	2	27	14	1992	26	2005
CHEVY	BLAZER	2002	1	16	14	2003	15	2016
DODGE	RAM	1998	1	20	14	1999	19	2012
NISSAN	ROAD TRUCK	1998	3	20	14	1998	20	2012
DODGE	1500	2000	1	18	14	2000	18	2014
KERSHAW	PMC-30	1983	3	35	25	1992	26	2008
KERSHAW	R-30	1983	3	35	25	1992	26	2008
KERSHAW	S-30	1983	3	35	25	1992	26	2008
KERSHAW	STM-16	1986	1	32	25	1986	32	2011
KERSHAW	PMC-50	1991	1	27	25	1992	26	2016
SWINGMASTER	181 SWINGLOADER	1996	1	22	25	1997	21	2021
HARSCO	UTV-717	2002	1	16	25	2002	16	2027
CHEVY	SILVERADO 15500	2003	3	15	14	2003	15	2017

Non-Revenue Vehicles
As of October 2017

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Department of Transportation and Public Works

Complete Non-Revenue Asset Inventory

Manufacturer	Model	Year	Fleet Count	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Anticipated Replacement Year
CHEVY	SILVERADO 15500	2004	2	14	14	2004	14	2018
TAYLOR-DUNN	BO-012-48	1984	1	34	14	1984	34	1998
FORD	1824	1986	1	32	14	1987	31	2000
UNKNOWN	TT-100-8	1989	2	29	14	1990	28	2003
KERSHAW	FLAT DECK TRAILER	1991	1	27	14	1992	26	2005
KERSHAW	45-13-91	1991	2	27	14	1992	26	2005
DODGE	PICK UP TRUCK	1996	1	22	14	1996	22	2010
DODGE	PICK UP TRUCK	2001	1	17	14	2001	17	2015
DODGE	PICK UP TRUCK	2002	1	16	14	2002	16	2016
DODGE	PICK UP TRUCK	2003	3	15	14	2003	15	2017
DODGE	PICK UP TRUCK	2004	4	14	14	2004	14	2018
DODGE	PICK UP TRUCK	2007	2	11	14	2009	9	2021
FREIGHTLINER	RCHALL BUCKET	1993	1	25	14	1996	22	2007
WALLACE	DLBT35-2	1993	1	25	14	1995	23	2007
JOHN DEERE	410D	1994	1	24	14	1994	24	2008
GMC	VAN	1996	2	22	14	1997	21	2010
GMC	VAN	2003	3	15	14	2002	16	2017
FORD	F150	2001	1	17	14	2001	17	2015
CHEVY	CARGO VAN	2002	1	16	14	2002	16	2016
CHEVY	CARGO VAN	2003	2	15	14	2003	15	2017
CHEVY	CARGO VAN	2004	3	14	14	2004	14	2018
NOLAN	R-TRACK-2003	2003	1	15	14	2004	14	2017
CLARKE-AMERICA	CT50	1981	1	37	14	1981	37	1995
NORTH WESTERN	410D	1977	1	41	14	1977	41	1991

Non-Revenue Vehicles
As of October 2017

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Department of Transportation and Public Works

Complete Non-Revenue Asset Inventory

Manufacturer	Model	Year	Fleet Count	Fleet Age	Useful Life	Avg. in Service Year	In Service Age	Anticipated Replacement Year
DGC, INC	T106AL	2006	1	12	14	2007	11	2020
DGC, INC	MARKIII-3FL	2006	1	12	14	2007	11	2020
CHRYSLER	SERVICE TRUCK	2009	4	9	14	2009	9	2023
YANMAR	TT-6D4TNV98	2011	4	7	14	2012	6	2025
WAYNE	SC-39 54-IN 3-WHL	1970	1	48	14	1970	48	1984
GMC	67 4-WHL	1979	1	39	14	1979	39	1993
CLARKE-AMERICA	772	1987	1	31	14	1987	31	2001
TENNANT	800	1997	2	21	14	1998	20	2011
ALTEK	DR1318-3054C	2007	2	11	14	2007	11	2021
AALADIN	TS 5X12	1992	1	26	14	1992	26	2006

Non-Revenue Vehicles
As of October 2017

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Department of Transportation and Public Works

Complete Equipment Asset Inventory

Manufacturer	Type	Category	Total Count
KONE	ESCALATOR	CONVEYANCE	13
OTIS	ESCALATOR	CONVEYANCE	7
SCHINDLER	ESCALATOR	CONVEYANCE	72
THYSSEN KRUPP	ESCALATOR	CONVEYANCE	1
KONE	ELEVATOR	CONVEYANCE	17
OTIS	ELEVATOR	CONVEYANCE	9
SCHINDLER	ELEVATOR	CONVEYANCE	45
THYSSEN KRUPP	ELEVATOR	CONVEYANCE	31
INFORMATION PENDING	CONSOLE EQUIPMENT BUS OPERATIONS	COMMUNICATIONS EQUIPMENT	21
INFORMATION PENDING	CONSOLE EQUIPMENT RAIL OPERATIONS	COMMUNICATIONS EQUIPMENT	10
INFORMATION PENDING	CONSOLE EQUIPMENT MOVER OPERATIONS	COMMUNICATIONS EQUIPMENT	8
INFORMATION PENDING	METROMOVER DATA TRANMISSION SYSTEM	COMMUNICATIONS EQUIPMENT	22
INFORMATION PENDING	METROMOVER TX/RX CABINETS	COMMUNICATIONS EQUIPMENT	10
INFORMATION PENDING	METROMOVER AUTO TRAIN CONTROL CABINETS	COMMUNICATIONS EQUIPMENT	18
INFORMATION PENDING	METROMOVER GUIDEWAY SWITCHES	COMMUNICATIONS EQUIPMENT	25
CUBIC	FAREBOX REVENUE ISLAND RECEIVER	FARE COLLECTION	14
CUBIC	FAREBOX REVENUE ISLAND VAULT	FARE COLLECTION	10
CUBIC	AFC TICKET VENDING MACHINE	FARE COLLECTION	118
CUBIC	AFC FARE GATE	FARE COLLECTION	208
HADDAX	METRORAIL AB SWITCH	COMMUNICATIONS EQUIPMENT	24
INFORMATION PENDING	METRORAIL PROGRAMMABLE LOGIC CONTROL	COMMUNICATIONS EQUIPMENT	25
INFORMATION PENDING	SONET	COMMUNICATIONS EQUIPMENT	25
INFORMATION PENDING	METRORAIL TRACTION POWER EQUIPMENT	COMMUNICATIONS EQUIPMENT	34
INFORMATION PENDING	FIRE ALARM CONTROL PANEL	FIRE PROTECTION	82
HALON SYSTEMS	HALON PANEL	FIRE PROTECTION	46
INFORMATION PENDING	METRORAIL FIRE MANAGEMENT PANEL	FIRE PROTECTION	37

Equipment
As of May 2018

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
163rd STREET MALL BUS TERMINAL 1	1421 NE 163rd STREET MIAMI, FL 33162	BUS TRANSFER CENTER	*	PASSENGER	25.2956	-80.1739	*	*
163rd STREET MALL BUS TERMINAL 2	16601 NE 15th AVENUE MIAMI, FL 33162	BUS TRANSFER CENTER	*	PASSENGER	25.2983	-80.1732	*	*
ADRIENNE ARSHT CENTER MOVER STATION (OMNI)	1455 BISCAYNE BOULEVARD MIAMI, FL 33132	COMFORT STATION	800	OTHER	25.7895	-80.1880	*	*
ADRIENNE ARSHT CENTER MOVER STATION (OMNI)	1455 BISCAYNE BOULEVARD MIAMI, FL 33132	ELEVATED FIXED GUIDEWAY STATION	56,761	PASSENGER	25.7895	-80.1880	1994	50
ADRIENNE ARSHT CENTER MOVER STATION (OMNI)	1455 BISCAYNE BOULEVARD MIAMI, FL 33132	BUS TRANSFER CENTER	*	PASSENGER	25.7895	-80.1880	1994	100
ADRIENNE ARSHT CENTER MOVER STATION (OMNI)	1455 BISCAYNE BOULEVARD MIAMI, FL 33132	PEDESTRIAN OVERPASS	*	PASSENGER	25.7895	-80.1880	*	*
ADRIENNE ARSHT CENTER MOVER STATION (OMNI)	1455 BISCAYNE BOULEVARD MIAMI, FL 33132	TICKET INFORMATION CENTER	*	PASSENGER	25.7891	-80.1880	*	*
ALLAPATTAH METRORAIL STATION	3501 NW 12th AVENUE MIAMI, FL 33127	ELEVATED FIXED GUIDEWAY STATION	32,121	PASSENGER	25.8093	-80.2155	1982	100
ALLAPATTAH METRORAIL STATION	3501 NW 12th AVENUE, MIAMI, FL 33127	BUS TRANSFER CENTER	*	PASSENGER	25.8093	-80.2155	1982	100
ALLAPATTAH METRORAIL STATION	3501 NW 12th AVENUE MIAMI, FL 33127	TRACTION POWER SUBSTATION	*	OTHER	25.8093	-80.2155	1982	100
ALLAPATTAH METRORAIL STATION	3501 NW 12th AVENUE MIAMI, FL 33127	TRAIN CONTROL	*	OTHER	*	*	*	*
ALLAPATTAH METRORAIL STATION	3501 NW 12th AVENUE MIAMI, FL 33127	SURFACE PARKING LOT	69 SPACES	PARKING	25.8093	-80.2155	1982	100
ATPS1	BETWEEN EARLINGTON HEIGHTS & MIAMI INTERNATIONAL AIRPORT	TRACTION POWER SUBSTATION	*	OTHER	*	*	*	*
AVENTURA MALL BUS TERMINAL	BETWEEN ABIGAIL RD & MADISON RD AVENTURA, FL 33180	BUS TRANSFER CENTER	*	PASSENGER	25.9583	-80.1459	2012	N/A
BAYFRONT PARK MOVER STATION	150 S BISCAYNE BOULEVARD MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	25,774	PASSENGER	25.7731	-80.1873	1986	50
BAYFRONT PARK MOVER STATION	150 S BISCAYNE BOULEVARD MIAMI, FL 33131	GAP POWER STATION	*	OTHER	25.7731	-80.1873	*	*
BRICKELL METRORAIL STATION	1001 SW 1st AVENUE MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	43,430	PASSENGER	25.7639	-80.1954	1984	100
BRICKELL METRORAIL STATION	1001 SW 1st AVENUE MIAMI, FL 33131	BUS TRANSFER CENTER	*	PASSENGER	25.7639	-80.1954	1984	*
BRICKELL METRORAIL STATION	1001 SW 1st AVENUE MIAMI, FL 33131	TRACTION POWER SUBSTATION	*	OTHER	25.7639	-80.1954	*	*

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
BRICKELL METRORAIL STATION	1001 SW 1st AVENUE MIAMI, FL 33131	TRAIN CONTROL	*	OTHER	*	*	*	*
BRICKELL CITY CENTRE MOVER STATION (EHS)	59 SE 8th STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	19,810	PASSENGER	25.7669	-80.1921	1994	50
BRICKELL CITY CENTRE MOVER STATION (EHS)	59 SE 8th STREET MIAMI, FL 33131	PDS SUBSTATION	*	OTHER	25.7669	-80.1921	2002	*
BRICKELL MOVER STATION	1200 SW FIRST AVENUE MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	4,244	PASSENGER	25.7627	-80.1953	1994	50
BRICKELL MOVER STATION	1200 SW FIRST AVENUE MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION		OTHER	*	*	2002	*
BROWNSVILLE METRORAIL STATION	5200 NW 27th AVENUE MIAMI, FL 33142	ELEVATED FIXED GUIDEWAY STATION	122,318	PASSENGER	25.8217	-80.2402	1985	100
BROWNSVILLE METRORAIL STATION	5200 NW 27th AVENUE MIAMI, FL 33142	BUS TRANSFER CENTER	*	PASSENGER	25.8217	-80.2402	1985	100
BROWNSVILLE METRORAIL STATION	5200 NW 27th AVENUE MIAMI, FL 33142	TRACTION POWER SUBSTATION	*	OTHER	25.8212	-80.2417	1985	*
BROWNSVILLE METRORAIL STATION	5200 NW 27th AVENUE MIAMI, FL 33142	TRAIN CONTROL	*	OTHER	*	*	*	*
BROWNSVILLE METRORAIL STATION	5200 NW 27th AVENUE MIAMI, FL 33142	PARKING STRUCTURE	100 SPACES	PARKING	25.8217	-80.2402	1985	100
BUSWAY - SW 112th AVE	20500 SW 112th AVENUE MIAMI, FL 33189	SURFACE PARKING LOT	450 SPACES	PARKING	25.5762	-80.3736	*	N/A
BUSWAY - SW 152nd ST	9300 CORAL REEF DRIVE MIAMI, FL 33157	SURFACE PARKING LOT	126 SPACES	PARKING	25.6287	-80.3435	2003	50
BUSWAY - SW 168th ST	SW 168th ST & EAST SW 97th AVE	SURFACE PARKING LOT	149 SPACES	PARKING	25.6143	-80.3488	2002	N/A
BUSWAY - SW 244th ST	24400 SOUTH DIXIE HIGHWAY MIAMI, FL	SURFACE PARKING LOT	95 SPACES	PARKING	25.5394	-80.4084	1986	50
BUSWAY - SW 296th ST	29500 SOUTH DIXIE HIGHWAY MIAMI, FL	SURFACE PARKING LOT	139 SPACES	PARKING	25.4917	-80.4547	2007	N/A
BUSWAY - SW 344th ST	254 WEST PALM DRIVE FLORIDA CITY, FL	SURFACE PARKING LOT	*	PARKING	*	*	*	*
CENTRAL ADMIN METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	ADMINISTRATIVE	30,000	ADMINISTRATIVE	25.8065	-80.2487	1969	50
CENTRAL AUDITORIUM METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	ADMINISTRATIVE	*	ADMINISTRATIVE	25.8062	-80.2487	*	50
CENTRAL FACILITIES METROBUS FACILITY	3401 NW 31st STREET MIAMI, FL 33142	GENERAL PURPOSE MAINTENANCE	*	MAINTENANCE	25.8041	-80.2513	*	50

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
CENTRAL FUEL METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	FUELING FACILITY	*	MAINTENANCE	25.8052	-80.2530	*	50
CENTRAL IEM METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	MAINTENANCE	*	MAINTENANCE	25.8061	-80.2485	*	50
CENTRAL K. WILLIAMS METROBUS FACILITY	3401 NW 31st STREET MIAMI, FL 33142	ADMINISTRATIVE	3,300	ADMINISTRATIVE	25.8041	-80.2513	1985	50
CENTRAL K. WILLIAMS METROBUS FACILITY	3401 NW 31st STREET MIAMI, FL 33142	GENERAL PURPOSE MAINTENANCE	37,000	MAINTENANCE	25.8041	-80.2513	1985	50
CENTRAL O & I METROBUS FACILITY	3431 NW 33rd STREET MIAMI, FL 33142	MAINTENANCE	50,000	MAINTENANCE	25.8059	-80.2527	1983	50
CENTRAL OPERATIONS METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	ADMINISTRATIVE	15,000	ADMINISTRATIVE	25.8062	-80.2500	1985	50
CENTRAL REVENUE METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	REVENUE COLLECTION	*	ADMINISTRATIVE	25.8060	-80.2496	*	50
CENTRAL SECURITY 1 METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	GUARD BOOTH	*	ADMINISTRATIVE	25.8059	-80.2484	*	50
CENTRAL SECURITY 2 METROBUS FACILITY	3431 NW 33st STREET MIAMI, FL 33142	GUARD BOOTH	*	ADMINISTRATIVE	25.8059	-80.2527	1983	50
CENTRAL SUPPORT SERVICES METROBUS FACILITY	3295 NW 31st STREET MIAMI, FL 33142	HEAVY MAINTENANCE & OVERHAUL	89,100	MAINTENANCE	25.8042	-80.2502	1983	50
CENTRAL SURFACE LOT METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	SURFACE PARKING LOT	*	OTHER	*	*	*	*
CENTRAL WASH METROBUS FACILITY	3300 NW 32nd AVENUE MIAMI, FL 33142	WASHING FACILITY	*	MAINTENANCE	25.8056	-80.2526	*	50
CIVIC CENTER METRORAIL STATION	1501 NW 12th AVENUE MIAMI, FL 33125	ELEVATED FIXED GUIDEWAY STATION	38,846	PASSENGER	25.7895	-80.2154	1985	100
CIVIC CENTER METRORAIL STATION	1501 NW 12th AVENUE MIAMI, FL 33125	TRACTION POWER SUBSTATION	*	OTHER	25.7895	-80.2154	*	*
CIVIC CENTER METRORAIL STATION	1501 NW 12th AVENUE MIAMI, FL 33125	TRAIN CONTROL	*	OTHER	*	*	*	*
COCONUT GROVE METRORAIL STATION	2780 SW 27th AVENUE MIAMI, FL 33133	ELEVATED FIXED GUIDEWAY STATION	31,286	PASSENGER	25.7403	-80.2394	1984	100
COCONUT GROVE METRORAIL STATION	2780 SW 27th AVENUE MIAMI, FL 33133	BUS TRANSFER CENTER	*	PASSENGER	25.7403	-80.2394	1984	100
COCONUT GROVE METRORAIL STATION	2780 SW 27th AVENUE MIAMI, FL 33133	TRACTION POWER SUBSTATION	*	OTHER	25.7403	-80.2394	*	*
COCONUT GROVE METRORAIL STATION	2780 SW 27th AVENUE MIAMI, FL 33133	TRAIN CONTROL	*	OTHER	*	*	*	*

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
COCONUT GROVE METRORAIL STATION	2780 SW 27th AVENUE MIAMI, FL 33133	SURFACE PARKING LOT	209 SPACES	PARKING	25.7403	-80.2394	1984	100
COLLEGE BAYSIDE MOVER STATION	225 NE 3rd STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	11,755	PASSENGER	25.7776	-80.1899	1986	50
COLLEGE BAYSIDE MOVER STATION	225 NE 3rd STREET MIAMI, FL 33131	GAP POWER STATION	*	OTHER	25.7776	-80.1899	*	*
COLLEGE NORTH MOVER STATION	100 NE 5th STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	9,613	PASSENGER	25.7789	-80.1921	1986	50
COLLEGE NORTH MOVER STATION	100 NE 5th STREET MIAMI, FL 33131	PDS SUBSTATION	*	OTHER	25.7789	-80.1921	2002	*
CORAL REEF DRIVE	NE CORNER SW 152nd STREET & SW 117th AVENUE, MIAMI, FL 33176	SURFACE PARKING LOT	95 SPACES	PARKING	25.6276	-80.3831	1975	N/A
CORAL WAY BLOW DOWN METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	VEHICLE BLOW-DOWN FACILITY	*	MAINTENANCE	25.7454	-80.3148	*	50
CORAL WAY O & I METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	MAINTENANCE	78,900	MAINTENANCE	25.7458	-80.3142	*	50
CORAL WAY O & I METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	SURFACE PARKING LOT	*	OTHER	*	*	*	*
CORAL WAY OPERATIONS METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	ADMINISTRATIVE	11,700	ADMINISTRATIVE	25.7450	-80.3141	1981	50
CORAL WAY REVENUE METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	REVENUE COLLECTION	*	ADMINISTRATIVE	25.7464	-80.3128	*	50
CORAL WAY SECURITY METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	GUARD BOOTH	*	ADMINISTRATIVE	25.7461	-80.3131	*	50
CORAL WAY WASH METROBUS FACILITY	2775 SW 74th AVENUE MIAMI, FL 33155	WASHING FACILITY	*	MAINTENANCE	25.7464	-80.3139	1982	50
CULMER METRORAIL STATION	711 NW 11th STREET MIAMI, FL 33136	ELEVATED FIXED GUIDEWAY STATION	33,276	PASSENGER	25.7844	-80.2073	1985	100
CULMER METRORAIL STATION	711 NW 11th STREET MIAMI, FL 33136	BUS TRANSFER CENTER	*	PASSENGER	25.7844	-80.2073	1985	100
CULMER METRORAIL STATION	711 NW 11th STREET MIAMI, FL 33136	TRACTION POWER SUBSTATION	*	OTHER	25.7844	-80.2073	*	*
CULMER METRORAIL STATION	711 NW 11th STREET MIAMI, FL 33136	TRAIN CONTROL	*	OTHER	*	*	*	*
CULMER METRORAIL STATION	711 NW 11th STREET MIAMI, FL 33136	SURFACE PARKING LOT	120 SPACES	PARKING	25.7844	-80.2073	1985	100
CULMER METRORAIL STATION	350 NW 11th TERRACE MIAMI, FL 33136	GAPTIE 2	4.60 ACRES	OTHER	25.7849	-80.2009	*	*

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
DADELAND NORTH METRORAIL STATION	8310 SOUTH DIXIE HIGHWAY MIAMI, FL 33156	ELEVATED FIXED GUIDEWAY STATION	43,646	PASSENGER	25.6915	-80.3053	1984	100
DADELAND NORTH METRORAIL STATION	8300 SOUTH DIXIE HIGHWAY MIAMI, FL 33156	BUS TRANSFER CENTER	*	PASSENGER	25.6915	-80.3062	1994	*
DADELAND NORTH METRORAIL STATION	8300 SOUTH DIXIE HIGHWAY MIAMI, FL 33156	COMFORT STATION	*	OTHER	25.6915	-80.3062	1994	*
DADELAND NORTH METRORAIL STATION	8310 SOUTH DIXIE HIGHWAY MIAMI, FL 33156	TRACTION POWER SUBSTATION	*	OTHER	25.6929	-80.3038	*	*
DADELAND NORTH METRORAIL STATION	8310 SOUTH DIXIE HIGHWAY MIAMI, FL 33156	TRAIN CONTROL	*	OTHER	*	*	*	*
DADELAND NORTH METRORAIL STATION	8300 SOUTH DIXIE HIGHWAY MIAMI, FL 33156	PARKING STRUCTURE	2032 SPACES	PARKING	25.6915	-80.3062	1994	*
DADELAND SOUTH METRORAIL STATION	9150 DADELAND BOULEVARD MIAMI, FL 33156	ELEVATED FIXED GUIDEWAY STATION	33,101	PASSENGER	25.6851	-80.3145	1984	100
DADELAND SOUTH METRORAIL STATION	9150 DADELAND BOULEVARD MIAMI, FL 33156	BUS TRANSFER CENTER	*	PASSENGER	25.6851	-80.3145	1984	*
DADELAND SOUTH METRORAIL STATION	9090 DADELAND BOULEVARD MIAMI, FL 33156	COMFORT STATION	*	OTHER	25.6858	-80.3159	*	*
DADELAND SOUTH METRORAIL STATION	9150 DADELAND BOULEVARD MIAMI, FL 33156	TRACTION POWER SUBSTATION	*	OTHER	25.6860	-80.3125	*	*
DADELAND SOUTH METRORAIL STATION	9150 DADELAND BOULEVARD MIAMI, FL 33156	TRAIN CONTROL	*	OTHER	*	*	*	*
DADELAND SOUTH METRORAIL STATION	9150 DADELAND BOULEVARD MIAMI, FL 33156	SURFACE PARKING LOT	*	PARKING	25.6851	-80.3145	*	*
DADELAND SOUTH METRORAIL STATION	9090 DADELAND BOULEVARD MIAMI, FL 33156	PARKING STRUCTURE	1274 SPACES	PARKING	25.6858	-80.3159	1984	100
DOUGLAS ROAD METRORAIL STATION	3060 SW 37th COURT MIAMI, FL 33146	PEDESTRIAN OVERPASS	1,400	PASSENGER	25.7322	-80.2544	*	*
DOUGLAS ROAD METRORAIL STATION	3060 SW 37th COURT MIAMI, FL 33146	ELEVATED FIXED GUIDEWAY STATION	37,603	PASSENGER	25.7329	-80.2548	1984	100
DOUGLAS ROAD METRORAIL STATION	3060 SW 37th COURT MIAMI, FL 33146	BUS TRANSFER CENTER	*	PASSENGER	25.7329	-80.2548	1984	100
DOUGLAS ROAD METRORAIL STATION	3060 SW 37th COURT MIAMI, FL 33146	TRACTION POWER SUBSTATION	*	OTHER	25.7322	-80.2555	*	*
DOUGLAS ROAD METRORAIL STATION	3060 SW 37th COURT MIAMI, FL 33146	TRAIN CONTROL	*	OTHER	*	*	*	*
DOUGLAS ROAD METRORAIL STATION	3060 SW 37th COURT MIAMI, FL 33146	SURFACE PARKING LOT	226 SPACES	PARKING	25.7329	-80.2548	1984	100

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
DR. MARTIN LUTHER KING, JR. METRORAIL STATION	6205 NW 27th AVENUE MIAMI, FL 33147	ELEVATED FIXED GUIDEWAY STATION	347,323	PASSENGER	25.8322	-80.2423	1985	100
DR. MARTIN LUTHER KING, JR. METRORAIL STATION	6205 NW 27th AVENUE MIAMI, FL 33147	BUS TRANSFER CENTER	*	PASSENGER	25.8322	-80.2423	1985	100
DR. MARTIN LUTHER KING, JR. METRORAIL STATION	6205 NW 27th AVENUE MIAMI, FL 33147	TRACTION POWER SUBSTATION	*	OTHER	*	*	*	*
DR. MARTIN LUTHER KING, JR. METRORAIL STATION	6205 NW 27th AVENUE MIAMI, FL 33147	TRAIN CONTROL	*	OTHER	*	*	*	*
DR. MARTIN LUTHER KING, JR. METRORAIL STATION	6205 NW 27th AVENUE MIAMI, FL 33147	PARKING STRUCTURE	616 SPACES	PARKING	25.8322	-80.2423	1985	100
DUPONT PLAZA MOVER (NO PLATFORM)	NEAR KNIGHT CENTER STATION	PDS SUBSTATION						
EARLINGTON HEIGHTS METRORAIL STATION	2100 NW 41st STREET MIAMI, FL 33142	ELEVATED FIXED GUIDEWAY STATION	42,752	PASSENGER	25.8125	-80.2301	1985	100
EARLINGTON HEIGHTS METRORAIL STATION	2100 NW 41st STREET MIAMI, FL 33142	BUS TRANSFER CENTER	*	PASSENGER	25.8125	-80.2301	1985	100
EARLINGTON HEIGHTS METRORAIL STATION	2100 NW 41st STREET MIAMI, FL 33142	TRACTION POWER SUBSTATION	*	OTHER	25.8126	-80.2377	*	*
EARLINGTON HEIGHTS METRORAIL STATION	2100 NW 41st STREET MIAMI, FL 33142	TRAIN CONTROL	*	OTHER	*	*	*	*
EARLINGTON HEIGHTS METRORAIL STATION	2100 NW 41st STREET MIAMI, FL 33142	PARKING STRUCTURE	1016 SPACES	PARKING	25.8125	-80.2301	1984	100
ELEVENTH STREET MOVER STATION	1098 NE SECOND AVENUE MIAMI, FL 33132	ELEVATED FIXED GUIDEWAY STATION	19,810	PASSENGER	25.7849	-80.1908	1994	50
ELEVENTH STREET MOVER STATION	1098 NE SECOND AVENUE MIAMI, FL 33132	GAP POWER STATION	*	OTHER	25.7849	-80.1908	*	*
FIFTH STREET MOVER STATION	35 SE 5th STREET MIAMI, FL 33133	ELEVATED FIXED GUIDEWAY STATION	7,056	PASSENGER	25.7691	-80.1922	1994	50
FIFTH STREET MOVER STATION	35 SE 5th STREET MIAMI, FL 33133	GAP POWER STATION	*	OTHER	25.7691	-80.1922	*	*
FINANCIAL DISTRICT MOVER STATION	50 SE 14th STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	2,498	PASSENGER	25.7604	-80.1929	1994	50
FIRST STREET MOVER STATION	225 NE FIRST STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	4,879	PASSENGER	25.7757	-80.1899	1986	50
FIRST STREET MOVER STATION	225 NE FIRST STREET MIAMI, FL 33131	PDS SUBSTATION	*	OTHER	25.7757	-80.1899	2002	*
FORT LAUDERDALE TRI-RAIL STATION	INTERSTATE 95 / BROWARD BLVD HOLLYWOOD, FL	SURFACE PARKING LOT	*	PARKING	*	*	*	N/A

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
FREEDOM TOWER MOVER STATION	600 NE SECOND AVENUE MIAMI, FL 33132	ELEVATED FIXED GUIDEWAY STATION	14,030	PASSENGER	25.7805	-80.1906	1994	50
FREEDOM TOWER MOVER STATION	600 NE SECOND AVENUE MIAMI, FL 33132	GAP POWER STATION	*	OTHER	25.7805	-80.1906	*	*
GOLDEN GLADES - EAST	16000 NW 7th AVENUE MIAMI, FL 33169	SURFACE PARKING LOT	1542 SPACES	PASSENGER	25.9226	-80.2120	*	N/A
GOLDEN GLADES - WEST	16000 NW 7th AVENUE MIAMI, FL 33169	SURFACE PARKING LOT	*	PASSENGER	*	*	*	N/A
GOVERNMENT CENTER BUS TERMINAL 1	111 NW 1st STREET MIAMI, FL 33128	BUS TRANSFER CENTER	*	PASSENGER	25.7756	-80.1967	1985	50
GOVERNMENT CENTER BUS TERMINAL 2	30 SW 1st AVENUE MIAMI, FL 33128	BUS TRANSFER CENTER	4,324	PASSENGER	25.7737	-80.1955	*	50
GOVERNMENT CENTER METRORAIL STATION	101 NW FIRST STREET MIAMI, FL 33128	ELEVATED FIXED GUIDEWAY STATION	126,393	PASSENGER	25.7767	-80.1961	1984	100
GOVERNMENT CENTER METRORAIL STATION	101 NW FIRST STREET MIAMI, FL 33128	TRACTION POWER SUBSTATION	*	OTHER	*	*	*	*
GOVERNMENT CENTER MOVER STATION	101 NW FIRST STREET MIAMI, FL 33128	ELEVATED FIXED GUIDEWAY STATION	*	PASSENGER	25.7767	-80.1961	1984	50
GOVERNMENT CENTER MOVER STATION	101 NW FIRST STREET MIAMI, FL 33128	PDS SUBSTATION	*	OTHER	25.7767	-80.1961	2002	*
HAMMOCKS TOWN CENTER	10201 HAMMOCKS BOULEVARD MIAMI, FL 33196	SURFACE PARKING LOT	50 SPACES	PARKING	25.6717	-80.4442	1987	N/A
HIALEAH METRORAIL STATION	127 EAST 21 ST/115 EAST 21 ST HIALEAH,FL 33010	PEDESTRIAN OVERPASS	2,048	PASSENGER	25.8416	-80.2791	*	*
HIALEAH METRORAIL STATION	127 EAST 21 ST/115 EAST 21 ST HIALEAH,FL 33010	ELEVATED FIXED GUIDEWAY STATION	31,286	PASSENGER	25.841	-80.2817	1985	100
HIALEAH METRORAIL STATION	127 EAST 21 ST/115 EAST 21 ST HIALEAH,FL 33010	BUS TRANSFER CENTER	*	PASSENGER	25.841	-80.2817	1985	100
HIALEAH METRORAIL STATION	127 EAST 21 ST/115 EAST 21 ST HIALEAH,FL 33010	TRACTION POWER SUBSTATION	*	OTHER	25.8409	-80.2801	1985	*
HIALEAH METRORAIL STATION	127 EAST 21 ST/115 EAST 21 ST HIALEAH,FL 33010	TRAIN CONTROL	*	OTHER	*	*	*	*
HIALEAH METRORAIL STATION	127 EAST 21 ST/115 EAST 21 ST HIALEAH,FL 33010	SURFACE PARKING LOT	247 SPACES	PARKING	25.841	-80.2817	1985	100
HISTORIC OVERTOWN/LYRIC THEATRE METRORAIL STATION	100 NW 6th STREET MIAMI, FL 33136	ELEVATED FIXED GUIDEWAY STATION	32,161	PASSENGER	25.7814	-80.1966	1984	100
HISTORIC OVERTOWN/LYRIC THEATRE METRORAIL STATION	100 NW 6th STREET MIAMI, FL 33136	TRACTION POWER SUBSTATION	*	OTHER	25.7814	-80.1966	*	*

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
HISTORIC OVERTOWN/LYRIC THEATRE METRORAIL STATION	100 NW 6th STREET MIAMI, FL 33136	TRAIN CONTROL	*	OTHER	25.7814	-80.1966	*	*
I-95	SOUTH MIAMI AVE & SW 19th RD MIAMI, FL 33130	TRAIN CONTROL	*	OTHER	*	*	*	*
I-95	SOUTH MIAMI AVE & SW 19th RD MIAMI, FL 33130	GAPTIE 1	.8 ACRES	OTHER	25.7573	-80.1991	*	*
ITCH	BETWEEN EARLINGTON HEIGHTS & MIAMI INTERNATIONAL AIRPORT	TRAIN CONTROL	*	OTHER	*	*	*	*
ITPS1	BETWEEN EARLINGTON HEIGHTS & MIAMI INTERNATIONAL AIRPORT	TRACTION POWER SUBSTATION	*	OTHER	*	*	*	*
ITPS2	BETWEEN EARLINGTON HEIGHTS & MIAMI INTERNATIONAL AIRPORT	TRACTION POWER SUBSTATION	*	OTHER	*	*	*	*
JOSEPH A. BRYANT METROMOVER FACILITY	100 SW 1st AVENUE MIAMI, FL 33130	COMBINED FACILITY	33,718	MAINTENANCE	25.7729	-80.1957	1985	50
JOSEPH A. BRYANT METROMOVER FACILITY	100 SW 1st AVENUE MIAMI, FL 33130	SURFACE PARKING LOT	*	PARKING	25.7729	-80.1957	1985	50
KENDALL DRIVE & 150 AVENUE	14955 SW 88th STREET MIAMI, FL 33196	SURFACE PARKING LOT	109 SPACES	PARKING	25.6851	-80.4357	1999	N/A
KNIGHT CENTER MOVER STATION	100 SE SECOND STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	6,803	PASSENGER	25.7719	-80.1914	1986	50
KNIGHT CENTER MOVER STATION	100 SE SECOND STREET MIAMI, FL 33131	GAP POWER STATION	*	OTHER	25.7719	-80.1914	*	*
MIAMI AVENUE MOVER STATION	90 SOUTH MIAMI AVENUE MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	5,973	PASSENGER	25.7734	-80.1936	1986	50
MIAMI GARDENS DRIVE	CORNER 186th ST & NW 73rd AVE MIAMI, FL 33015	COMFORT STATION	*	OTHER	25.9409	-80.3197	*	N/A
MIAMI GARDENS DRIVE	CORNER 186th ST & NW 73rd AVE MIAMI, FL 33015	BUS TRANSFER CENTER	124 SPACES	PASSENGER	25.9409	-80.3197	*	N/A
MIAMI INTERNATIONAL AIRPORT METRORAIL STATION	3814 NW 25th STREET MIAMI, FL 33142	BUS TRANSFER CENTER	*	PASSENGER	25.7972	-80.2583	2011	100
MIAMI INTERNATIONAL AIRPORT METRORAIL STATION	3814 NW 25th STREET MIAMI, FL 33142	COMFORT STATION	*	OTHER	25.7972	-80.2583	2011	100
MIAMI INTERNATIONAL AIRPORT METRORAIL STATION	3814 NW 25th STREET MIAMI, FL 33142	TRAIN CONTROL	*	OTHER	*	*	*	*
MIAMI INTERNATIONAL AIRPORT METRORAIL STATION	3814 NW 25th STREET MIAMI, FL 33142	ELEVATED FIXED GUIDEWAY STATION	*	PASSENGER	25.7972	-80.2583	2011	100
MIAMI-DADE COLLEGE	SW 104th and 113rd AVENUE MIAMI, FL	SURFACE PARKING LOT	25 SPACES	PARKING	*	*	*	N/A

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
MUSEUM PARK MOVER STATION (BIC)	1191 BISCAYNE BOULEVARD MIAMI, FL 33132	ELEVATED FIXED GUIDEWAY STATION	15,615	PASSENGER	25.7859	-80.1879	1994	50
MUSEUM PARK MOVER STATION (BIC)	1191 BISCAYNE BOULEVARD MIAMI, FL 33132	PDS SUBSTATION	*	OTHER	25.7859	-80.1879	2002	*
NORTHEAST METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	SURFACE PARKING LOT	*	OTHER	25.9437	-80.1946	*	*
NORTHEAST BLOW DOWN METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	VEHICLE BLOW-DOWN FACILITY	*	MAINTENANCE	25.9423	-80.1936	*	50
NORTHEAST FUEL METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	FUELING FACILITY	*	MAINTENANCE	25.9429	-80.1942	*	50
NORTHEAST O & I METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	MAINTENANCE	79,000	MAINTENANCE	25.9429	-80.1932	1985	50
NORTHEAST OPERATIONS METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	ADMINISTRATIVE	12,000	ADMINISTRATIVE	25.9440	-80.1933	1985	50
NORTHEAST REVENUE METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	REVENUE COLLECTION	*	ADMINISTRATIVE	25.9439	-80.1935	*	50
NORTHEAST SECURITY 1 METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	GUARD BOOTH	*	ADMINISTRATIVE	25.9446	-80.1951	*	*
NORTHEAST SECURITY 2 METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	GUARD BOOTH	*	ADMINISTRATIVE	25.9435	-80.1926	*	*
NORTHEAST WASH METROBUS FACILITY	360 NE 185th STREET MIAMI, FL 33179	WASHING FACILITY	*	MAINTENANCE	25.9435	-80.1956	*	50
NORTHSIDE METRORAIL STATION	3150 NW 79th STREET MIAMI, FL 33147	ELEVATED FIXED GUIDEWAY STATION	37,304	PASSENGER	25.8457	-80.2508	1985	100
NORTHSIDE METRORAIL STATION	3150 NW 79th STREET MIAMI, FL 33147	BUS TRANSFER CENTER	*	PASSENGER	25.8457	-80.2508	1985	100
NORTHSIDE METRORAIL STATION	3150 NW 79th STREET MIAMI, FL 33147	TRACTION POWER SUBSTATION	*	OTHER	25.845613	-80.2476	1985	*
NORTHSIDE METRORAIL STATION	3150 NW 79th STREET MIAMI, FL 33147	TRAIN CONTROL	*	OTHER	*	*	*	*
NORTHSIDE METRORAIL STATION	3150 NW 79th STREET MIAMI, FL 33147	SURFACE PARKING LOT	296 SPACES	PARKING	25.8457	-80.2508	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	ELEVATED FIXED GUIDEWAY STATION	51,606	PASSENGER	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	ANCILLARY BLDG 1	*	OTHER	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	BUS TRANSFER CENTER	*	PASSENGER	25.8963	-80.3796	1985	100

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	PEDESTRIAN OVERPASS	*	PASSENGER	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	GUARD BOOTH	*	ADMINISTRATIVE	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	SUPERVISOR BOOTH	*	MAINTENANCE	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	TRACTION POWER SUBSTATION	*	OTHER	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	TRAIN CONTROL	*	OTHER	*	*	*	*
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	PARKING STRUCTURE	1031 SPACES	PARKING	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	SURFACE PARKING LOT	139 SPACES	PARKING	25.8963	-80.3796	1985	100
OKEECHOBEE METRORAIL STATION	2005 S OKEECHOBEE ROAD HIALEAH, FL 33010	GAPTIE 3	2.70 ACRES	OTHER	25.8397	-80.3056	*	*
OVERTOWN TRANSIT VILLAGE	701 NW 8th COURT MIAMI, FL 33136	ADMINISTRATIVE	*	ADMINISTRATIVE	25.7813	-80.2083	2006	50
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	ELEVATED FIXED GUIDEWAY STATION	12,000	PASSENGER	25.8434	-80.3268	2003	100
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	BUS TRANSFER CENTER	*	PASSENGER	25.8434	-80.3268	2003	100
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	GUARD BOOTH	*	ADMINISTRATIVE	25.8434	-80.3268	2003	100
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	PEDESTRIAN OVERPASS	*	PASSENGER	25.8434	-80.3268	2003	100
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	SUPERVISOR BOOTH	*	ADMINISTRATIVE	25.8434	-80.3268	2003	100
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	TRAIN CONTROL	*	OTHER	*	*	*	*
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	GAPTIE 4	2.70 ACRES	OTHER	25.8434	-80.3249	2003	100
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	TRACTION POWER SUBSTATION	2.70 ACRES	OTHER	25.8430	-80.3230	*	*
PALMETTO METRORAIL STATION	7701 NW 79th AVENUE MEDLEY, FL 33166	SURFACE PARKING LOT	720 SPACES	PARKING	25.8434	-80.3268	2003	100
PARK WEST MOVER STATION	800 NE SECOND AVENUE MIAMI, FL 33132	ELEVATED FIXED GUIDEWAY STATION	15,950	PASSENGER	25.7825	-80.1906	1994	50

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
PARK WEST MOVER STATION	800 NE SECOND AVENUE MIAMI, FL 33132	PDS SUBSTATION	*	OTHER	25.7825	-80.1906	2002	*
RIVERWALK MOVER STATION	88 SE 4th STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	7,056	PASSENGER	25.7711	-80.1926	1994	50
RIVERWALK MOVER STATION	88 SE 4th STREET MIAMI, FL 33131	PDS SUBSTATION	*	OTHER	25.7711	-80.1926	2002	*
SANTA CLARA METRORAIL STATION	2050 NW 12th AVENUE MIAMI, FL 33135	ELEVATED FIXED GUIDEWAY STATION	37,304	PASSENGER	25.7962	-80.2164	1985	100
SANTA CLARA METRORAIL STATION	2050 NW 12th AVENUE MIAMI, FL 33135	BUS TRANSFER CENTER	*	PASSENGER	25.7962	-80.2164	1985	100
SANTA CLARA METRORAIL STATION	2050 NW 12th AVENUE MIAMI, FL 33135	TRACTION POWER SUBSTATION	*	OTHER	*	*	*	*
SANTA CLARA METRORAIL STATION	2050 NW 12th AVENUE MIAMI, FL 33135	TRAIN CONTROL	*	OTHER	*	*	*	*
SANTA CLARA METRORAIL STATION	2050 NW 12th AVENUE MIAMI, FL 33135	PARKING STRUCTURE	65 SPACES	PARKING	25.7962	-80.2164	1985	100
SCHOOL BOARD MOVER STATION	50 NE 15th STREET MIAMI, FL 33132	ELEVATED FIXED GUIDEWAY STATION	9,900	PASSENGER	25.7894	-80.1933	1994	50
SCHOOL BOARD MOVER STATION	50 NE 15th STREET MIAMI, FL 33132	PDS SUBSTATION	*	OTHER	25.7894	-80.1933	2002	*
SCHOOL BOARD MOVER STATION	50 NE 15th STREET MIAMI, FL 33132	WASHING FACILITY	*	MAINTENANCE	25.7894	-80.1933	1994	50
SEVENTH AVENUE TRANSIT VILLAGE	6101 NW 7th AVENUE MIAMI, FL 33127	BUS TRANSFER CENTER	*	PASSENGER	25.8312	-80.2083	2016	N/A
SHERIDAN STREET TRI-RAIL STATION	INTERSTATE 95 / SHERIDAN STREET HOLLYWOOD, FL	SURFACE PARKING LOT	*	PARKING	*	*	*	N/A
SNAPPER CREEK EXPRESSWAY	US1 & SNAPPER CREEK EXPRESSWAY MIAMI, FL 33143	PEDESTRIAN OVERPASS	3,000	PASSENGER	25.6941	-80.3022	*	N/A
SOUTH MIAMI METRORAIL STATION	5949 SUNSET DRIVE MIAMI, FL 33143	ELEVATED FIXED GUIDEWAY STATION	30,466	PASSENGER	25.7051	-80.2890	1984	100
SOUTH MIAMI METRORAIL STATION	5949 SUNSET DRIVE MIAMI, FL 33143	BUS TRANSFER CENTER	*	PASSENGER	25.7051	-80.2890	1984	100
SOUTH MIAMI METRORAIL STATION	5949 SUNSET DRIVE MIAMI, FL 33143	TRACTION POWER SUBSTATION	*	OTHER	25.7055	-80.2882	*	*
SOUTH MIAMI METRORAIL STATION	5949 SUNSET DRIVE MIAMI, FL 33143	TRAIN CONTROL	*	OTHER	*	*	*	*
SOUTH MIAMI METRORAIL STATION	5949 SUNSET DRIVE MIAMI, FL 33143	PARKING STRUCTURE	1802 SPACES	PARKING	25.7051	-80.2890	1984	100

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
STEPHEN P. CLARK CENTER	111 NW 1st STREET MIAMI, FL 33128	ADMINISTRATIVE	*	ADMINISTRATIVE	25.7756	-80.1967	1985	50
STEPHEN P. CLARK CENTER	111 NW 1st STREET MIAMI, FL 33128	REVENUE COLLECTION	*	ADMINISTRATIVE	25.7756	-80.1967	1985	50
STEPHEN P. CLARK CENTER	111 NW 1st STREET MIAMI, FL 33128	TRAIN CONTROL	*	OTHER	*	*	*	*
SW 127 AVENUE / KENDALL DRIVE	9001 SW 127th AVENUE MIAMI, FL 33186	SURFACE PARKING LOT	*	PARKING	25.6839	-80.4005	*	N/A
TENTH STREET MOVER STATION	1011 SE FIRST AVENUE MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	2,139	PASSENGER	25.764	-80.1926	1994	50
TENTH STREET MOVER STATION	1011 SE FIRST AVENUE MIAMI, FL 33131	GAP POWER STATION	*	OTHER	25.764	-80.1926	*	*
THIRD STREET MOVER STATION	250 SOUTH MIAMI AVENUE MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	5,011	PASSENGER	25.772	-80.1925	1986	50
THIRD STREET MOVER STATION	250 SOUTH MIAMI AVENUE MIAMI, FL 33131	PDS SUBSTATION	*	OTHER	25.772	-80.1925	2002	*
TRI-RAIL METRORAIL STATION	1125 EAST 25th STREET HIALEAH, FL 33013	ELEVATED FIXED GUIDEWAY STATION	30,666	PASSENGER	25.8464	-80.2598	1985	100
TRI-RAIL METRORAIL STATION	1125 EAST 25th STREET HIALEAH, FL 33013	TRACTION POWER SUBSTATION	*	OTHER	25.8464	-80.2598	1985	*
TRI-RAIL METRORAIL STATION	1125 EAST 25th STREET HIALEAH, FL 33013	TRAIN CONTROL	*	OTHER	25.8464	-80.2598	1985	*
TRI-RAIL METRORAIL STATION	1125 EAST 25th STREET HIALEAH, FL 33013	SURFACE PARKING LOT	44 SPACES	PASSENGER	25.8462	-80.2599	1985	*
UNIVERSITY METRORAIL STATION	5400 PONCE DE LEON MIAMI, FL 33146	ELEVATED FIXED GUIDEWAY STATION	31,286	PASSENGER	25.7148	-80.2770	1984	100
UNIVERSITY METRORAIL STATION	5400 PONCE DE LEON MIAMI, FL 33146	BUS TRANSFER CENTER	*	PASSENGER	25.7148	-80.2770	1984	100
UNIVERSITY METRORAIL STATION	5400 PONCE DE LEON MIAMI, FL 33146	TRACTION POWER SUBSTATION	*	OTHER	25.7148	-80.2780	*	*
UNIVERSITY METRORAIL STATION	5400 PONCE DE LEON MIAMI, FL 33146	TRAIN CONTROL	*	OTHER	*	*	*	*
UNIVERSITY METRORAIL STATION	5400 PONCE DE LEON MIAMI, FL 33146	PEDESTRIAN OVERPASS	*	PASSENGER	*	*	2018	*
UNIVERSITY METRORAIL STATION	5400 PONCE DE LEON MIAMI, FL 33146	SURFACE PARKING LOT	237 SPACES	PASSENGER	25.7148	-80.2770	1985	*
VIZCAYA METRORAIL STATION	3205 SW 1st AVENUE MIAMI, FL 33129	PEDESTRIAN OVERPASS	7,565	PASSENGER	25.7498	-80.2122	1984	100

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
VIZCAYA METRORAIL STATION	3205 SW 1st AVENUE MIAMI, FL 33129	ELEVATED FIXED GUIDEWAY STATION	31,286	PASSENGER	25.7498	-80.2122	1984	100
VIZCAYA METRORAIL STATION	3205 SW 1st AVENUE MIAMI, FL 33129	BUS TRANSFER CENTER	*	PASSENGER	25.7498	-80.2122	1984	100
VIZCAYA METRORAIL STATION	3205 SW 1st AVENUE MIAMI, FL 33129	TRACTION POWER SUBSTATION	*	OTHER	25.7492	-80.2125	*	*
VIZCAYA METRORAIL STATION	3205 SW 1st AVENUE MIAMI, FL 33129	TRAIN CONTROL	*	OTHER	*	*	*	*
VIZCAYA METRORAIL STATION	3205 SW 1st AVENUE MIAMI, FL 33129	SURFACE PARKING LOT	125 SPACES	PARKING	25.7498	-80.2122	1984	100
WEST KENDALL TRANSIT TERMINAL	9155 SW 162nd AVENUE MIAMI, FL 33196	BUS TRANSFER CENTER	*	PASSENGER	25.6809	-80.4573	2010	50
WEST KENDALL TRANSIT TERMINAL	9155 SW 162nd AVENUE MIAMI, FL 33196	SURFACE PARKING LOT	40 SPACES	PARKING	25.6809	-80.4573	2010	50
WILKIE D. FERGUSON, JR. MOVER STATION (SPS)	90 NW 5th STREET MIAMI, FL 33131	ELEVATED FIXED GUIDEWAY STATION	11,524	PASSENGER	25.7788	-80.1953	1986	50
WILKIE D. FERGUSON, JR. MOVER STATION (SPS)	90 NW 5th STREET MIAMI, FL 33131	GAP POWER STATION	*	OTHER	25.7788	-80.1953	*	*
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	COMBINED FACILITY	228,873	ADMINISTRATIVE	25.8381	-80.3114	1983	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	FIRE PUMP	*	OTHER	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	FUELING FACILITY	*	MAINTENANCE	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	GUARD BOOTH	*	ADMINISTRATIVE	25.8381	-80.3114	*	*
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	MAINTENANCE	*	MAINTENANCE	25.8381	-80.3114	1983	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	SATELLITE 1	*	OTHER	25.8381	-80.3114	*	*
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	SATELLITE 2	*	OTHER	25.8381	-80.3114	*	*
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	SATELLITE 3	*	OTHER	25.8381	-80.3114	*	*
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	SURFACE PARKING LOT	*	PARKING	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	TRACTION POWER SUBSTATION	*	OTHER	25.8381	-80.3114	*	50

Legend: *- Pending Information
N/A - Not Applicable

Department of Transportation and Public Works

Complete Facilities Asset Inventory

Facility	Address	Category	Size	Primary Use	Latitude	Longitude	Year Built	Useful Life
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	TRAIN CONTROL ZONE 1	*	OTHER	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	TRAIN CONTROL ZONE 2	*	OTHER	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	TRAIN CONTROL ZONE 3	*	OTHER	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	TRAIN CONTROL ZONE 4	*	OTHER	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	VEHICLE TESTING	*	MAINTENANCE	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	WAREHOUSE 1	*	MAINTENANCE	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	WAREHOUSE 2	*	MAINTENANCE	25.8381	-80.3114	*	50
WILLIAM LEHMAN CENTER METRORAIL FACILITY	6601 NW 72nd AVENUE MIAMI, FL 33166	WASHING FACILITY	*	MAINTENANCE	25.8381	-80.3114	*	50

Legend: *- Pending Information
N/A - Not Applicable

Glossary

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

Asset category - a grouping of asset classes, including a grouping of equipment, a grouping of rolling stock, a grouping of infrastructure, and a grouping of facilities.

Asset class - means a subgroup of capital assets within an asset category. For example, buses, trolleys, and cutaway vans are all asset classes within the rolling stock asset category.

Asset inventory - a register of capital assets, and information about those assets.

Asset management - a strategic approach to managing transportation infrastructure. It focuses on business processes for resource allocation and utilization with the objective of better decision making based upon quality information and well-defined objectives.

Condition assessment - the process of inspecting, analyzing or testing assets to collect data that is used to measure condition and performance. The condition assessment process involves regular inspections, testing or analysis.

Capital asset - a unit of rolling stock, a facility, a unit of equipment, or an element of infrastructure used for providing public transportation. Fixed, long-term items that will require preservation to add value and utility to an organization.

Decision support tool - an analytic process or methodology to help prioritize projects to improve and maintain the state of good repair of capital assets within a public transportation system, based on available condition data and objective criteria; or to assess financial needs for asset investments over time.

Equipment - an article of nonexpendable, tangible property having a useful life of at least one year.

Exclusive-use maintenance facility - a maintenance facility that is not commercial and either owned by a transit provider or used for servicing their vehicles.

Facility - a building or structure that is used in providing public transportation.

Full level of performance - the objective standard established by FTA for determining whether a capital asset is in a state of good repair.

Gap analysis – A technique used to determine what steps need to be taken in order to move from a current state to a desired, future state.

Horizon period - the fixed period of time within which a transit provider will evaluate the performance of its TAM plan.

Implementation plan – a management tool designed to illustrate, in detail, the critical steps in developing and starting a project. It is a guide or map that helps program staff be proactive rather than reactive in developing their program and identifying any challenges along the way.

Implementation strategy - a transit provider's approach to carrying out TAM practices, including establishing a schedule, accountabilities, tasks, dependencies, and roles and responsibilities.

Investment prioritization - a transit provider's ranking of capital projects or programs to achieve or maintain a state of good repair. An investment prioritization is based on financial resources from all sources that a transit provider reasonably anticipates will be available over the TAM plan horizon period.

Key asset management activities - a list of activities that a transit provider determines are critical to achieving its TAM goals.

Life-cycle cost - the cost of managing an asset over its whole life.

Net Present Value (NPV) – sum of discounted monetary costs or benefits, or both over a period of time, with discounting related to the timing of the monetary flow, to reflect the time value of money.

Performance Measure – an expression based on a quantifiable indicator of performance or condition that is used to establish targets and to assess progress toward meeting the established targets (e.g., a measure for on-time performance is the percent of trains that arrive on time, and a corresponding quantifiable indicator of performance or condition is an arithmetic difference between scheduled and actual arrival time for each train).

Performance target - a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the Federal Transit Administration (FTA).

Public transportation system - the entirety of a transit provider's operations, including the services provided through contractors.

Public transportation agency safety plan – a transit provider's documented comprehensive agency safety plan that is required by 49 U.S.C. 5329.

Recipient - an entity that receives Federal financial assistance under 49 U.S.C. Chapter 53, either directly from FTA or as a subrecipient.

Risk – the possibility of adverse consequences related to an asset from natural or man-made hazards. Generally consists of the likelihood of the hazard, the consequences of the hazard to the asset, and the impact of asset damage or malfunction on the mission of the asset or on life, property, or the environment.

Risk Management - The identification, assessment, and prioritization of risks followed by coordinated and efficient application of resources to monitor risks, mitigate threats and maximize the realization of opportunities.

Rolling stock - means a revenue vehicle used in providing public transportation, including vehicles used for carrying passengers on fare-free services.

Service vehicle - a unit of equipment that is used primarily either to support maintenance and repair work for a public transportation system or for delivery of materials, equipment, or tools.

Stakeholder - A person or organization who has a legitimate interest in an activity e.g. community, county commission, etc.

State of good repair (SGR) - the condition in which a capital asset is able to operate at a full level of performance.

TERM scale - the five (5) category rating system used in the Federal Transit Administration's Transit Economic Requirements Model (TERM) to describe the condition of an asset: 5.0—Excellent, 4.0—Good; 3.0— Adequate, 2.0—Marginal, and 1.0— Poor.

Tier I provider - a recipient that owns, operates, or manages either (1) one hundred and one (101) or more vehicles in revenue service during peak regular service across all fixed route modes or in any one non-fixed route mode, or (2) rail transit.

Transit asset management (TAM) - the strategic and systematic practice of procuring, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life-cycles, for the purpose of providing safe, cost-effective, and reliable public transportation.

Transit asset management plan (TAMP) - means a plan that includes an inventory of capital assets, a condition assessment of inventoried assets, a decision support tool, and a prioritization of investments.

Transit asset management (TAM) policy - a transit provider's documented commitment to achieving and maintaining a state of good repair for all of its capital assets. The TAM policy defines the transit provider's TAM objectives and defines and assigns roles and responsibilities for meeting those objectives.

Transit asset management (TAM) strategy - the approach a transit provider takes to carry out its policy for TAM, including its objectives and performance targets.

Transit asset management system - a strategic and systematic process of operating, maintaining, and improving public transportation capital assets effectively, throughout the life-cycles of those assets.

Transit provider - a recipient or subrecipient of Federal financial assistance under 49 U.S.C. chapter 53 that owns, operates, or manages capital assets used in providing public transportation.

Useful life - either the expected life-cycle of a capital asset or the acceptable period of use in service determined by FTA.

Useful life benchmark (ULB) - the expected life-cycle or the acceptable period of use in service for a capital asset, as determined by a transit provider, or the default benchmark provided by FTA.