

# TRANSIT ASSET MANAGEMENT PLAN UPDATE

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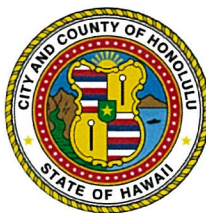


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9-29-22

Date

*Prepared by City and County of Honolulu Department of Transportation Services in Cooperation with  
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## Document Issue Table

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## Change History

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0.4.0	9/13/2022	Sections 1.1, 2.3	Final	Planner VI



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## List of Acronyms

**AIM** – Asset Inventory Module

**BFS** – Department of Budget and Fiscal Services

**BFMP** – Bus Fleet Management Plan

**CIP** – Capital Improvement Program

**CMS** – Component Management System

**CSC** - Core Systems Contractor

**DDC** – Department of Design and Construction

**DFM** – Department of Facility Maintenance

**DIT** – Department of Information Technology

**DTS** – Department of Transportation Services

**EAM** – Enterprise Asset Management

**FAST** – Fixing America’s Surface Transportation Act

**FMS** – Facilities Maintenance System

**FTA** – Federal Transit Administration

**HART** – Honolulu Authority for Rapid Transportation

**HDOT** – Hawaii Department of Transportation

**H RTP** - Honolulu Rail Transit Project

**IAM** – Institute of Asset Management

**LOMC** - Lead Operations and Maintenance Contractor

**LOMC-CSC** - Lead Operations and Maintenance Contractor-Core Systems Contractor

**LOMC-RSS** - Lead Operations and Maintenance Contractor-Revenue System Services

**LOMC-VTS** – Lead Operations and Maintenance Contractor-Vertical Transportation Services

**MAP-21** – Moving Ahead for Progress in the 21st Century Act

**MMIS** – Maintenance Management Information System

**MMS** – Maintenance Management System



**NTD** – National Transit Database

**O&M** – Operations and Maintenance

**OahuMPO** – Oahu Metropolitan Planning Organization

**OEM** – Original Equipment Manufacturer

**OTS** – Oahu Transit Services, Inc.

**PTASP** – Public Transportation Agency Safety Plan

**PTMMS** – Paratransit Maintenance Management System

**RAMS** – Reliability, Availability, Maintainability and Safety

**SGR** – State of Good Repair

**TAM** – Transit Asset Management

**TERM** – Transit Economic Requirements Model

**TMD** – Transportation Mobility Division

**TPD** – Transportation Performance and Development Division

**ULB** – Useful Life Benchmark

**USDOT** – United States Department of Transportation

**YOE** – Year of Expenditure





## List of Definitions

**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 TAM 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 TAM plan, in accordance with 49 U.S.C. 5326.

**Asset Category** – The primary or top-level way of cataloging assets. Assets are divided into four major categories: Vehicles, Facilities, Stations, and Systems.

**Asset Sub-Category** – The second level of cataloging assets in the asset hierarchy. For instance, the two asset classes within the Vehicles category are revenue and non-revenue vehicles.

**Capital Asset** – Includes equipment, rolling stock, infrastructure, and facilities for use in public transportation that is owned or leased by the transit provider. The FTA typically considers five main categories for capital assets: Vehicles, Systems, Guideway Elements, Facilities, and Stations.

**Condition Assessment** – The process of inspecting the asset to collect data, document, and measure condition and performance. Condition assessment can also be carried out through modeling.

**Core Systems Contractor (CSC)** – The third party under contract to design and build the Core Systems and operate and maintain the System except the Vertical Circulation and Fare Collection systems and station and guideway maintenance. The Core System Contractor provides design and construction services to the City and County of Honolulu and HART for the H RTP, and O&M service to the City for the System.

**Decision Support Tool** – An analytic process or methodology that: (1) Helps 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 (2) Assesses financial needs for asset investments over time.

**Department of Transportation Services (DTS)** – The department of the City and County of Honolulu responsible for oversight of the Operations and Maintenance of the H RTP.

**Enterprise Asset Management (EAM)** – A combination of software, systems and services used to maintain and control operational assets and equipment. The aim is to optimize the quality and utilization of assets throughout their lifecycles, increase productive uptime and reduce operational costs. EAM involves work management, asset maintenance, planning and scheduling, supply chain management, and environmental, health, and safety initiatives.

**Facilities** – Asset classification that includes all assets related to maintenance and administrative facilities as well as stations and substation enclosures.

**Guideway** – Asset classification that includes track and ballast, associated structures, and line equipment.





**Honolulu Authority for Rapid Transportation (HART)** – The agency responsible for design and construction of the H RTP. The approval of the 2016 Charter Amendment 4 to the Revised Charter of the City and County of Honolulu 1973 (2000 edition) moved operations and maintenance oversight responsibilities for rail from HART to the City and County of Honolulu Department of Transportation Services (DTS).

**Honolulu Rail Transit Project (H RTP)** – The complete FFGA approved project, minimum operable segment, including those segments operating as the System and those segments still in the design and construction phase. It excludes any future segment not included in an FTA approved Record of Decision.

**Lead O&M Contractor (LOMC)** – Any Contractor with respect to the O&M work, or any other Contractor that the City Parties has or will enter into any contract to lead in performance of any material part of the O&M work.

**LOMC responsible for Core Systems O&M Services (LOMC-CSC)** – The third party under contract to design and build the Core Systems and operate and maintain the System except the Vertical Circulation and Fare Collection systems and station and guideway maintenance. The Core System Contractor provides design and construction services to the City and County of Honolulu and HART for the H RTP, and O&M service to the City for the System.

**LOMC responsible for Revenue System Services (LOMC-RSS)** – The third party under contract, responsible for overseeing and managing revenue system services, on behalf of the City. The LOMC-RSS is also responsible for staffing the HOLO Card Call center and sub-contracting for ticket vending machine cash collection.

**LOMC responsible for Vertical Transportation Services (LOMC-VTS)** – The third party under contract, responsible for installing and maintaining the elevators and escalators.

**Moving Ahead for Progress in the 21st Century Act (MAP-21)** – A funding and authorization bill for federal surface transportation. Signed into law in July 2012, Chapter 20019 requires transit agencies to develop a Transit Asset Management Plan and to implement a Transit Asset Management System.

**Oahu Transit Services, Inc. (OTS)** – A private, not for profit management firm under contract with DTS to provide fixed-route (TheBus) and paratransit (TheHandi-Van) service for the island of Oahu.

**O&M** – Operations and maintenance.

**State of Good Repair** – The condition in which a capital asset is able to operate at a full level of performance. A capital asset is in a state of good repair when that asset:

1. Is able to perform its designed function
2. Does not pose a known unacceptable safety risk
3. Its lifecycle investments must have been met or recovered

**Stations** – Asset classification that includes passenger stations and transfer facilities, and all related assets.

**Systems** – Asset classification that includes fare collection, train control, communications, security, and traction power equipment.



**Transit Economic Requirements Model** – TERM is FTA's capital needs analysis tool. FTA also developed a regional/local version of the tool called TERM Lite.

**TERM Lite** – An analysis tool designed to help transit agencies assess their SGR backlog and other items.

**TERM Scale** – Rating system used in the Federal Transit Administration's Transit Economic Requirements Model (TERM) to describe the condition of an asset. The five levels are: 5 (excellent), 4 (good), 3 (adequate), 2 (marginal), and 1 (poor).

**Tier I Provider** – A transit provider 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** – A strategic and systematic process through which an organization procures, operates, maintains, rehabilitates, and replaces transit assets over their lifecycle to manage their performance, risks, and costs to provide safe, cost-effective, reliable service to current and future customers.

**Transit Asset Management Plan** – A plan developed by an agency that includes, at a minimum, a discussion of current transit capital asset inventories and condition assessments, decision support project prioritization, and SGR performance.

**Useful Life Benchmark** – The expected lifecycle of a capital asset for a particular transit agency's operating environment, or the acceptable period of use in service for a particular transit agency's operating environment.

**Vehicles** – Asset classification that includes both revenue vehicles (e.g., buses, paratransit vehicles, rail vehicles) and non-revenue vehicles (e.g., trucks, sedans).

# Executive Summary

## ES.1 - Introduction

The National Transit Asset Management (TAM) system, conceived by the Federal Transit Administration (FTA), was established for the purpose of monitoring and managing public transportation capital assets to enhance safety, reduce maintenance costs, increase reliability, and improve performance. All transit agencies receiving Chapter 53 funding from the Federal government are required to develop TAM Plans, per the Moving Ahead for Progress in the 21st Century (MAP-21) legislation, specifically the 2016 TAM Final Rule and 49 CFR Part 625.

The first-generation TAM Plan for the City and County of Honolulu Department of Transportation Services (DTS) was completed in September 2018. This is the first major update to the first-generation TAM Plan and serves as the 2022 TAM Plan. The planning horizon covered under this TAM Plan is 2022-2026. Rail system assets are not included in this TAM Plan as the system is not yet in revenue operation. Rail assets will be included after commissioning and once the rail line becomes operational.

This TAM Plan represents an opportunity for DTS to anticipate lifecycle costs and to maintain the transit system in a State of Good Repair (SGR). MAP-21 also requires condition assessments and prioritizing capital investments based on performance, condition, and risk. The TAM Plan provides a framework by which DTS can track its progress toward a mature, data-driven asset management program by setting a baseline of existing conditions and activities required to maintain all of DTS' assets in SGR.

This TAM Plan was developed during 2020 and 2021 and reflects DTS' asset management maturity and organizational preparedness during that timeframe. The plan includes an implementation program that outlines specific actions and recommendations for the short, medium, and long terms.

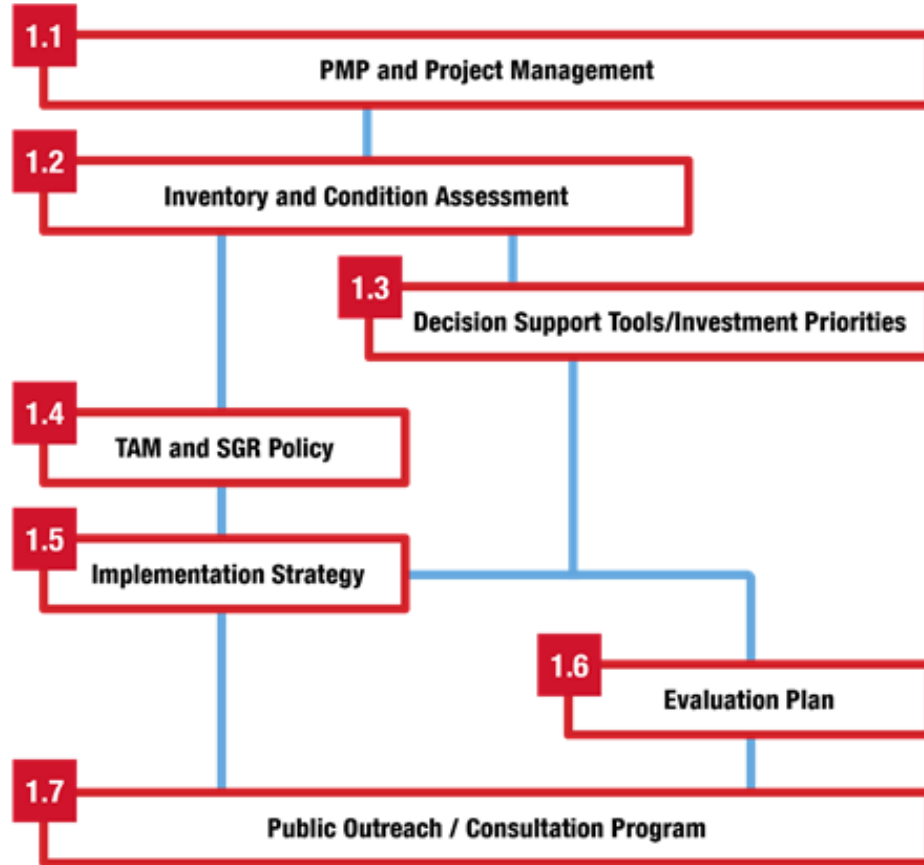
Development of this TAM Plan included participation and input from stakeholders across DTS as well as other agencies as follows:

- Department of Budget and Fiscal Services (BFS)
- Oahu Transit Services, Inc. (OTS)
- Lead O&M Contractor-Core Systems Contractor (LOMC-CSC)
- Lead O&M Contractor-Revenue System Services (LOMC-RSS)
- Lead O&M Contractor-Vertical Transportation Services (LOMC-VTS)

## ES.2 - Plan Development Summary

During the development of the Plan, DTS addressed each of the nine required TAM Plan elements as defined in the Federal guidance documents. Development of the TAM Plan was an iterative process designed to first assess agency asset management maturity, while further developing asset inventories and updating the TAM and SGR policy as shown below in Figure ES-1. DTS, other agency stakeholders, and the consultant team executed the seven tasks below. The final tasks included developing an implementation strategy and evaluation plan as well as a public outreach and consultation program.

Figure ES - 1: TAM Plan Update (Phase 1) Development Tasks



### ES.3 - FTA Requirements

DTS is considered a Tier I agency, defined as having 101 vehicles or more across all fixed route modes. This TAM Plan addresses all Federal requirements for Tier I agencies as illustrated in Table ES-1 below.

Table ES - 1: TAM Plan Reference Table

#	TAM Plan Element	Description	Chapter
1	Asset Inventory	A register of capital assets and information about those assets	3
2	Condition Assessment	A rating of the condition of assets for which a provider has direct capital responsibility at a level of detail sufficient to monitor and predict the performance of the assets and to inform the investment prioritization	4
3	Decision Support Tools	A description of analytic processes or tools that a provider uses to estimate capital investment needs over time and develop its investment prioritization	5



#	TAM Plan Element	Description	Chapter
4	Investment Prioritization	A prioritized list of proposed projects and programs to improve or manage the state of good repair of capital assets	5
5	TAM and SGR Policy	Policy that documents commitment to achieving State of Good repair for all capital assets and identifies roles and responsibilities	2
6	Implementation Strategy	Process to follow in order to implement the TAM Plan	7
7	List of Key Annual Activities	Identification of key activities/actions to implement a TAM Plan for each year of the plan's horizon	7
8	Resources	Identification of resources that a provider needs to develop and carry out the TAM plan	7
9	Monitor, Evaluate and Update	An outline of how a provider will monitor, update, and evaluate, as needed, its TAM plan and related business practices, to ensure continuous improvement	7

Besides the TAM Plan, FTA has two additional process-type requirements for TAM: record keeping and coordination with a state and/or regional planning function (HDOT and OahuMPO) and self-certification. Reporting requirements include the data report as part of annual National Transit Database (NTD) submittals, the setting of performance targets, and an annual narrative report. Chapter 4 on Condition Assessments addresses SGR targets and asset condition results.

## ES.4 - TAM Policy, Goals and Objectives

DTS developed two policy documents for this TAM Plan update: (1) DTS TAM Goals and Objectives and (2) an updated DTS TAM Policy.

Development of these documents involved two policy workshops with senior stakeholders within DTS.

The TAM policy applies to all transit assets for which DTS has capital replacement responsibility. This includes vehicles (revenue and non-revenue), stations, facilities, systems (including IT assets), and guideway/track assets. The policy covers assets associated with all transit modes, including bus, paratransit, and rail. DTS will maintain transit assets in a State of Good Repair and comply with Federal requirements by employing risk management strategies, using data-driven decision tools in processes for asset management, and building staff's knowledge of asset management best practices.

Table ES-2 on the following page presents DTS' goal statements for asset management.

Table ES - 2: DTS Transit Asset Management Goals

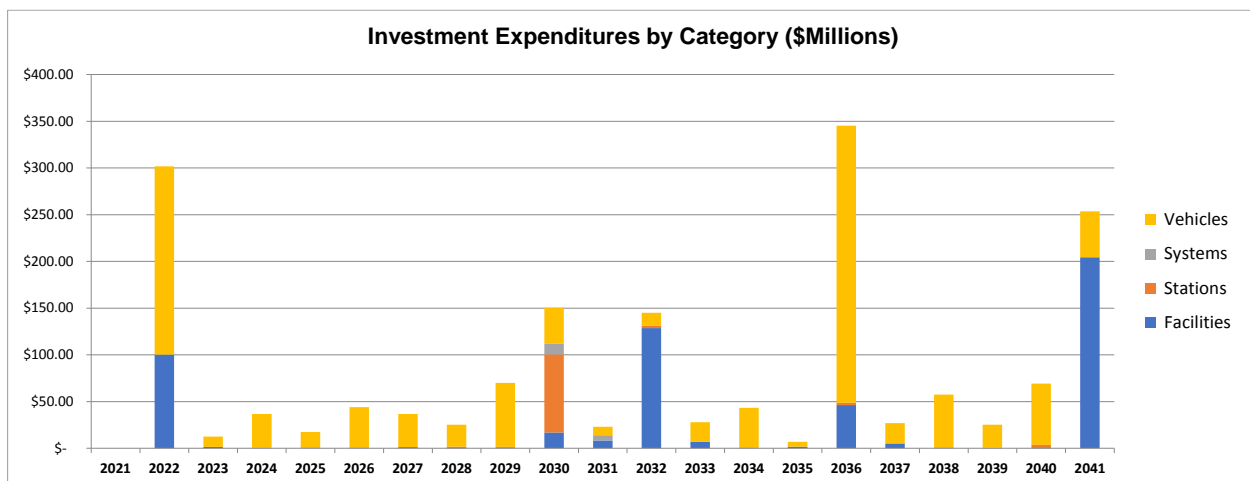
Goal Area	TAM Goal Statement
<b>Safety/Security</b>	Maintain assets in a State of Good Repair (SGR) and employ asset risk management strategies to ensure a safe, reliable, and resilient system.
<b>Decision-Making/ Prioritization/ Lifecycle Management/ Cost-Effectiveness</b>	Utilize robust data, tools, reporting, and processes to integrate asset management activities across organizations, divisions, and branches to make the best lifecycle management decisions.
<b>System Preservation and Growth</b>	Develop and implement strategic policies, plans, and procedures for operating and maintaining assets in a cost-effective way and meet customer demand.
<b>Employee Learning</b>	Build staff knowledge and capacity in relation to asset management best practices and foster a culture of safety, cooperation, continuous improvement, and customer service across the department.
<b>Federal Requirements</b>	Ensure compliance with Federal requirements through leadership, governance, training, communication, measuring performance, and comprehensive reporting.

## ES.5 - Backlog and Twenty-Year Plan

The DTS State of Good Repair backlog is estimated at \$281 million (\$2021), with 66% of that amount represented by vehicles, mainly revenue buses. The State of Good Repair backlog represents deferred reinvestment, replacement, and annual capital maintenance. The backlog level corresponds to 31% of asset valuation.

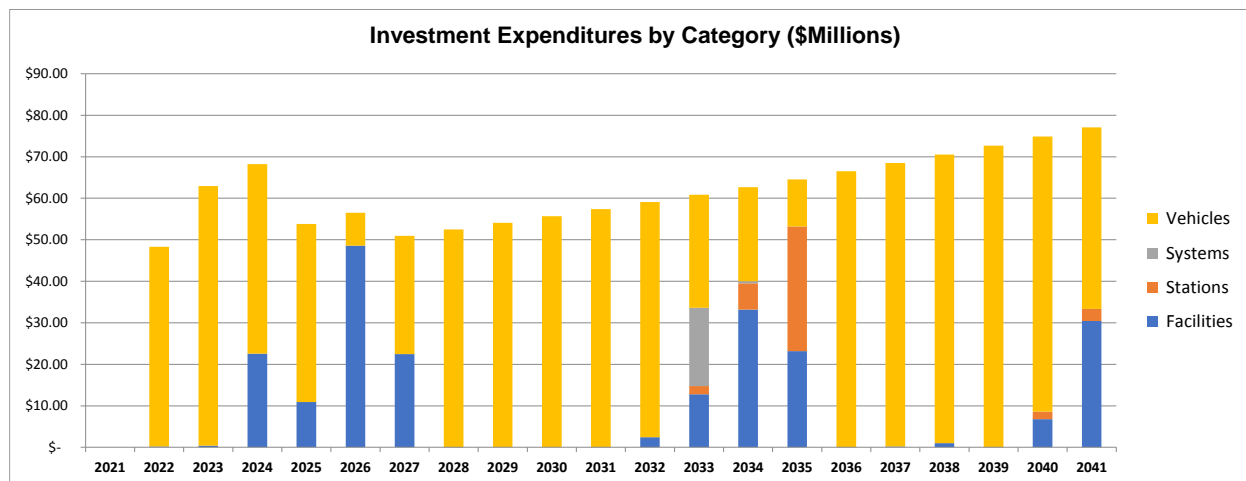
Two twenty-year capital renewal projections were developed using an FTA projection tool called TERM Lite. The unconstrained and constrained funding scenarios are presented in Figures ES-2 and ES-3, respectively.

Figure ES - 2: Unconstrained 20-Year Projection (\$YOE)



The unconstrained scenario assumes that the entirety of the backlog is addressed in 2022 and, for each subsequent year, all capital replacement needs for that year are fully funded. Note the large replacement need for vehicles in 2036 (the next cycle of replacement for buses replaced in 2022, plus inflation) and the large replacement need for facilities in 2041 (the replacement of the Pearl City maintenance facility).

Figure ES - 3: Constrained 20-Year Projection (\$YOE)



The constrained scenario results in ongoing capital needs over the 20-year planning horizon and an ongoing SGR backlog. In the outer years of the planning horizon, almost all expenditures would go toward vehicle replacement as other asset types are prioritized lower.

## ES.6 - Implementation Program

The implementation program presented in this TAM plan addresses four required plan elements (i.e., implementation strategy; list of key annual activities; resources; and monitor, evaluate, and update). As part of the implementation program, DTS has documented the five Federal compliance activities—three process-type and two reporting requirements—and how DTS will carry those out. DTS has also documented 13 additional action plans related to transit asset management, with an identified owner and estimated timeframe for each. Once the rail system is commissioned, DTS plans to incorporate rail assets as a core part of future TAM Plans.

# 1. Introduction

This chapter describes the DTS major functions and roles, particularly as they relate to TAM. Following that, the chapter explores the roles and responsibilities of other TAM stakeholders outside of DTS. Next, the chapter presents the scope and purpose of the TAM Plan. Finally, a detailed outline of this report is presented.

## 1.1 - DTS Background

### *Transit Services on Oahu*

The City, through its Department of Transportation Services is responsible for the implementation and management of the operations and maintenance of the transit system. The DTS organizational structure consists of the Office of the Director, the Mobility Innovation Office, the Administrative Services Office, the Complete Streets Office, and the Safety and Security Office as well as the Transportation Engineering Division, Transportation Performance and Development Division, Transportation Mobility Division, Proposed Transportation Rail Division, and the Transportation Technology Division. The DTS Administration, consisting of the Director, Deputy Director, and Director of Rapid Transit, collaboratively formulates policy, manages key external stakeholder relationships, leads special projects, represents the DTS at public meetings (e.g., Board, Council, Commission, and Legislative Hearings), and allocates resources to achieve strategic objectives. They work together closely to implement the Mayor's vision while leading the department's daily business activities (finances, operations, and administrative activities) to ensure safe, reliable, and resilient transit service is delivered to the communities of Oahu.

The fixed-route system, TheBus, operates over 100 routes that serve most major regions of the island and provided approximately 200,000 passenger trips per weekday in FY 2019. Over 540 buses and 200 paratransit vehicles operate out of the Kalihi-Palama Bus Facility, Pearl City Bus Facility, and TheHandi-Van Facility. The COVID-19 pandemic has resulted in lower ridership in FY 2020 and FY 2021. The Americans with Disabilities Act (ADA) complementary paratransit service, TheHandi-Van, is a public transit service for persons unable to independently use TheBus and is generally available island wide.

Honolulu's rail system is under development. When completed, the rail system is expected to include 20 miles of elevated rail track, 21 rail stations, 80 railcars, the Rail Operations Center, and other assets. The West Project Segment has nine stations from East Kapolei to Aloha Stadium and is currently in the Systems Integration Testing Phase. The rail system assets will be included in the next update to the TAM Plan.

### *DTS Divisions and Branches Involved with TAM*

Oversight of the City's public transit system, including both the fixed-route service (TheBus) and the ADA complementary paratransit service (TheHandi-Van), is assigned to DTS' **Transportation Mobility Division (TMD)**. TMD is comprised of three branches:

- The **Bus Service and Operations Branch** administers transit service planning, operations, and related activities for the City's fixed-route system, through performance monitoring, policy guidance, and direction of TheBus services operator, to promote transit ridership; to oversee compliance with ADA requirements; to coordinate bus-rail integration, and interface with alternate modes of transportation. Oahu Transit Services, Inc. (OTS), is a private, non-profit entity that operates TheBus and TheHandi-Van on behalf of DTS.



- The **Paratransit Service and Operations Branch** monitors performance and provides policy guidance and direction for TheHandi-Van. This branch also oversees the City's TheHandi-Van Eligibility Center, which provides in-person assessments of people applying for eligibility to ride the City's TheHandi-Van paratransit service, and manages the Agency Trips program, in which participating social service agencies provide trips to their clients.
- The **Facilities, Operations and Equipment Branch** procures all vehicles and equipment used to operate and support TheBus and TheHandi-Van services. This branch also oversees the development of new bus facilities, and the maintenance and improvement of existing facilities.

The **Transportation Rail Division** is responsible for Rail Operations and Maintenance as well as Rail Facilities Management and Maintenance. The Division has two branches as follows:

- The **Rail Operations and Maintenance Branch** is responsible for the following areas: Rail Operations Center, Train Operations, Station Operations, Rolling Stock, Track and Structures, Traction Electrification, Train Control, and Telecommunications.
- The **Rail Facilities Management and Maintenance Branch** is responsible for the following areas: Stations, Elevators, Escalators, and Parking Facilities. Staff are co-located with the Contractor(s) to ensure collaboration, coordination, and teamwork.

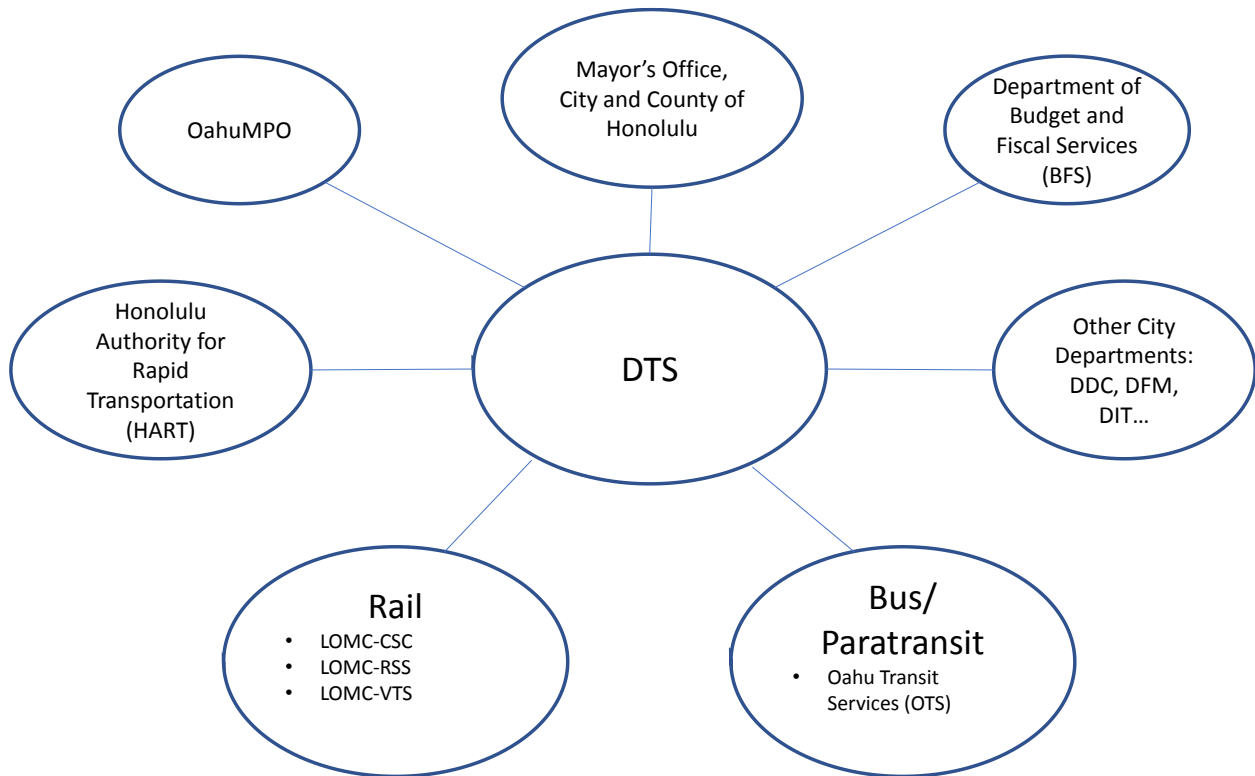
The **Administrative Services Office** has responsibilities for Contract Management, Electronic Revenue Systems, and Asset Management.

Another important contributor within DTS is the Transportation Performance and Development Division (TPD). Within this Division, two branches are involved in asset management activities. These are the **Performance and Business Analysis Branch** and the **Programming and Support Branch**. Although TPD has a much broader purview than transit (i.e., Complete Streets, parking, regional planning), two of the key TAM areas these branches interface with are the development and monitoring of key performance indicators, and the coordination of the development of capital projects (including the potential eligibility for Federal funds).

## 1.2 - Key Stakeholders

There are multiple stakeholders for transit asset management for the City and County of Honolulu, from the Mayor's Office down to the individual contractors and operating entities for bus, paratransit, and rail. DTS and the offices, divisions, and branches described above are at the center of this set of stakeholders, along with other City agencies such as the Department of Budget and Fiscal Services (BFS) and the semi-autonomous Honolulu Authority for Rapid Transportation (HART), and transportation planning partners like the Oahu Metropolitan Planning Organization (OahuMPO).

Figure 1 - 1: Honolulu Transit Asset Management Stakeholders



### 1.3 - Multi-Modal Transit Asset Management Plan

The TAM Final Rule resulting from the original MAP-21 legislation (later reauthorized under the FAST Act) requires the establishment of a strategic and systematic process of operating, maintaining, and improving public transportation capital assets effectively through their entire lifecycle. The Final Rule:

- Defines State of Good Repair (SGR)
- Requires grantees to develop a TAM Plan and updates every four years
- Requires target setting and new annual reporting requirements
- Requires FTA to continue offering technical assistance to grantees.

The first-generation TAM Plan for DTS was completed in September 2018. This is the first major update to the first-generation TAM Plan and serves as the 2022 TAM Plan. The planning horizon covered under this TAM Plan is 2022-2026.

This TAM Plan outlines strategies, processes, and tools to address DTS' asset management policy and goals and maintain Honolulu's multi-modal transit system in a State of Good Repair. In preparation for the commencement of rail passenger service, onboarding of the rail assets into a rail inventory and data architecture as well as an asset management maturity assessment for the rail system were performed. Rail system assets are not included in this TAM Plan, however, as the system is not yet in revenue operation. Rail assets will be included after commissioning and once the rail line becomes operational.

The DTS asset management program is comprehensive and includes a wide range of activities, including inventory work, condition assessment, policy development, capital reinvestment needs modeling, systems review, and other related tasks. Development of this multi-modal TAM Plan is being carried out in two phases: Phase 1 and Phase 2. The purpose of this report is to comply with TAM Final Rule legislation, specifically 49 CFR 625, and this TAM Plan update is the primary deliverable for Phase 1 of the work.

This **Multi-Modal Transit Asset Management Plan** addresses all FTA requirements. Following this introduction, the report is organized as follows:

- **Chapter 2:** Transit Asset Management Policy, Goals, and Objectives – Summary of program goals and objectives; current asset management policy; and drivers for the TAM program implementation
- **Chapter 3:** Inventory of Assets – Description of asset inventory development process for bus and paratransit systems; listing of assets and asset valuation
- **Chapter 4:** Condition Assessment – Summary of condition assessment methodologies; SGR measures, targets, and actual performance; modeled and physical condition assessment results
- **Chapter 5:** Reinvestment Needs and Prioritization – Description of capital program; decision support tools; State of Good Repair backlog; 20-year reinvestment needs projections (unconstrained and constrained); prioritization of projects
- **Chapter 6:** Capability and Gaps Analysis – Asset Management baseline (maturity) and gaps analysis
- **Chapter 7:** Implementation Program – List of annual activities, implementation timeline and action plans, resources, and continuous improvement
- **Chapter 8:** Conclusion and Next Steps
- **Appendices:** Information on the asset inventory data sources and assumptions, facility condition assessment forms, and asset management maturity workshops

## 2. Transit Asset Management Policy, Goals, and Objectives

This chapter begins by stating the goals and objectives driving this TAM Plan. Next, the chapter summarizes the DTS TAM policy that was developed early in the project, which includes key stakeholder roles and responsibilities. The chapter concludes with drivers to consider for the TAM program implementation into the future.

### 2.1 - Asset Management Goals and Objectives

As part of the development of this TAM Plan, the consultant team facilitated two policy workshops with senior stakeholders within DTS to develop TAM goals and objectives and an updated TAM policy.

During these workshops, DTS staff identified five goal areas deemed critical to asset management: (1) Safety/Security; (2) Decision-Making/Prioritization/Lifecycle Management/Cost-Effectiveness; (3) System Preservation and Growth; (4) Employee Learning; and (5) Federal Requirements. DTS then developed specific goal statements around each of these goal areas as shown in Table 2-1 below.

Table 2 - 1: DTS Transit Asset Management Goals

Goal Area	TAM Goal Statement
<b>Safety/Security</b>	Maintain assets in a State of Good Repair (SGR) and employ asset risk management strategies to ensure a safe, reliable, and resilient system.
<b>Decision-Making/ Prioritization/ Lifecycle Management/ Cost-Effectiveness</b>	Utilize robust data, tools, reporting, and processes to integrate asset management activities across organizations, divisions, and branches to make the best lifecycle management decisions.
<b>System Preservation and Growth</b>	Develop and implement strategic policies, plans, and procedures for operating and maintaining assets in a cost-effective way and meet customer demand.
<b>Employee Learning</b>	Build staff knowledge and capacity in relation to asset management best practices and foster a culture of safety, cooperation, continuous improvement, and customer service across the department.
<b>Federal Requirements</b>	Ensure compliance with Federal requirements through leadership, governance, training, communication, measuring performance, and comprehensive reporting.

For each of the five goal statements, DTS staff then defined corresponding asset management objectives as shown in Table 2-2 on the following page.



Table 2 - 2: DTS Transit Asset Management Objectives

TAM Goals	TAM Objectives
<p><b>Maintain assets in a State of Good Repair (SGR) and employ risk management strategies to ensure a safe, reliable, and resilient system.</b></p>	<ul style="list-style-type: none"> <li>• Develop an asset risk register and associated risk profile</li> <li>• Incorporate asset risk profile in project selection and decision-making</li> </ul>
<p><b>Utilize robust data, tools, reporting, and processes to integrate asset management activities across organizations, divisions, and branches to make the best lifecycle management decisions.</b></p>	<ul style="list-style-type: none"> <li>• Proactively leverage and promote the usage of data-driven decision support tools</li> <li>• Promote accountability of project delivery</li> <li>• Develop useful life benchmarks (ULBs) for all assets and align procurement policies with lifecycle management</li> <li>• Facilitate asset management integration across the multi-modal transit network</li> </ul>
<p><b>Develop and implement strategic policies, plans, and procedures for operating and maintaining assets in a cost-effective way and meet customer demand.</b></p>	<ul style="list-style-type: none"> <li>• Meet Original Equipment Manufacturer standards for preventive maintenance, rehabilitation, and replacement</li> <li>• Maintain strong oversight over compliance and procedures</li> <li>• Leverage agency wide resource planning to ensure sufficient funding to achieve a State of Good Repair.</li> </ul>
<p><b>Build staff knowledge and capacity in relation to asset management best practices and foster a culture of safety, cooperation, continuous improvement, and customer service across the department.</b></p>	<ul style="list-style-type: none"> <li>• Develop and implement procedures and assure knowledge transfer between contractors and staff</li> <li>• Provide clear governance roles and responsibilities within DTS, operators and contractors for transit asset management</li> </ul>
<p><b>Ensure compliance with Federal requirements through leadership, governance, training, communication, measuring performance, and comprehensive reporting.</b></p>	<ul style="list-style-type: none"> <li>• Complete Transit Asset Management policy and related procedures</li> <li>• Complete and maintain asset inventories and condition assessments</li> <li>• Set annual targets and track performance for Federal TAM reporting.</li> </ul>

## 2.2 - Asset Management Policy

DTS also established an updated Transit Asset Management policy, which aligns with the goals and objectives outlined above and documents DTS' commitment to maintaining transit assets in a State of Good Repair. The TAM policy applies to all transit assets for which DTS has capital replacement responsibility. This includes vehicles (revenue and non-revenue); stations and facilities; systems (including IT assets); and guideway/track assets. The policy covers assets associated with all transit modes, including bus, paratransit, and rail.

The policy statement states: DTS will maintain transit assets in a State of Good Repair and comply with Federal requirements by employing risk management strategies, using data-driven decision tools in processes for asset management, and building staff's knowledge of asset management best practices.

## 2.3 - Roles and Responsibilities

Implementation of the DTS asset management policy is a shared responsibility between DTS offices, divisions, and branches as well as its operators and associated contractors.

The Director of Rapid Transit led the development of the multi-modal TAM Plan and related activities, processes, and procedures in cooperation with the leadership team, the relevant Divisions, and other stakeholders.

Responsibilities for the many functions of TAM are summarized in Table 2-3 below.

Table 2 - 3: Roles and Responsibilities for Asset Management

TAM Function	Responsibility
<b>TAM Program Leadership</b>	<ul style="list-style-type: none"><li>• DTS Director – Accountable Executive</li><li>• DTS Deputy Director</li><li>• DTS Director of Rapid Transit</li></ul>
<b>Asset Inventory Development</b>	<ul style="list-style-type: none"><li>• DTS Transportation Mobility Division and Transportation Rail Division</li><li>• Oahu Transit Services, Inc. (OTS)</li><li>• Lead Operations and Maintenance Contractor-Core Systems Contractor (LOMC-CSC)</li><li>• Lead Operations and Maintenance Contractor-Revenue System Services (LOMC-RSS)</li><li>• Lead Operations and Maintenance Contractor-Vertical Transportation Services (LOMC-VTS)</li></ul>
<b>Inventory Maintenance and Updates</b>	<ul style="list-style-type: none"><li>• DTS Transportation Mobility Division and Transportation Rail Division</li><li>• OTS</li><li>• LOMC-CSC</li><li>• LOMC-RSS</li><li>• LOMC-VTS</li></ul>

TAM Function	Responsibility
<b>Asset Condition Assessments</b>	<ul style="list-style-type: none"> <li>• DTS Transportation Mobility Division and Transportation Rail Division</li> <li>• OTS</li> <li>• LOMC-CSC</li> <li>• LOMC-RSS</li> <li>• LOMC-VTS</li> </ul>
<b>Useful Life Benchmarks, Engineering</b>	<ul style="list-style-type: none"> <li>• DTS Administrative Services Office</li> <li>• OTS</li> <li>• LOMC-CSC</li> <li>• LOMC-RSS</li> <li>• LOMC-VTS</li> </ul>
<b>Asset Risk Management</b>	<ul style="list-style-type: none"> <li>• DTS Administrative Services Office</li> <li>• DTS Safety and Security Office</li> <li>• DTS Transportation Mobility Division</li> <li>• DTS Transportation Rail Division</li> <li>• DTS Transportation Performance and Development Division</li> <li>• OTS</li> <li>• LOMC-CSC</li> <li>• LOMC-RSS</li> <li>• LOMC-VTS</li> </ul>
<b>Capital Need Forecasts</b>	<ul style="list-style-type: none"> <li>• DTS Administrative Services Office</li> <li>• DTS Transportation Mobility Division</li> <li>• DTS Transportation Rail Division</li> <li>• DTS Transportation Performance and Development Division</li> <li>• OTS</li> <li>• LOMC-CSC</li> <li>• LOMC-RSS</li> <li>• LOMC-VTS</li> </ul>
<b>Decision Support/ Prioritization/ Capital Budgeting</b>	<ul style="list-style-type: none"> <li>• DTS Administrative Services Office</li> <li>• DTS Safety and Security Office</li> <li>• DTS Transportation Mobility Division</li> <li>• DTS Transportation Rail Division</li> <li>• DTS Transportation Performance and Development Division</li> </ul>

TAM Function	Responsibility
<b>Information Technology/ Enterprise Asset Management</b>	<ul style="list-style-type: none"> <li>• DTS Transportation Mobility Division and Transportation Rail Division</li> <li>• OTS</li> <li>• LOMC-CSC</li> <li>• LOMC-RSS</li> <li>• LOMC-VTS</li> </ul>
<b>Federal Reporting</b>	<ul style="list-style-type: none"> <li>• DTS Transportation Performance and Development Division</li> </ul>

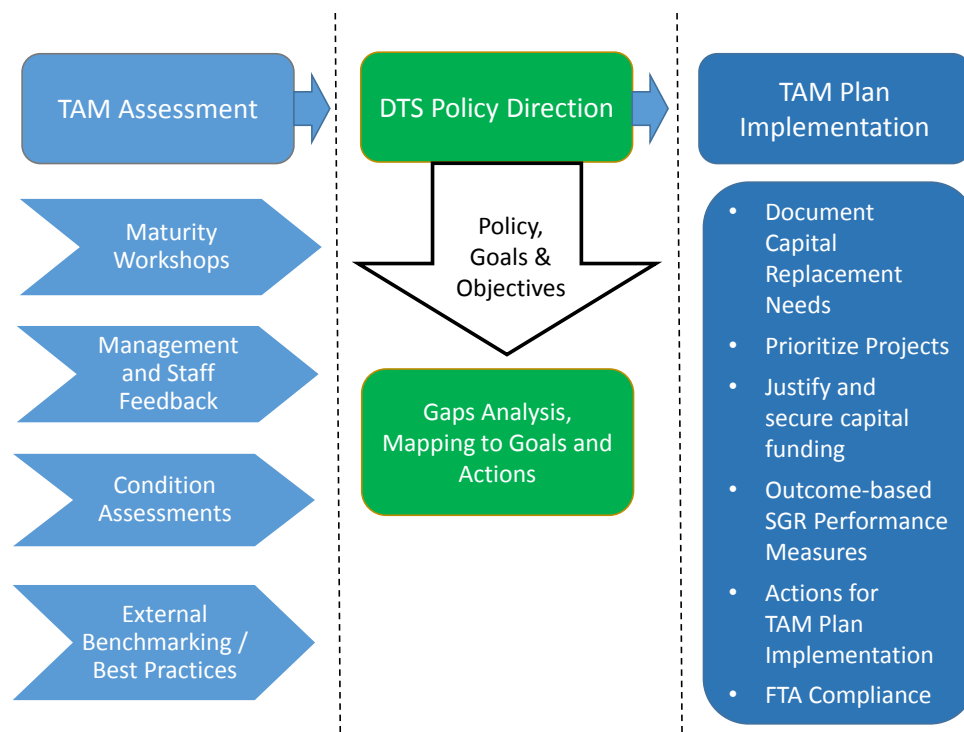
## 2.4 - Drivers for TAM Plan Implementation

The DTS policy on asset management and the associated goals and objectives laid out earlier in this chapter are the most important drivers for TAM Plan implementation. This TAM Plan was also informed by other program inputs such as:

- Asset management maturity assessment workshops
- Management and staff feedback
- Condition assessments
- External benchmarking and best practices

DTS undertook each of these activities during the 2020 and 2021 calendar years. The combination of these drivers informed the gaps analysis conducted and the development of DTS' TAM Plan implementation roadmap, shown in dark blue on the right of Figure 2-1. The Gaps Analysis is presented in Chapter 6, while the TAM Plan Implementation Program is presented in Chapter 7.

Figure 2 - 1: Drivers for TAM Plan Implementation











## 3. Inventory of Assets

This chapter summarizes the inventory and useful life benchmark (ULB) assumptions for the TAM Plan.

### 3.1 - Bus and Paratransit Asset Inventory

The DTS inventory is a detailed list of the existing asset holdings as of June 30, 2021. The inventory documents asset information such as asset type, date in service, expected useful life, and unit replacement cost. Some assets have additional information such as make and model as well as location.

The current inventory contains the following:

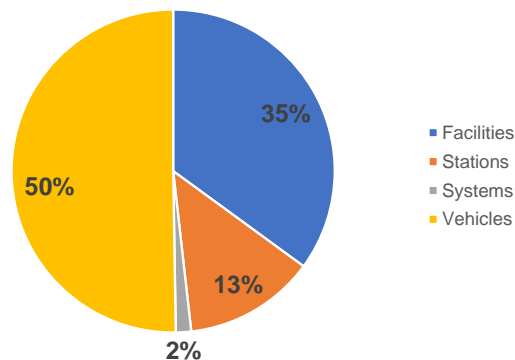
 <b>7 - Kalihi-Palama Bus Facilities</b> <b>4 - Pearl City Bus Facilities</b> <b>1 - Paratransit Facility</b>	 <b>540 - Buses</b>
 <b>86 - Service Vehicles</b>	 <b>207 - Paratransit Vehicles</b>
 <b>5 - Transit Centers</b> <b>3 - Park and Ride Lots</b> <b>899 - Bus Stop Shelters</b>	 <b>Equipment/Technology</b>

Assets included in the inventory were obtained from data sources provided by DTS and OTS (Appendix A). Some data sources were more detailed than others, so coordination with DTS along with industry research occurred to fill in any missing information needed for the capital needs analysis.

One common metric associated with capital asset inventories is asset valuation, which is simply the total dollar value of the assets in inventory. The current asset valuation is presented on the following page in Figure 3-1 and is listed in 2021 dollars for each asset class.

Figure 3 - 1: Asset Allocation and Valuation (\$2021)

Asset Category	Valuation
<b>Facilities</b>	\$312,807,578
<b>Stations</b>	\$117,564,056
<b>Systems</b>	\$13,650,420
<b>Vehicles</b>	\$448,678,612
<b>Total</b>	<b>\$892,700,666</b>



Note that equipment is captured under the Facilities asset category, and Facilities includes both administrative and maintenance facilities. Stations includes transit centers, park and ride lots, and bus stop shelters. Systems includes items such as fare collection, communications and security systems. Vehicles includes both revenue and non-revenue vehicles.

The proportions for asset valuation at DTS are not unlike other bus-only agencies, with the majority of asset valuation tied up with vehicles. This picture will change once the rail system comes online.

## 3.2 - Bus and Paratransit Key Replacement Cycles

During the development of the asset inventory, key replacement cycles—Useful Life Benchmark assumptions—were also captured. These are summarized below.

Table 3 - 1: Useful Life Benchmarks

Category	Sub-category	Element	Sub-element	Useful Life (Years)
<b>Facilities</b>	Buildings	Administration	-	40
<b>Facilities</b>	Buildings	Maintenance	-	40
<b>Facilities</b>	Buildings	Building Components	Access and Parking	20
<b>Facilities</b>	Buildings	Building Components	Boiler	40

Category	Sub-category	Element	Sub-element	Useful Life (Years)
<b>Facilities</b>	Buildings	Building Components	Drainage	40
<b>Facilities</b>	Buildings	Building Components	Elevators and Conveying Systems	25
<b>Facilities</b>	Buildings	Building Components	Exterior	40
<b>Facilities</b>	Buildings	Building Components	Fencing	15
<b>Facilities</b>	Buildings	Building Components	Fire Alarm	40
<b>Facilities</b>	Buildings	Building Components	Generators	15
<b>Facilities</b>	Buildings	Building Components	HVAC Components	15-40
<b>Facilities</b>	Buildings	Building Components	Interior	15
<b>Facilities</b>	Buildings	Building Components	Other	15-40
<b>Facilities</b>	Buildings	Building Components	Plumbing	40
<b>Facilities</b>	Buildings	Building Components	Roof	40
<b>Facilities</b>	Equipment	-	-	15
<b>Facilities</b>	Equipment	Maintenance	-	10
<b>Facilities</b>	Equipment	Maintenance	Air Compressor	25
<b>Facilities</b>	Equipment	Maintenance	Fuel Tank	25
<b>Facilities</b>	Equipment	Maintenance	Misc. Equipment	25
<b>Facilities</b>	Equipment	MIS/IT/Network Systems	Computer/Hardware	6
<b>Facilities</b>	Equipment	MIS/IT/Network Systems	Software	6
<b>Stations</b>	Complete Station	Bus Stop Shelters	Bus	40
<b>Stations</b>	Complete Station	Transfer Center	Bus	40
<b>Stations</b>	Access	Parking	Park & Ride	40
<b>Systems</b>	Communications	-	-	10

Category	Sub-category	Element	Sub-element	Useful Life (Years)
<b>Systems</b>	Communications	Cable Transmission System	Cable	10
<b>Systems</b>	Communications	Phone System	Phone System	12
<b>Systems</b>	Communications	Phone System	Telephones	12
<b>Systems</b>	Communications	Radio	-	12
<b>Systems</b>	Communications	Safety and Security	CCTV	20
<b>Systems</b>	ITS	-	-	12
<b>Systems</b>	Revenue Collection	Central Revenue Collection	-	20
<b>Systems</b>	Revenue Collection	In-Station	-	20
<b>Systems</b>	Revenue Collection	On-Vehicle	-	12
<b>Systems</b>	UPS	-	-	40
<b>Vehicles</b>	Revenue Vehicles	Bus	Articulated Bus (60 ft) - Diesel	14
<b>Vehicles</b>	Revenue Vehicles	Bus	Articulated Bus (60 ft) - Hybrid	14
<b>Vehicles</b>	Revenue Vehicles	Bus	Bus (30 ft) - Diesel	14
<b>Vehicles</b>	Revenue Vehicles	Bus	Bus (35 ft) - Diesel	14
<b>Vehicles</b>	Revenue Vehicles	Bus	Bus (40 ft) - Diesel	14
<b>Vehicles</b>	Revenue Vehicles	Bus	Bus (40 ft) - Hybrid	14
<b>Vehicles</b>	Revenue Vehicles	Bus	Electric	14
<b>Vehicles</b>	Revenue Vehicles	Vans, Cutaways and Autos	Light-Duty Van (Vans)	5
<b>Vehicles</b>	Revenue Vehicles	Vans, Cutaways and Autos	Medium-Duty Van (Cutaways)	7

Category	Sub-category	Element	Sub-element	Useful Life (Years)
<b>Vehicles</b>	Non-Revenue Vehicles	Car	-	8
<b>Vehicles</b>	Non-Revenue Vehicles	Special	-	12
<b>Vehicles</b>	Non-Revenue Vehicles	Truck	-	12



## 4. Condition Assessment

This chapter presents the DTS asset conditions in the following order:

- State of Good Repair targets and recent performance – annual FTA targets and performance reported through the National Transit Database
- Condition assessment methodologies – a summary of DTS' approaches to measuring asset condition
- Physical condition results – a presentation of on-site condition assessment for DTS facilities
- Modeled condition results – a presentation of modeled condition for assets in the worst condition, based on unconstrained and constrained scenarios.

### 4.1 - SGR Targets and Recent Performance

DTS established its first set of SGR targets for the 2018 TAM Plan. Since that time, the targets have been adjusted to reflect realistic expectations for the condition of fleets during the next fiscal year. The most recent targets and results, as well as 2022 targets, are shown in Table 4-1 below.

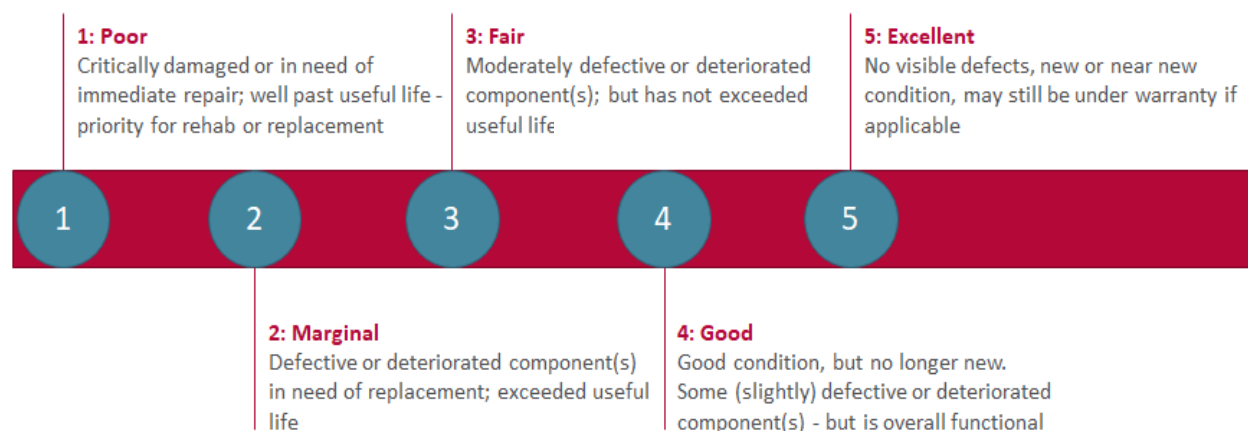
Table 4 - 1: DTS SGR Targets and Recent Performance

Rolling Stock – Percent of revenue vehicles that have met or exceeded their useful life benchmark				
Performance Measure	2021 Target (%)	2021 Performance (%)	2021 Difference	2022 Target (%)
<b>AB – Articulated Bus</b>	20.00	27.93	-7.93	36.04
<b>BU – Bus</b>	20.00	45.69	-25.69	39.61
<b>CU – Cutaway</b>	20.00	38.74	-18.74	38.74
<b>VN – Van</b>	20.00	100.00	-80.00	100.00
Equipment – Percent of service vehicles that have met or exceeded their useful life benchmark				
Performance Measure	2021 Target (%)	2021 Performance (%)	2021 Difference	2022 Target (%)
<b>Automobiles</b>	25.00	21.54	3.46	28.36
<b>Trucks and other Rubber Tire Vehicles</b>	40.00	9.52	30.48	10.53
Facility – Percent of facilities rated below 3 on the condition scale				
Performance Measure	2021 Target (%)	2021 Performance (%)	2021 Difference	2022 Target (%)
<b>Passenger / Parking Facilities</b>	10.00	0.00	10.00	10.00
<b>Administrative / Maintenance Facilities</b>	10.00	0.00	10.00	10.00

Source: DTS FY 2021 NTD Submittal

Note asset condition ratings used in the report are consistent with FTA methodology and represent a spectrum from condition rating 1 (poor) to condition rating 5 (excellent). The figure below provides additional definitions.

Figure 4 - 1: Asset Condition Ratings Definition



## 4.2 - Condition Assessment Methodologies

In preparation for the initial TAM Plan in 2018, DTS conducted condition assessments of both its administrative/maintenance facilities and passenger/parking facilities. The condition assessments were led by DTS with participation by OTS for the administrative/maintenance facilities. OTS occupies facilities owned by the City/DTS. Past assessments were typically conducted in November or December of each year. These assessments were conducted in 2018, 2019, and 2020.

Starting in 2021, DTS modified its approach to the condition assessments as follows. First, it brought in a specialized outside contractor to lead the inspections in partnership with DTS and OTS. Second, it enhanced the condition assessment approach to include assessing facility condition at the more detailed secondary, or sub-component, level. The secondary level ratings for individual sub-components were then aggregated to derive the primary level ratings for facility components and finally the overall rating for each facility. This best practice follows FTA's TAM Facility Performance Measure Reporting Guidebook. Third, DTS implemented a weighted average condition using replacement cost as the basis for rolling up scoring. The contractor produced photographs and documentation for building components judged below a condition rating of 3 (adequate) and transmitted to the City for review and potential action.

The combination of all these changes significantly improved the process and resulted in actionable condition assessment results, presented on the following page.

## 4.3 - Physical Condition Results

The FTA distinguishes two types of facilities: (1) Administrative and Maintenance Facilities; and (2) Passenger and Parking Facilities. DTS conducted condition assessments of all of its applicable bus and paratransit facilities as part of the 2022 TAM Plan update.

The methodology employed for aggregation was the replacement cost method. For each building, the score was rounded to the nearest integer. This single score represents a composite average weighted by replacement cost of the individual elements. Detailed condition assessments at the secondary level were produced as part of the analysis.

Table 4 - 2: Asset Condition Results: Administrative and Maintenance Facilities

Asset Number	Asset Name	Facility Type	Facility Score	Rounded Score
KPA	Kalihi-Palama Bus Facility Building A (Administration)	Administrative	2.96	3
KPB	Kalihi-Palama Bus Facility Building B (Maintenance)	Maintenance	2.67	3
KPB1	Kalihi-Palama Bus Facility Building B1 (Service Station)	Maintenance	2.65	3
KPB2	Kalihi-Palama Bus Facility Building B2 (Wash Rack)	Maintenance	2.82	3
KPB3	Kalihi-Palama Bus Facility Building B3 (Woodworking/Upholstery Shop)	Maintenance	2.98	3
KPB4	Kalihi-Palama Bus Facility Building B4 (Facility/Plant Maintenance)	Maintenance	2.64	3
KPC	Kalihi-Palama Bus Facility Building C (Unit Repair)	Maintenance	3.01	3
HandiVan	The HandiVan Facility	Administrative/ Maintenance	3.44	3
PCA	Pearl City Bus Facility - Building A (Maintenance)	Administrative/ Maintenance	3.54	4
PCB	Pearl City Bus Facility - Building B (Service Station)	Maintenance	3.57	4
PCC	Pearl City Bus Facility - Building C (Wash Rack)	Maintenance	3.54	4
PCD	Pearl City Bus Facility - Building D (Transportation)	Administrative	3.63	4

In all, twelve (12) administrative and maintenance facilities were assessed. Eight (8) facilities were rated as condition 3, and four (4) facilities were rated as condition 4. Therefore, in relation to the TAM performance targets, none of the facilities were rated below 3 on the TERM scale. Passenger and parking facilities are presented next in Table 4-3 and included a combination of transit centers and park and rides.

Table 4 - 3: Asset Condition Results: Passenger and Parking Facilities

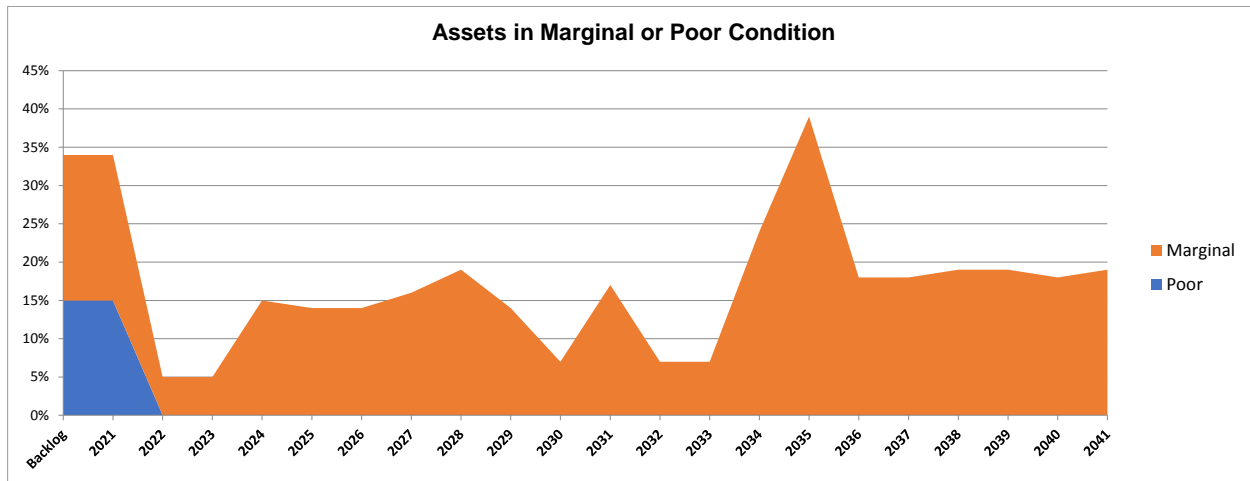
Asset Number	Asset Name	Facility Type	Facility Score	Rounded Score
P1	Alapai Transit Center	Passenger	3.36	3
P2	Hawaii Kai Park and Ride	Parking	2.92	3
P3	Middle Street Intermodal Center	Passenger	3.28	3
P4	Mililani Park and Ride	Parking	3.04	3
P5	Mililani Transit Center	Passenger	3.11	3
P6	Royal Kunia Park and Ride	Parking	3.01	3
P7	Wahiawa Transit Center	Passenger	3.02	3
P8	Waipahu Transit Center	Passenger	3.28	3

All eight (8) of the passenger and parking facilities were rated as condition 3. Therefore, with respect to the TAM performance targets, none of the facilities were rated below 3 on the TERM scale.

## 4.4 - Modeled Condition Results

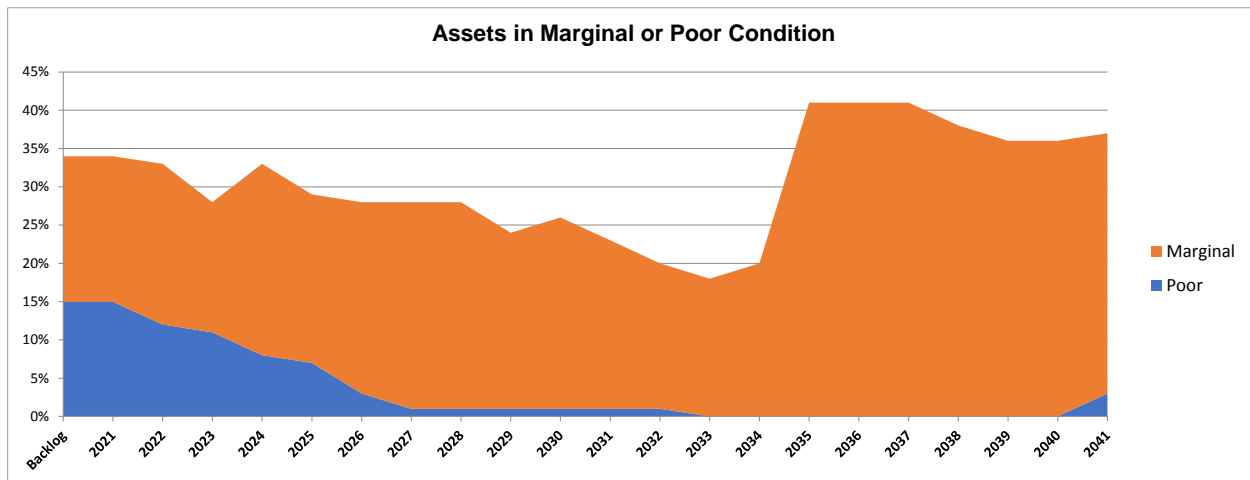
Use of the TERM Lite model as a decision support tool has enabled DTS to visually project asset condition for the entire asset base over a 20-year period. When interpreting the results, it's important to keep in mind that the projections are age-based, not condition-based. Therefore, on-site condition assessments are a better proxy to determine current asset condition, as shown above in Section 4.3. TERM Lite serves as a valuable tool to forecast future asset condition after 10+ years. Two scenarios were modeled and are shown on the following page. Figure 4-2 shows future asset condition under an unconstrained scenario. Figure 4-3 shows future asset condition under a constrained investment scenario.

Figure 4 - 2: 20-Year Asset Conditions with Unconstrained Scenario



With the unconstrained scenario, all assets in poor condition are addressed in two years, and by 2041, DTS would end up with 19% of its assets in marginal condition, compared to above 30% today.

Figure 4 - 3: 20-Year Asset Conditions with Constrained Scenario



With the constrained scenario, assets in poor condition are fully addressed by 2033, and there is an improvement of assets in marginal condition until 2033, but then the proportion of these assets grows again in the outer years to reach 34% in 2041.

The next chapter, Chapter 5 on investment needs and prioritization, goes into additional detail on the unconstrained and constrained scenarios and their implications.



## 5. Reinvestment Needs and Prioritization

This chapter presents DTS' reinvestment needs and investment prioritization. The chapter consists of the following sections:

- Budget and Capital Program
- Decision Support Tools
- State of Good Repair (SGR) backlog
- 20-Year investment needs forecast – unconstrained and constrained
- Capital prioritization.

### 5.1 - Budget and Capital Program

The DTS budget process is one component of the overall City and County of Honolulu budget process. Each year, a new capital and operating budget is developed together with a six-year Capital Improvement Program (CIP).

The DTS annual budget process begins in August with the development of the Department's capital and operating budget requests. OTS begins their process internally, and their department Vice Presidents accumulate a list of capital project needs. The budgets for DTS and OTS are separated into two categories: Capital Improvement Program (CIP) and Operating Budget. A similar process is expected with the Rail contractors to identify rail capital replacement and rehabilitation needs.

#### ***Budget Process***

The City's capital budget process normally kicks off in July with the Administration review and prioritization of six-year capital budget projects. From October to December, the departments work with BFS to finalize and program project cost estimates. January to June of the following year has the final reviews conducted by BFS, the Mayor, and City Council. Mid-June results in a charter mandated adoption of budget ordinances by the City Council.

For transit-related capital needs, there are multiple layers of budgeting and prioritization: at the OTS level, at the DTS level, and at the City-wide level. Each year during the budget process, OTS generates capital requests which roll up to department VPs with equipment item, estimated cost and useful life, and a justification field. OTS conducts an initial prioritization of their capital requests and this list is then submitted to TMD for review. Staff members of both DTS and OTS meet to discuss the proposed budget and address any questions. Once TMD agrees with the OTS budget, it also coordinates with the Programming and Support Branch at DTS. The capital and operating budgets are packaged together and submitted to BFS. BFS typically has their own list of questions as part of the review process. Once BFS completes their review, then the budgets go to a final round of review with the Mayor's Office. Ultimately, the Mayor submits the proposed budget to City Council for adoption.

#### ***Capital Improvement Program Budget***

DTS submits a CIP budget request each year, and revenue vehicles (Bus and Handi-Van Acquisition Program) are included as one of the major items. The CIP accounts for DTS' larger, more costly assets, typically for items over \$100,000. Examples include the purchase of revenue vehicles or capital investments such as a roof replacement.

## ***Operating Program and Budget***

In relation to the TAM program, a relatively small portion of transit capital needs is funded through the DTS operating budget—primarily considered equipment (Category C). The Operating Budget accounts for DTS' and OTS' equipment and maintenance operations assets, including non-revenue vehicle purchases and other equipment and maintenance needs.

## ***Assumptions for Modeling Purposes***

In conclusion, both the CIP and the operating budget contribute to transit asset renewal (e.g., asset replacement like for like or rehabilitation of assets) as well as to transit asset expansion and improvement (e.g., bus stop ADA access and site improvements).

The table on the following page summarizes high-level funding assumptions for the six-year CIP period, beginning with FY 2022 as the base year, to derive the estimated proportion dedicated towards capital asset renewal, as opposed to capital asset expansion or improvement. It is estimated that between FY 2022 and FY 2028 the total renewal estimate varies between \$44 and \$64 million (\$2022) and that the total expansion/improvement estimate varies between \$12 and \$29 million (\$2022). These assumptions are important because they will be used in the section on capital investment projections.

Note the figures for FY 2022 reflect the actual amounts appropriated. The figures for FY 2023-28 reflect initial proposed amounts subject to change; they do not necessarily reflect the final CIP.

Table 5 - 1: Capital Budget Assumptions, FY 2022-28

<b>Capital Improvement Program and Operating Budget (Equipment) (All figures in \$2022 millions)</b>	<b>FY22 Actual</b>	<b>FY23</b>	<b>FY24</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>
Bus and Handi-Van Acquisition Program	45.844	58.738	61.238	48.741	49.716	43.456	43.456
Bus Stop ADA Access and Site Improvements	0.616	1.405	1.405	1.405	1.405	1.405	1.405
Intermodal Connectivity Improvements	4.200	8.113	6.150	6.200	6.000	5.250	0
Electrification of Transportation Infrastructure (DDC)	9.715	8.463	10.200	5.000	5.200	5.200	11.600
Kalihi-Palama Bus Facility Improvements (DDC)	1.000	1.650	0	0	0	0	0
Pearlridge Bus Transfer Center and Plaza - Transit Oriented Development (DDC)	0	2.450	11.675	5.000	0	0	0
Pearl City Bus Facility (DDC)	0.375	0.210	2.561	0	0	0	0
Kalihi-Palama Stream Bank Improvements (DDC)	2.460	0	0	5.000	0	0	0
<b>Total</b>	<b>64.210</b>	<b>81.029</b>	<b>93.229</b>	<b>71.346</b>	<b>62.321</b>	<b>55.311</b>	<b>56.461</b>
Operating Budget - Equipment (Category C), Total*	1.106	0.509	0.509	0.509	0.509	0.509	0.509
<b>Breakdown between Renewal and Expansion</b>	<b>FY22 Actual</b>	<b>FY23</b>	<b>FY24</b>	<b>FY25</b>	<b>FY26</b>	<b>FY27</b>	<b>FY28</b>
Transit-Related CIP Projects - Renewal, Replacement, Rehabilitation	47.219	60.598	63.799	48.741	49.716	43.456	43.456
Transit-Related CIP Projects - Expansion, Improvement	16.991	20.431	29.430	22.605	12.605	11.855	13.005
Operating Budget - Equipment (Category C) - Renewal, Replacement, Rehabilitation	1.106	0.509	0.509	0.509	0.509	0.509	0.509
Operating Budget - Equipment (Category C) - Expansion, Improvement	0	0	0	0	0	0	0
<b>Total Renewal Estimate</b>	<b>48.325</b>	<b>61.107</b>	<b>64.308</b>	<b>49.250</b>	<b>50.225</b>	<b>43.965</b>	<b>43.965</b>
<b>Total Expansion/Improvement Estimate</b>	<b>16.991</b>	<b>20.431</b>	<b>29.430</b>	<b>22.605</b>	<b>12.605</b>	<b>11.855</b>	<b>13.005</b>

\*Figures for FY24 - FY28 for Operating Budget - Equipment are included strictly for modeling purposes.

Source: DTS, Project Team analysis

## 5.2 - Decision Support Tools

### 5.2.1 Condition Assessments

OTS has a wealth of institutional knowledge on the conditions of the buses and paratransit vehicles they manage. OTS keeps a record of the assets' useful life and condition, with photo documentation, and can determine which assets need to be prioritized for replacement and funding.

The overall methodology employed for the condition assessments is consistent with the latest FTA guidance and is performed for all facilities—maintenance and administrative facilities as well as passenger and parking facilities. The Facilities, Operations, and Equipment branch at DTS, in partnership with OTS, conducts facility inspections, typically in November or December each year. Information gathered through the facility condition assessment process is taken into account by OTS staff for maintenance and potential asset replacements. Two engineers from the branch deploy with OTS staff to carry out the administrative and maintenance facility building and site inspections. DTS staff carry out the transit center, park-and-ride lot, and FTA-funded bus shelter inspections on their own. The condition assessment forms used, recently updated, and reflected in this TAM Plan update are consistent with the FTA TAM Facility Performance Measure Reporting Guidebook. The current forms used are shown in Appendix B.

### 5.2.2 Fleet Planning

DTS uses a Bus Fleet Management Plan (BFMP) to manage vehicle forecasts. TPD develops the BFMP and TMD handles vehicle procurement. The BFMP informs the rolling six-year CIP budget with forecasted bus and paratransit vehicle replacement needs, including the current emphasis on electrification, as well as the annual budget for each fiscal year. The most current BFMP plans DTS fleet needs from 2021 through 2040.

### 5.2.3 OTS Tools

OTS uses a number of decision support tools that aid with asset management. These include:

- Maintenance Management System (MMS)
- Component Management System (CMS)
- Facilities Maintenance System (FMS)
- Paratransit MMS (PTMMS)
- Fleetwatch
- Bus Stop Inventory
- Epicor, for parts and inventory management

### 5.2.4 TERM Lite

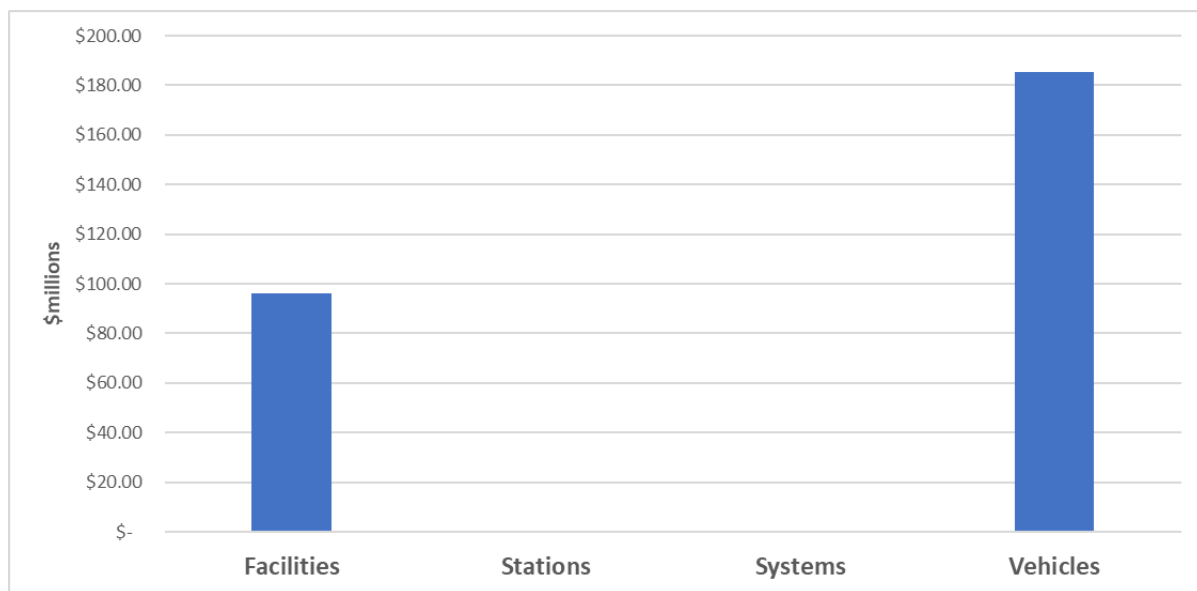
DTS made the decision to adopt TERM Lite as a key decision support tool in preparation for the 2022 TAM Plan. TERM Lite is expected to aid with SGR monitoring (e.g., identifying the scope and size of SGR backlog) and SGR management (assessing how the backlog fluctuates over time) as well as provide long-term asset planning support. Asset management projections are covered in the remaining sections of this chapter.

### 5.3 - State of Good Repair Backlog

Backlog represents deferred reinvestment in asset rehabilitation, replacement, and annual capital maintenance. The current State of Good Repair backlog at DTS consists of vehicles (\$185 million) and facilities (\$96 million) as shown in Figure 5-1 below. There is no backlog for stations or for systems. Total backlog is \$281 million, or about 31% of asset valuation.

The analysis for the current backlog is reported in 2021 dollars. This provides DTS with information to use in planning and prioritizing replacements. Since OTS does not perform mid-life overhauls, all vehicles are assumed to be replaced at the end of their useful life.

Figure 5 - 1: DTS Transit SGR Backlog (\$2021 millions)



This backlog represents a snapshot in time and reflects the current cycle for equipment replacements, mainly revenue vehicles.

### 5.4 - 20-Year Reinvestment Needs Forecast

As part of the 2022 TAM Plan, DTS ran TERM Lite to project capital reinvestment needs for two scenarios: (1) unconstrained scenario; and (2) constrained scenario.

Both forecasts rely on basic inventory and modeling assumptions that include:

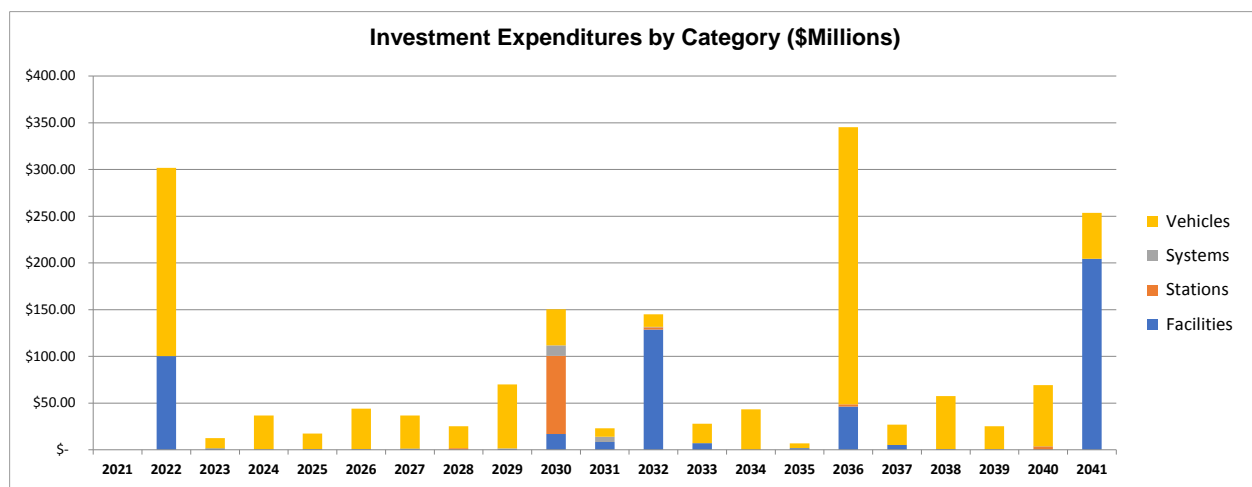
- Useful life benchmarks (ULBs) updated as part of the inventory development process
- An analysis time period of 20 years (2022-2041)
- Prioritization factors of 60% for Asset Condition, 25% for Service Reliability, 10% for Safety and Security, and 5% for O&M Costs
- A default 3% inflation factor used for escalation purposes
- Capital budget assumptions for renewal as presented in Table 5-1 above and extended for the 20 years (for constrained scenario only)



When reviewing the model results, it is important to keep some key assumptions in mind:

- The projections are age-based as this is part of the TERM Lite Model design
- All assets follow the deterioration curve rates established by the FTA
- Total dollar needs estimates are presented in Year of Expenditure (YOE) dollars
- The projections shown on the following pages are the standard TERM Lite output pages and typically rolled up at the asset category level (i.e., vehicles, systems, stations, facilities). For further analysis, data mining within an asset category is feasible

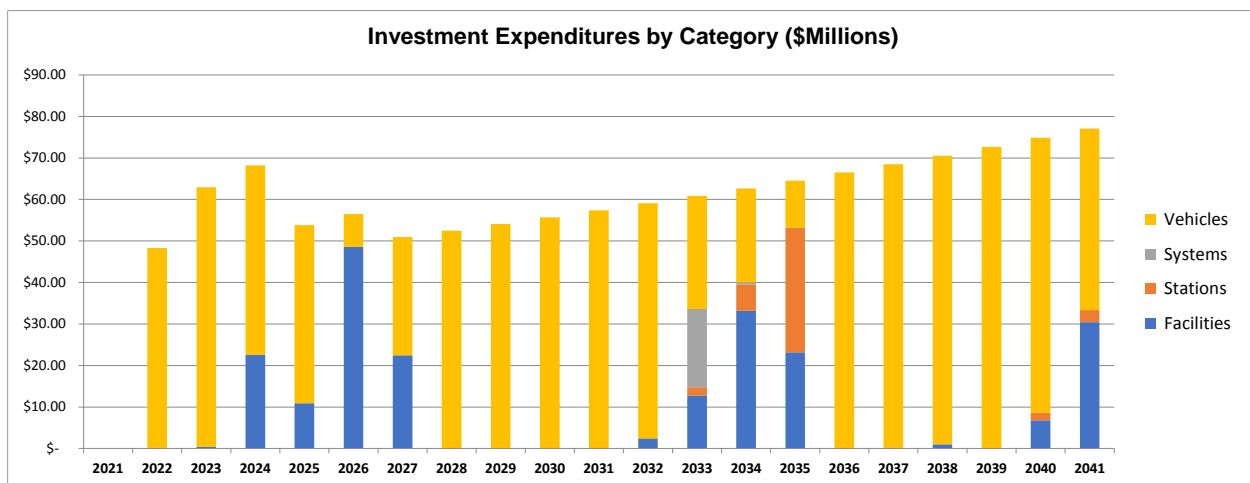
**Figure 5 - 2: Unconstrained 20-Year Projection (\$YOE)**



The takeaways from the unconstrained projection are as follows:

- Unconstrained means essentially unlimited available capital monies and the ability to deliver projects
- The entirety of the backlog is addressed in year 1 (2022) and the backlog for each subsequent year is addressed by the bars shown
- If the entire backlog were eliminated immediately, then 11 out of the next 20 years would require less than \$50 million for renewal
- A major reinvestment need for bus shelters (shown in orange) is reached in about 2030, assuming 40-year useful lives for them and an early 1990s vintage. Depending on the actual in-service dates of each shelter and the assumed useful life, this milestone could be slightly earlier or slightly later
- There are regular vehicle reinvestment needs almost every year but especially in 2036

Figure 5 - 3: Constrained 20-Year Projection (\$YOE)

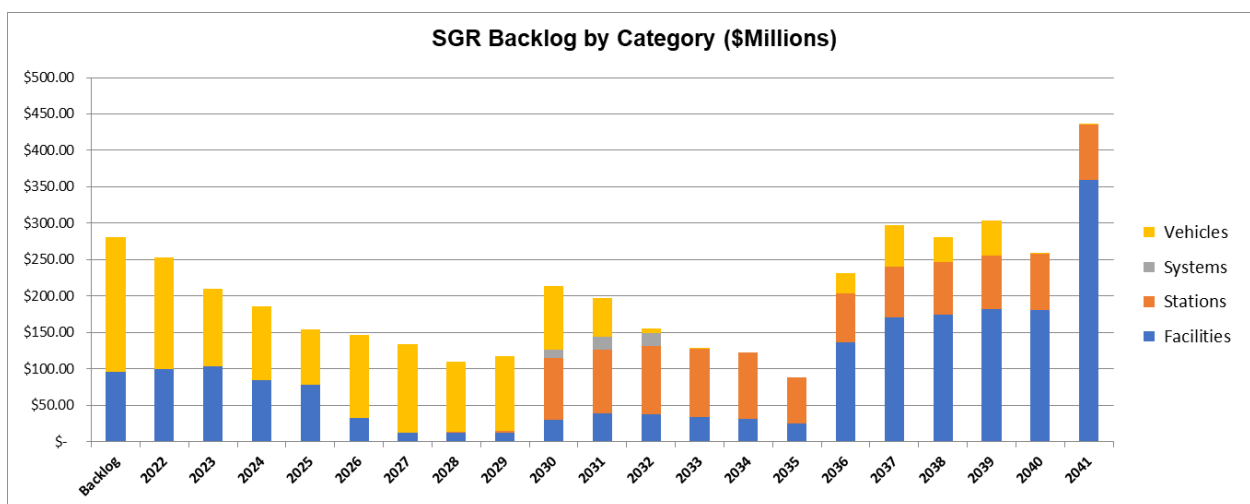


The takeaways from the constrained projection are as follows:

- Constrained projections are constrained according to the assumptions in Table 5-1 and extrapolation of available funding to 2041
- Vehicle needs predominate almost the entire projection period (there is funding of facilities from 2024 to 2027 to address the backlog of facility assets, and some funding for stations in 2033 to 2035)
- In the outer years when large numbers of revenue vehicles and a maintenance facility needs replacement, there is insufficient funding to address those needs, therefore the backlog begins growing again and vehicle replacements are prioritized

The constrained scenario also results in an SGR backlog over the years as shown in Figure 5-4 below.

Figure 5 - 4: Backlog Projections Implications for Constrained Scenario (\$YOE)



Takeaways from the SGR backlog under the constrained scenario are as follows:

- The backlog gradually decreases from \$281 million to \$110.7 million through 2028

- The backlog increases significantly in 2030 due to the deferral of station replacement needs
- The backlog then grows again (due to deferred facilities replacement needs) to reach current levels, roughly, by 2036. As this backlog continues to grow in 2037 to 2041, the facilities category becomes a bigger share of total need

## 5.5 - Capital Prioritization

Currently, there is no formally adopted process or documentation for prioritizing projects within the City, other than the bifurcation between CIP and equipment-related asset replacement projects. However, DTS has undertaken various prioritization efforts during the past few years. The Programming and Support Branch under the Transportation Performance and Development Division uses criteria to support prioritization of capital items included in the initial budget requests submitted by each DTS division and office. Example criteria include public health, safety, regulations and external mandates, Mayor's initiatives, and Council initiatives. Each criterion is ranked on a scale of High (A), Medium/urgent (B), and Low/Non-urgent (C).

A data-driven method could be implemented to help make capital prioritization more consistent and defensible, applicable to all assets, and communicated broadly. DTS divisions interviewed expressed openness at implementing new capital project prioritization tools. Modeling capabilities showing repercussions of not funding asset replacement can serve as an advocacy tool to support requests for capital funds.

The CIP showcased in Table 5-2 on the following page represents the proposed prioritized set of DTS transit-related investments for the next six years. Note the figures for FY 2022 reflect the actual amounts appropriated, whereas the figures for FY 2023-28 reflect initial proposed amounts subject to change; they do not necessarily reflect the final CIP.

The CIP is normally adjusted annually to carry it one additional year. With current assumptions, the SGR backlog is estimated to gradually decline over the next five years. Fixed-route bus and Handi-Van acquisition is the first and largest item on the CIP list for every year of the six-year period, which is consistent with the priorities reflected in the constrained run in TERM Lite.

Table 5 - 2: Capital Prioritization

Capital Improvement Program and Operating Budget (Equipment) (All figures in \$2022 millions)	FY22 Actual	FY23	FY24	FY25	FY26	FY27	FY28
Bus and Handi-Van Acquisition Program	45.844	58.738	61.238	48.741	49.716	43.456	43.456
Bus Stop ADA Access and Site Improvements	0.616	1.405	1.405	1.405	1.405	1.405	1.405
Intermodal Connectivity Improvements	4.200	8.113	6.150	6.200	6.000	5.250	0
Electrification of Transportation Infrastructure (DDC)	9.715	8.463	10.200	5.000	5.200	5.200	11.600
Kalihi-Palama Bus Facility Improvements (DDC)	1.000	1.650	0	0	0	0	0
Pearlridge Bus Transfer Center and Plaza - Transit Oriented Development (DDC)	0	2.450	11.675	5.000	0	0	0
Pearl City Bus Facility (DDC)	0.375	0.210	2.561	0	0	0	0
Kalihi-Palama Stream Bank Improvements (DDC)	2.460	0	0	5.000	0	0	0
Total	64.210	81.029	93.229	71.346	62.321	55.311	56.461
Operating Budget - Equipment (Category C), Total*	1.106	0.509	0.509	0.509	0.509	0.509	0.509

\*Figures for FY24 - FY28 for Operating Budget - Equipment are included strictly for modeling purposes.

Source: DTS, Project Team analysis

## 6. Capability and Gaps Analysis

DTS completed its first TAM plan in September 2018 for the period of October 2018 to September 2022. In 2020, DTS began a multi-year effort to expand and strengthen its asset management program. As part of this effort, DTS undertook steps intended to:

- Raise awareness of TAM at all levels by engaging staff within DTS and its contractors, OTS, and other key stakeholders (e.g., City Department of Budget and Fiscal Services)
- Assess DTS' current asset management capabilities to establish a baseline
- Advance in parallel multiple activities including the development of rail asset inventories, additional condition assessments, and an updated asset management policy
- Identify areas of improvement that can be incorporated into the TAM Plan moving forward

This section provides the asset management baseline, a gaps analysis, and a roadmap of high-level actions to address the gaps identified.

### 6.1 - Asset Management Baseline

#### 6.1.1 Baseline Assessment Approach

DTS held a rail asset management maturity workshop in October 2020 and a bus asset management maturity workshop in November 2020, each of which included 10-15 participants. During these workshops, the level of maturity for DTS, including its contractors and operating entities, was assessed against 37 questions representing good asset management practice. These questions were designed to align with the requirements of MAP-21 and the Institute of Asset Management (IAM) framework “anatomy” shown below in Figure 6-1.

Figure 6 - 1: Asset Management Framework Anatomy



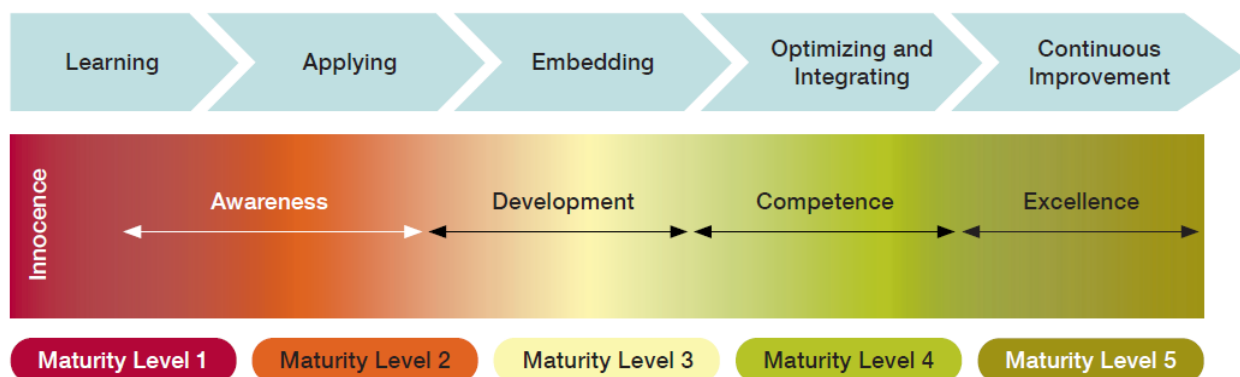
Source: Institute of Asset Management

The set of questions investigated for both rail and bus/paratransit assets follows the IAM framework anatomy, which includes seven distinct focus areas:

- **1) Organizational Strategic Plan:** How well has DTS defined organizational objectives and the needs of internal and external stakeholders and how do these shape the scope of the TAM system?
- **2) Strategy & Planning:** Does DTS have sufficient stakeholder engagement and defined asset and customer Levels of Service? Are information technology requirements, business processes, and asset management policies and plans in place?
- **3) Organization & People:** Are leadership and governance, skills and competencies, and clear roles and responsibilities in place for asset management? Does DTS have adequate change management, succession planning, communication, and a continuous improvement culture?
- **4) Asset Information:** Asset information is displayed at the bottom of the framework anatomy because it is foundational to everything else. Does DTS have up-to-date asset inventories? How well does DTS define, record, analyze, and control required asset data and information?
- **5) Asset Management Decision-Making:** Does DTS have sufficient data analytics and up-to-date asset strategies and long-term renewals planning? Does DTS optimize its asset interventions and have a defensible process for its Capital Improvement Program (CIP)?
- **6) Lifecycle Delivery:** Day-to-day, how does DTS handle each step of the lifecycle process, including acquisition (planning, design, construction), operations management, maintenance management, materials management, investigation and recording of asset failures, and shutdown and outage management?
- **7) Risk & Review:** How does DTS assess enterprise and asset management risk as well as associated mitigations, and has it incorporated a repeatable process for quality assurance?

The workshops, which were conducted via Teams video call, included a facilitated discussion, along with an assessment of current practices for each question against a predefined 1-5 Maturity Scale, where Level 1 represents Innocence and Level 5 represents Excellence, as shown below in Figure 6-2.

Figure 6 - 2: Maturity Assessment Scale





For each question, workshop facilitators reached a consensus rating amongst the participants as to the level of asset management maturity. In addition to capturing the current score for each of the 37 questions, an assessment was also made of the rate of improvement that was feasible in each of the areas over the Short (0-2 years), Medium (2-4 years), and Long Term (5+ years). The key principle is that, to be considered a “competent” asset manager, DTS should achieve at least a Level 4 (Competence) in most (if not all) of the 37 facets of asset management. It is not necessary, nor necessarily recommended, to achieve a Level 5 (Excellence) in all cases. DTS should make a value judgment on whether excellence in certain facets is desirable, beneficial, and ultimately cost-effective.

It should be noted that there are a range of asset management assessment techniques available, which vary significantly in terms of breadth and depth, with some of them reaching into hundreds of questions. The asset management baseline approach selected here was specifically formatted for two-hour workshops to provide a high-level indicator of the current status of asset management practice for 37 key question areas. This is useful for organizations such as DTS where the topic of asset management may be in its emergent stages in some areas—even though many strong specific contributing practices already exist.

Baseline results are presented next, separately for bus/paratransit and for rail.

### **6.1.2 Baseline Results – Bus/Paratransit**

The results obtained from the workshops include both a baseline “current (2020)” assessment along with a preliminary view of the “to-be” scores that could potentially be achieved in the future. Figure 6-3 shows the results for the bus/paratransit workshop for each of the 37 questions.

DTS’ assessment outputs are broadly consistent with other organizations at the same stage in development of their TAM programs, and reflect that in 2020, DTS was generally aware of TAM activities and requirements and had some areas of strength but was in a state of development to build a mature level of capability.

High-level takeaways are that:

- DTS exhibits highest asset management maturity (Competent, Level 4) with Lifecycle Delivery (maintenance management, materials management) and emergency preparedness and response. This was the case with 3 of the 37 questions.
- DTS exhibits fair (Developing, Level 3) asset management competencies with Strategy & Planning, Organization & People, and in some Asset Information and Lifecycle Delivery areas like performance monitoring and document control. This was the case in 19 out of the 37 questions.
- DTS exhibits low (Innocent or Aware, Level 1 or 2) asset management competencies with Organizational Strategic Plan, information technology requirements, change management/communication, asset information, data analytics, optimized asset interventions, shutdown & outage management, and Risk & Review. This was the case in 15 out of the 37 questions.

Figure 6 - 3: Bus and Paratransit Asset Management Maturity Results

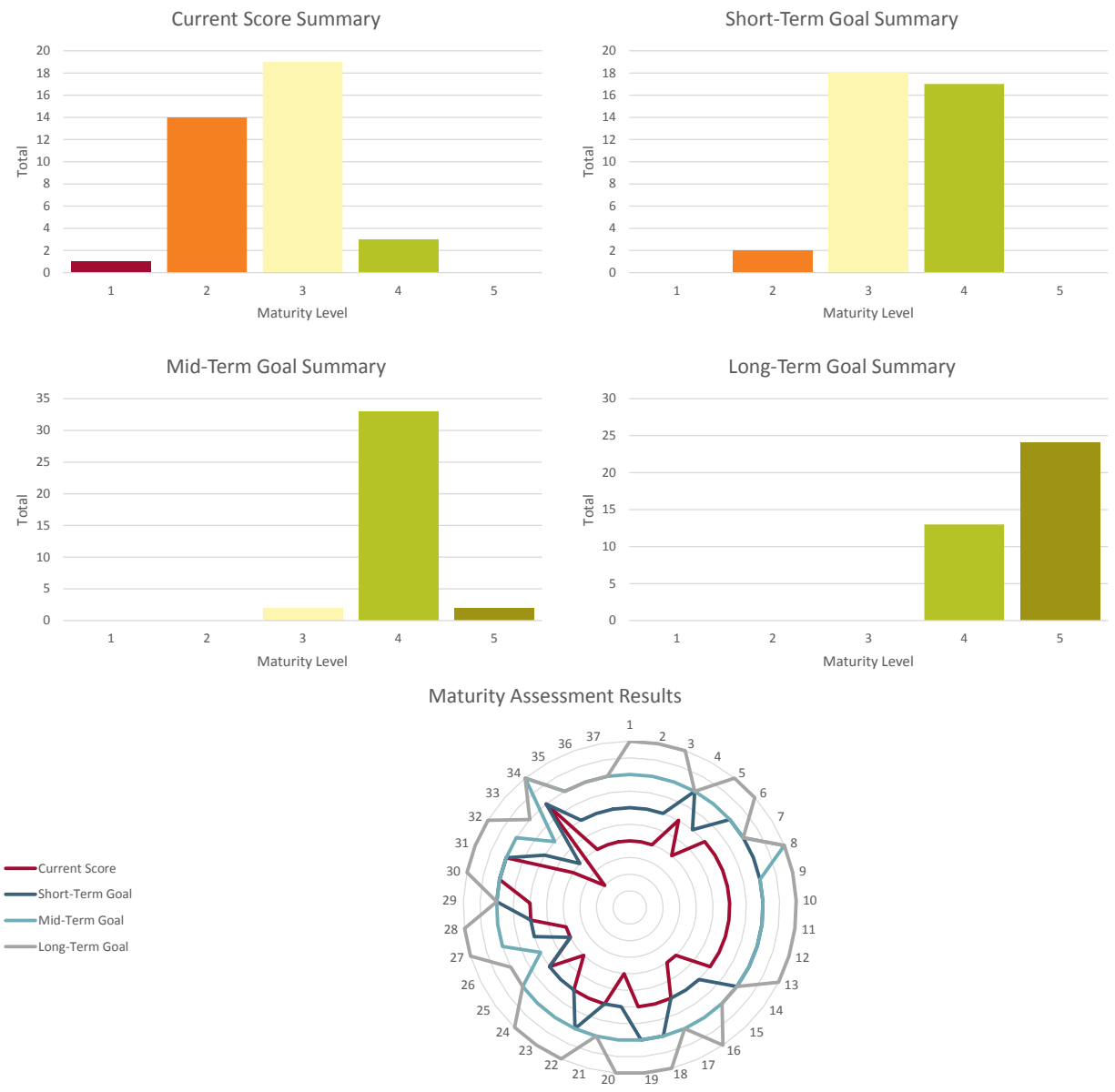
Question Number	Focus	Theme	Current Score	Short-Term Goal (0-2 Years)	Mid-Term Goal (2-4 Years)	Long-Term Goal (5 Years +)
1	Organizational Strategic Plan	Strategic Plan & Organizational Objectives	2	3	4	5
2	Organizational Strategic Plan	Performance Measurement & Reporting	2	3	4	5
3	Strategy & Planning	Stakeholder Engagement	2	3	4	5
4	Strategy & Planning	Asset & Customer Levels of Service (LOS)	3	4	4	4
5	Strategy & Planning	Information Technology Requirements	2	3	4	5
6	Strategy & Planning	Business Processes & Procedures	3	4	4	5
7	Strategy & Planning	Future Trends (Impact of growth)	3	4	4	4
8	Strategy & Planning	Asset Management Policy	3	4	5	5
9	Strategy & Planning	Asset Management Plan	3	4	4	5
10	Strategy & Planning	Legal, Regulatory, and Statutory Requirements	3	4	4	5
11	Organization & People	Asset Management Leadership & Governance	3	4	4	5
12	Organization & People	Asset Management Skills & Competencies	3	4	4	5
13	Organization & People	Asset Management Roles & Responsibilities	3	4	4	5
14	Organization & People	Knowledge Retention & Succession Planning	3	4	4	4
15	Organization & People	Change Management	2	3	4	4
16	Organization & People	Communication and Information sharing	2	3	4	5
17	Organization & People	Continuous Improvement Culture	3	3	4	4
18	Asset Information	Asset Information Strategy & Standards	3	4	4	5
19	Asset Information	Asset Inventory	3	4	4	5
20	Asset Information	Asset Information	2	3	4	5
21	Asset Information	Performance Monitoring	3	3	4	4
22	Asset Information	Asset Information Management	3	4	4	5
23	Asset Information	Document Control	3	3	4	5
24	Asset Management Decision-Making	Asset Knowledge / Data Analytics	2	3	4	5
25	Asset Management Decision-Making	Asset Strategies & Long Term Renewals Planning	3	3	4	4
26	Asset Management Decision-Making	Optimized Asset Interventions	2	2	3	4
27	Asset Management Decision-Making	Capital Investment Plan (CIP) Development	2	3	4	5
28	Lifecycle Delivery	Capital Projects: Planning, Design & Construction	3	3	4	5
29	Lifecycle Delivery	Operations Management	3	4	4	4
30	Lifecycle Delivery	Maintenance Management	4	4	4	5
31	Lifecycle Delivery	Materials Management	4	4	4	5

Question Number	Focus	Theme	Current Score	Short-Term Goal (0-2 Years)	Mid-Term Goal (2-4 Years)	Long-Term Goal (5 Years +)
32	Lifecycle Delivery	Investigation and Recording of Asset Failures	2	3	4	5
33	Lifecycle Delivery	Shutdown & Outage Management	1	2	3	4
34	Risk & Review	Emergency Preparedness & Response	4	4	5	5
35	Risk & Review	Risk Framework - Enterprise level	2	3	4	4
36	Risk & Review	Risk Framework - Asset level	2	3	4	4
37	Risk & Review	Asset Management Quality Assurance	2	3	4	4

There were about 40 percent of the asset management competency areas where DTS exhibited a low maturity score (Level 1 or Level 2). Workshop participants were also asked to propose a maturity goal for the short (0-2 years), medium (2-4 years) and long term (5+ years). These projections are shown in a series of bar graphs and a maturity radar plot in Figure 6-4 below. In the radar plot, the current state is shown in red. As the system matures, the contour of the DTS asset management maturity gradually expands from red to dark blue, to light blue, to grey for the long-term goal (5+ years).

Note that by the medium term (2-4 years), DTS hopes to reach competency in the majority of the areas and even reach excellence in many areas by the long term (5+ years). The colors in the bar graphs are consistent between Figures 6-3 and 6-4: low maturity scores are shown in red and orange, medium maturity score is shown in pale yellow, and high maturity scores are shown in light and dark green.

Figure 6 - 4: Bus and Paratransit Asset Management Maturity Trend Results



### **6.1.3 Baseline Results – Rail**

The workshop occurred at a time when the rail system had not yet been commissioned and the asset management maturity scores reflect that. At that time, DTS had already established a Rail Operations and Maintenance Branch but was in the process of staffing it up. In 2020, DTS was generally aware of TAM activities and requirements and had some areas of strength but was in a state of development to build a more mature level of capability across almost all of the competencies reviewed.

High-level takeaways are that:

- The area singled out for competent maturity currently was in Strategy & Planning and was for legal, regulatory, and statutory requirements.
- DTS exhibits fair (Developing, Level 3) asset management competencies for stakeholder engagement, assessing future trends (impact of growth), operations management, and several Risk areas (emergency preparedness & response, enterprise level risk management). This was the case in 5 out of the 37 questions.
- DTS exhibits low (Aware, Level 2) asset management competencies with the bulk of the asset management maturity areas investigated, including Organizational Strategic Plan; Strategy & Planning; Organization & People; Asset Inventory; Asset Management Decision-Making; Lifecycle Delivery; and two areas in Risk & Review. This was the case for 27 out of the 37 questions.
- DTS exhibits very low (Innocent, Level 1) competencies for three areas: establishing asset and customer levels of service, asset information, and performance reporting.

Figure 6 - 5: Rail Asset Management Maturity Results

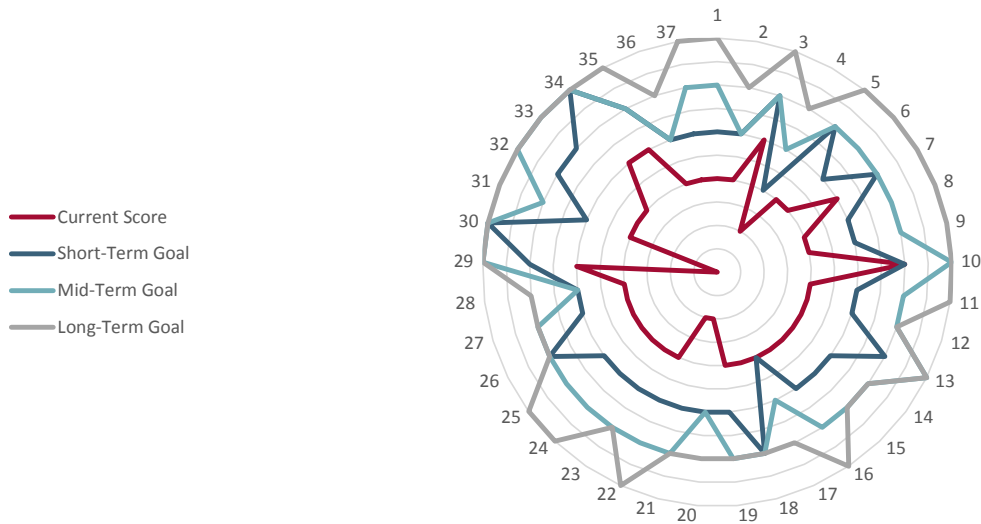
Question Number	Focus	Theme	Current Score	Short-Term Goal (0-2 Years)	Mid-Term Goal (2-4 Years)	Long-Term Goal (5 Years +)
1	Organizational Strategic Plan	Strategic Plan & Organizational Objectives	2	3	4	5
2	Organizational Strategic Plan	Performance Measurement & Reporting	2	3	3	4
3	Strategy & Planning	Stakeholder Engagement	3	4	4	5
4	Strategy & Planning	Asset & Customer Levels of Service (LOS)	1	2	3	4
5	Strategy & Planning	Information Technology Requirements	2	4	4	5
6	Strategy & Planning	Business Processes & Procedures	2	3	4	5
7	Strategy & Planning	Future Trends (Impact of growth)	3	4	4	5
8	Strategy & Planning	Asset Management Policy	2	3	4	5
9	Strategy & Planning	Asset Management Plan	2	3	4	5
10	Strategy & Planning	Legal, Regulatory, and Statutory Requirements	4	4	5	5
11	Organization & People	Asset Management Leadership & Governance	2	3	4	5
12	Organization & People	Asset Management Skills & Competencies	2	3	4	4
13	Organization & People	Asset Management Roles & Responsibilities	2	4	5	5
14	Organization & People	Knowledge Retention & Succession Planning	2	3	4	4
15	Organization & People	Change Management	2	3	4	4
16	Organization & People	Communication and Information sharing	2	3	4	5
17	Organization & People	Continuous Improvement Culture	2	2	3	4
18	Asset Information	Asset Information Strategy & Standards	2	4	4	4
19	Asset Information	Asset Inventory	2	3	4	4
20	Asset Information	Asset Information	1	3	3	4
21	Asset Information	Performance Monitoring	1	3	4	4
22	Asset Information	Asset Information Management	2	3	4	5
23	Asset Information	Document Control	2	3	4	4
24	Asset Management Decision-Making	Asset Knowledge / Data Analytics	2	3	4	5
25	Asset Management Decision-Making	Asset Strategies & Long Term Renewals Planning	2	3	4	5
26	Asset Management Decision-Making	Optimized Asset Interventions	2	4	4	4
27	Asset Management Decision-Making	Capital Investment Plan (CIP) Development	2	3	4	4
28	Lifecycle Delivery	Capital Projects: Planning, Design & Construction	2	3	3	4
29	Lifecycle Delivery	Operations Management	3	4	5	5
30	Lifecycle Delivery	Maintenance Management	N/A	5	5	5
31	Lifecycle Delivery	Materials Management	2	3	4	5



Question Number	Focus	Theme	Current Score	Short-Term Goal (0-2 Years)	Mid-Term Goal (2-4 Years)	Long-Term Goal (5 Years +)
32	Lifecycle Delivery	Investigation and Recording of Asset Failures	2	4	5	5
33	Lifecycle Delivery	Shutdown & Outage Management	2	4	5	5
34	Risk & Review	Emergency Preparedness & Response	3	5	5	5
35	Risk & Review	Risk Framework - Enterprise level	3	4	4	5
36	Risk & Review	Risk Framework - Asset level	2	3	3	4
37	Risk & Review	Asset Management Quality Assurance	2	3	4	5

There were about 84 percent of the asset management competency areas where DTS exhibited a low maturity score (Level 1 or Level 2). As with the bus workshop, rail workshop participants were asked to propose a maturity goal for the short (0-2 years), medium (2-4 years) and long term (5+ years). These projections are shown in a maturity radar plot in Figure 6-6 below. Note that DTS hopes to reach competency in 15 of the areas and reach excellence in 22 areas by the long term (5+ years). In the figure, the long-term goal is shown in grey as the outermost extent of the radar plot.

Figure 6 - 6: Rail Asset Management Maturity Trend Results



## 6.2 - Gaps Analysis

As mentioned earlier, DTS' assessment outputs are broadly consistent with other organizations at the same stage in development of their TAM programs. In 2020, DTS was generally aware of TAM activities and requirements and had some areas of strengths but was collecting asset data and in a state of development to build a more mature level of capability.

Gaps analysis is a standard tool to document areas for improvement and for action planning. Gaps are not to be considered negatively and can be better equated to opportunities for asset management. For each gap, specific actions or initiatives can be identified and recommended.

Due to the rapidly changing nature of the rail system and its transition from HART to DTS for passenger service, many of the gaps identified will be addressed relatively quickly.

While developing the gaps analysis, it is also helpful to be cognizant of the five goal areas set by DTS early in the development of this TAM Plan. These are: **(1)** Safety/security; **(2)** Decision-making/prioritization/lifecycle management/cost-effectiveness; **(3)** System preservation and growth; **(4)** Employee learning; and **(5)** Federal requirements. These goals also help identify asset management gaps that may exist. The detailed goal statements are listed in Table 2-1 in Chapter 2.

Note the maturity workshops were conducted in October and November 2020 and therefore represent a snapshot in time. Some of the gaps identified through those workshops have been partially or fully addressed during the window of time corresponding to the development of this TAM plan update. Table 6-1 lists the gaps remaining along with example actions.

Table 6 - 1: DTS Mapping of Gaps to Asset Management Focus Areas

Focus Area	Theme	Identified Gap(s)	DTS TAM Goal	Example Actions
<b>Organizational Strategic Plan</b>	Strategic plan, organizational objectives	Lack of unifying strategic plan with linkage to asset management and preservation	(2) (3)	Develop and implement a DTS strategic plan; consider linkage to TAM
	Performance measurement/reporting	KPIs in place but not linked to strategic plan	(2) (3)	Align KPIs for assets with strategic plan
<b>Strategy &amp; Planning</b>	Information technology requirements	Lack of DTS IT Plan. Rail Maximo system not fully functional. Separate bus MMIS system.	(2) (5)	Develop agency IT plan. Finish Maximo implementation
	Business processes and procedures	SOPs exist for rail but are inconsistent	(3) (4)	Achieve consistency among SOPs
	Asset management plan	TAM Plan in place for bus but not consistently used. TAM Plan does not include rail assets.	(1) (2) (3) (4) (5)	Complete TAM Plan update, including rail assets
<b>Organization &amp; People</b>	Communication and information sharing	DTS/fare collection contractor have infrequent and incomplete TAM data for sharing	(4)	Agree on communication strategy for asset management and establish clear channels
<b>Asset Information</b>	Asset inventory/information	Lack of rail inventory (and some information is considered questionable or unknown). Bus asset information exists but is not linked/tracked easily between other data sets	(2) (5)	Develop rail inventory (urgent)

Focus Area	Theme	Identified Gap(s)	DTS TAM Goal	Example Actions
<b>Asset Information</b>	Performance monitoring	Fare collection contractor behind on setting up performance monitoring systems. Rail contractor for core systems is required to perform at high levels and a recording of KPIs using Reliability, Availability, Maintainability and Safety (RAMS) metrics	(1) (2) (3) (4)	Improve performance monitoring tools for bus revenue collection
<b>Asset Management Decision-Making</b>	Long-term renewals planning	Plans not drafted yet for structures and other assets. Fare collection contractor (bus and rail) needs to refine plans, procedures, and work instructions based on performance in new operating environment	(1) (2) (3) (4)	Draft maintenance management and service plans and capital replacement program
	Asset knowledge/data analytics	Information is scattered about and there are different levels of knowledge and gaps in capacity/capabilities	(2) (4)	Conduct detailed assessment of needs and capacity; integrate with agency IT plan; set up training
	Optimized asset interventions	Funding constraints are an issue each year; DTS has not historically pursued this	(1) (2) (3) (4)	Include asset interventions in ULB policy discussions and improve over time (start with pilot project)
	Capital Improvement Plan (CIP) development	The use of asset management information in the development of the CIP is inconsistent across departments and stakeholders	(2) (4)	Document new process for strategic capital investment planning that incorporates TAM needs for bus and rail

Focus Area	Theme	Identified Gap(s)	DTS TAM Goal	Example Actions
<b>Lifecycle Delivery</b>	Shutdown and outage management	Poor documentation (bus side)	(1) (3) (4)	Develop consistent SOPs
	Investigation and recording of asset failures	Lacking documentation for revenue collection	(1) (3) (4)	Improve process documentation, SOP
<b>Risk &amp; Review</b>	Asset-level risk and quality assurance (bus)	No asset risk management framework in place	(1) (2) (3) (4) (5)	Develop risk register and mitigations for bus/paratransit assets
	Asset-level risk and quality assurance (rail)	RAMS hazard approach includes likelihood of failure for equipment for core systems, but no comprehensive risk register for assets across all types	(1) (2) (3) (4) (5)	Develop comprehensive risk register and mitigations for rail assets

*Key: (1) Safety/security; (2) Decision-making/prioritization/lifecycle management/cost-effectiveness; (3) System preservation and growth; (4) Employee learning; and (5) Federal requirements.*

## 7. Implementation Program

This chapter addresses TAM Plan elements 6 (Implementation Plan), 7 (List of Key Annual Activities), 8 (Resources) and 9 (Monitor, Evaluate and Update). This chapter also includes a summary of policy, governance, and accountability as well as DTS' plans regarding asset management software, specifically Maximo development and integration.

### 7.1 - Policy, Governance, and Accountability

#### 7.1.1 Policy

According to the FTA, an asset management policy “provides top-down direction to the entire agency. This direction can be vital for an asset management initiative because, depending on the selected implementation path, it can require organization-wide change.” Like any other policy, the asset management policy should be visible and used by executive leadership to communicate direction and expectations. In addition to communicating executive-level commitment, an asset management policy can help foster a culture that values asset management and links responsibilities with strategic objectives.

The DTS asset management policy is presented in Chapter 2 of this document. Roles and responsibilities for the key stakeholders are clearly stated, including the role of the accountable executive. The stated policy is “to maintain transit assets in a State of Good Repair and comply with Federal requirements by employing risk management strategies, using data-driven decision tools in processes for asset management, and building staff’s knowledge of asset management best practices.”

#### 7.1.2 Governance & Accountability

Establishing a governance structure and obtaining executive sponsorship are critical for successful implementation. The development of this TAM Plan required engaging leadership, asset owners, and stakeholders in multiple departments who perform asset management-related functions at DTS, contractors and other key stakeholders. Continuous engagement of the DTS Administration since the beginning of the TAM program initiative was important in the progress made with the multiple work streams that were occurring in parallel.

The Asset Management policy developed by DTS includes a section on individual and departmental/office/divisional/branch roles and responsibilities. During 2020-22, DTS established a project manager for leading the development of the TAM Plan and related activities; she is currently housed in the Transportation Mobility Division, Paratransit Service and Operations Branch. There are multiple other asset management stakeholders within DTS and outside of DTS. At this time, DTS is evaluating whether the Asset Management function should be a centralized, decentralized, or hybrid model moving forward.

### 7.2 - List of Key Annual Activities

The TAM Policy, goals and objectives and this TAM Plan set the stage for continually improving how DTS manages its assets. To successfully implement this TAM Plan and advance DTS’ asset management maturity and capability, it is recommended that staff conduct a quarterly review of the implementation plan (i.e., Action plans #1 through #13 in Table 7-2 on the following page) to monitor progress accomplished in recent quarters and prepare for new activities.

The accountable executive and senior staff play a critical role in shaping TAM objectives and performance targets. The accountable executive will review and approve future updates to this TAM Plan to ensure alignment with other strategic planning efforts.



At least once every four years, DTS must review and update its TAM Plan. These revisions will require input from various internal and external stakeholders. External stakeholder involvement will be coordinated through a variety of means as described in section 7.6.2. DTS expects better asset performance, risk reduction, and agency cost savings with each update of the TAM Plan.

In summary, there are three process-type requirements for FTA and two reporting requirements. The reporting requirements entail annual reporting back to the FTA. The requirements are as follows:

- Process-type requirements:
  - Compliant TAM Plan
  - Record keeping and coordination with planning (i.e., OahuMPO and HDOT)
  - Self-certification
- Reporting requirements
  - Data report (i.e., performance targets and performance in asset inventory module)
  - Narrative report.

Table 7-1 presents ongoing activities related to federal compliance, labeled FC-1 through FC-5, consistent with the process and reporting requirements identified above.

**Table 7 - 1: Federal Compliance Items for Transit Asset Management**

#	Category	Activity	Frequency	Submit To
<b>FC1</b>	Process-Type Requirement	<u>TAM Plan Update</u> – Develop and update TAM Plan. TAM Plan requires updating the asset inventory, conducting condition assessments, and prioritizing investments, among others. The TAM Plan must include rail assets once the rail system becomes operational.	Every four years, unless major change to service or extension. Normal cycle is 2018, 2022, 2026, etc. but DTS could set up a new cycle if completing a full update off the regular cycle	Not submitted to FTA Shared with internal and external stakeholders, including HDOT and OahuMPO
<b>FC2</b>	Process-Type Requirement	<u>Record keeping and coordination with planning</u> – Share TAM Plan and related information, such as performance targets and annual condition assessment reports, with OahuMPO and HDOT	At least once per year	N/A
<b>FC3</b>	Process-Type Requirement	Self-Certification	When submitting grant application	FTA

#	Category	Activity	Frequency	Submit To
FC4	Reporting Requirement	<p><u>Data Report</u> has multiple components:</p> <p><u>Asset Inventory</u> – Report sufficient data to complete Asset Inventory Module (AIM) form requirements</p> <p><u>Facility Condition Assessments</u> – Conduct condition assessments for administrative, maintenance, and passenger/parking facilities.</p> <p><u>Performance Results</u> – Report for rolling stock, equipment, facilities, and infrastructure (i.e., track)</p> <p><u>Target Setting</u> – Set targets for four asset categories: rolling stock, equipment, facilities, and infrastructure (i.e., track). Rolling stock and equipment can include sub-fleets.</p>	Annually	Reported to NTD and incorporated into TAM Plan as appropriate
FC5	Reporting Requirement	<p>Narrative Report – report on prior year annual performance results, describe progress made during the year to meet the performance targets set the year before.</p> <p>A template example is provided on <a href="https://www.transit.dot.gov/regulations-and-programs/asset-management/ntd-narrative-report-example-format/">the FTA website via this link (https://www.transit.dot.gov/regulations-and-programs/asset-management/ntd-narrative-report-example-format/)</a>.</p>	Annually	Reported to NTD

## 7.3 - Implementation Timeline and Action Plans

Based on the Gaps Analysis presented in Chapter 6, DTS has developed a set of recommended improvements to bring its multi-modal asset management program in alignment with agency goals and objectives. These improvements represent a living list of action plans (i.e., projects and initiatives) that will be monitored and updated over time.

The action plans are presented in Table 7-2 on the following page. The list roughly mirrors the list of gaps presented in the prior chapter. For each gap deemed critical enough at this stage, an action plan is identified, an owner is assigned (including supporting stakeholder if appropriate), the expected outcome/benefit is identified, and finally, a recommended timeframe (short, medium, long term) is identified. DTS expects much progress will be accomplished in the next two years.

**Table 7 - 2: Action Plan & Implementation Timeframes**

Gap	#	Action	Owner (Support)	Outcome	Short Term (0-2 years)	Medium Term (2-4 years)	Long Term (5+ years)
Lack of unifying strategic plan with linkage to TAM and KPIs	1	Finish strategic plan; check for inclusion of linkage to TAM and KPIs	DTS	Alignment of DTS TAM program with organizational strategic plan; best practice.			
Lack of DTS IT Plan	2	Develop agency-wide IT Plan	DTS	Strategic agency-wide IT plan in place; robust IT infrastructure and planning			
Rail EAM not fully functional	3	Continue ongoing implementation and enhancement for full functionality	DTS	Fully functional EAM for rail			
Separate MMIS systems	4	Carry out current state assessment, requirements definition, fit-gap analysis, business case analysis, and subsequent solution implementation	DTS	Fully integrated EAM for operations and maintenance; best practice			
Revenue collection has incomplete TAM data for sharing	5	Establish communication and data strategy for revenue collection asset management and establish clear channels	DTS ASO	Complete TAM data for fare collection and more uniform maturity across contractors			
Rail inventory not fully complete	6	Complete remaining fields for rail inventory (e.g., cost and lifecycle information)	DTS	Complete rail inventory for TAM purposes and capital needs projections; FTA compliance			

Gap	#	Action	Owner (Support)	Outcome	Short Term (0-2 years)	Medium Term (2-4 years)	Long Term (5+ years)
Performance monitoring is limited	7	Complete performance measurement framework; implement	DTS TMD, TRD	Increased awareness of performance monitoring, updated processes, uniform monitoring (e.g., revenue collection)			
Long-term asset renewal interventions planning is lacking	8	Draft maintenance management and service plans for specific asset classes (e.g., structures). Refine plans for revenue collection based on performance in new environment	DTS	Asset class-specific maintenance management and service plans (e.g., structures) a good pilot for broader expansion; Consistent SOPs for revenue collection			
Asset interventions not optimized	9	Establish ULB policy discussion for each TAM Plan update. Include asset interventions in these discussions	DTS ASO	Refreshed ULBs and asset interventions; best practice			
CIP development does not meaningfully use needs-based asset requirements (i.e., unclear linkage with mid- to long-term plan)	10	Establish new strategic capital investment planning to supplement CIP and inform the longer term (e.g., 10-20 years)	DTS (BFS)	More accurate CIP process; ability to justify and raise more capital replacement dollars; best practice			
Poor shutdown and outage management documentation	11	Prepare associated documentation and improve consistency of SOPs	DTS TMD, TRD	Complete and consistent SOPs; safety benefits and best practice			

Gap	#	Action	Owner (Support)	Outcome	Short Term (0-2 years)	Medium Term (2-4 years)	Long Term (5+ years)
No asset risk management framework in place	12	Develop asset risk register and mitigations for bus/paratransit assets	DTS	Bus/paratransit asset risk register in place; improved future TAM Plans; safety/security benefits; best practice			
No comprehensive risk register across all asset types	13	Examine benefits of establishing a comprehensive register or what individual assets may be missing; implement	DTS	Comprehensive asset risk register in place; improved communications; safety/security benefits; best practice			

## 7.4 - Resources

Activities related to Transit Asset Management have grown significantly since 2018, when the 2018 TAM Plan effort was handled entirely in-house. Since 2017, DTS and OTS started to conduct annual facility condition assessments using one or more engineers from each agency. In 2020, DTS contracted with a consultant to develop the TAM Plan update, carry out enhanced condition assessments, and other related tasks. During 2021, DTS accelerated its efforts to build databases and tools for rail operations and maintenance, including the implementation of Maximo EAM.

Estimating precisely the resources dedicated to transit asset management is challenging because the level of effort includes partial FTEs from multiple functional areas within DTS and indeed, multiple organizations outside of DTS as well as the use of contractors.

For the purposes of this TAM Plan, transit asset management “resources” are addressed in two buckets: (1) resources required for FTA-Compliance for Transit Asset Management and (2) resources required for all other TAM-related needs. The first category can be estimated quantitatively; the second category is estimated more qualitatively.

This section presents estimated resources needed to implement the activities required for FTA compliance and other action plans during the next four years (i.e., 2022-2026). The first major update to the TAM Plan in 2022 and the upcoming future update that includes the rail assets are estimated to be especially resource-intensive because of having to implement new processes (e.g., condition assessment, inventory work, MMIS, etc.). It is expected that once DTS reaches a steady state with these activities, the resource need should diminish.

The figures listed are estimates and are subject to DTS budget constraints and other factors. Table 7-3 presents resources needed to implement the compliance-related activities. Table 7-4 presents order-of-magnitude effort for the other action plans identified above.

**Table 7 - 3: Asset Management Resources Required – Federal Compliance**

#	Activity	Estimated Annual Staff Time (FTEs)		Frequency	Comments
		Short Term (0-2 Years)	Medium Term (2-4 Years)		
FC1	TAM Plan Update	1.5	1.0	Every 4 years	Led by TMD initially, used consultant contract for 2022 TAM Plan. An update is also required if major service change (i.e., rail system implementation)
FC2	Coordination with OahuMPO and HDOT	0	0	Annually	
FC3	Self-Certification	0	0	Ongoing	
FC4	Data Report (NTD)	0.1	0.1	Annually	1 FTE focused effort, but only for September-October each year
FC5	Narrative Report (NTD)	0.05	0.05	Annually	(same as above)

Table 7-4 below identifies the other asset management resources required (not required for Federal compliance). The level of effort column projects a qualitative estimate of the resources needed as follows: Small (less than \$100,000 or equivalent in labor); Medium (\$100,000-\$500,000 or equivalent in labor); and Large (greater than \$500,000 or equivalent in labor).

**Table 7 - 4: Asset Management Resources Required – Other TAM-Related**

#	Action Plan	Level of Effort	Comments
1	Organizational Strategic Plan	Medium	Likely requires consultant contract
2	Develop DTS IT Plan	Medium	Likely requires consultant contract
3	Fully deploy Maximo for Rail	Large	Significant amounts of DTS staff time. Includes vendor contract initially
4	Integrated EAM for Rail and Bus	Large	Cost for software upgrade to be determined
6	Data strategy for revenue collection asset management	Small	
7	Complete rail inventory for core and non-core system assets (e.g., cost data)	Medium	Includes consultant contract initially



#	Action Plan	Level of Effort	Comments
8	Complete performance measurement framework, implement	Medium	Includes consultant contract initially
9	Draft maintenance management and service plans for specific asset classes	Medium	
10	Establish ULB policy discussion for each TAM Plan update and asset interventions	Small	
11	Establish new strategic capital planning process	Medium	
12	Prepare documentation for shutdown and outage management and improve SOP consistency	Small	
13	Develop asset risk register and mitigations for all modes	Medium	

## 7.5 - Asset Management Software Systems

Historically, the main asset management software system used by DTS through its bus/paratransit operator is the Maintenance Management System (MMS), which was developed in-house by OTS and is maintained by their IT Department. MMS is fully used today and is supported by other systems, including the Facilities Maintenance System (FMS), Paratransit MMS (PTMMS), and others.

With the future implementation of the rail system, DTS is in the process of assessing its asset management software systems, especially given the future deployment of Maximo EAM.

DTS is assessing the current asset management software systems and environments to develop a roadmap for a central governance structure to plan, guide, implement, oversee, and support EAM Systems.

## 7.6 - Monitor, Evaluate and Update

This section addresses continuous improvement to DTS' TAM program and processes at a high level and includes the following:

- Communications and change management
- Stakeholder involvement
- Risk management
- Future TAM Plan updates

### 7.6.1 Communications and Change Management

Successful asset management implementation requires good communication—including ongoing dialogue and progress updates—and change management. It is useful when this communication is led

from the top, for instance by the accountable executive. Change management is an active process used to build awareness, enlist participation of key stakeholders, implement the changes required, and sustain the change over time to achieve the asset management goals. Especially for business process change, it is important to reach agreement on the need to make the change as well as the need to support the change through to implementation.

Perhaps one of the most important actions in this respect is the development of several internal communications actions from Tables 7-1 and 7-2, which will deliver regular communication to key staff about the importance of asset management, the adopted SGR/TAM policy, the key actions being conducted, and progress on those actions.

A common approach for change management is represented by the ADKAR acronym, which is a useful aid for understanding and promoting organizational change. The acronym represents the need to have:

**A** – Awareness of the need for change

**D** – Desire to participate and support the change

**K** – Knowledge on how to change

**A** – Ability to implement required skills and behaviors

**R** – Reinforcement to sustain the change

**ADKAR** can be incorporated into many of the actions in the implementation program.

### **7.6.2 Stakeholder Involvement**

Efficient management of DTS transit assets depends not just on employees, its contractor entities, and funding partners, but also on various external stakeholders. Customers, regulators, and vendors have their own expectations of the transit system:

- **Customers:** It is vitally important that DTS customers trust that the equipment and operators will get them to their destination safely. When customers experience delays or if injury frequencies begin to rise, DTS risks losing its most important stakeholder.
- **Regulators/Funding Partners:** FTA, HDOT (Hawaii Department of Transportation), and OahuMPO. These partners can have meaningful input into the continuous improvement of DTS' TAM program.
- **Vendors:** The performance and pricing of organizations, contractors, consultants, material suppliers, and other vendors directly affect DTS' ability to deliver projects on time and within budget. Issues with vendor performance and/or pricing may have a profound impact on the performance of the transit system.

In the provision of transit services, DTS relies heavily on the actions of its operating entities, such as OTS, LOMC-CSC, LOMC-RSS, and LOMC-VTS. This TAM Plan was written with an understanding of what each stakeholder expects from the transit system and is designed to help meet those expectations, while simultaneously balancing DTS priorities. Stakeholders should be engaged in meaningful ways in supporting the implementation of the actions from this Plan.

### **7.6.3 Risk Management**

There are typically four types of risk facing a transit agency: corporate/agency risk, program/project risk, hazard/safety risk, and asset risk. This section is concerned with asset risk, which historically has been the least developed for transit agencies.

Asset risk management will be an increasingly important driver of continuous TAM improvement, enabling a more proactive management decision approach. Developing a risk management approach will guide the development of DTS' risk management system, enabling future iterations of this TAM Plan to focus on the largest asset-related risks.

One planned action in the implementation plan is the development of a risk register, risk matrices, and associated mitigations. This framework would at a minimum include factors contributing to likelihood of failure (LOF) and consequence of failure (COF) as well as weights, scales, and scoring descriptions for use in evaluating likelihood and consequence of failure. At the end of the process, it will be feasible to identify the assets that pose the most significant risks to potentially be mitigated, and/or which assets should receive further condition assessments to better understand risk. A risk register supports a key tenet of the TAM Plan which is to "identify unacceptable risks, including safety risks, in continuing to use an asset that is not in a state of good repair".<sup>1</sup>

### **7.6.4 Future TAM Plan Updates**

Following 2022, the next TAM Plan produced by DTS will include the rail system assets. Any TAM Plan is expected to be forward looking, and as such will forecast projects and activities for at least the next four fiscal years.

Once the rail system becomes operational, the next version of the TAM Plan is expected to be a full update and this update will begin a new four-year cycle.

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<sup>1</sup> Federal Transit Administration, Transit Asset Management, Top 12 Frequency Asked Questions, How do transit providers comply with the TAM rule?

## 8. Conclusion and Next Steps

This 2022 Transit Asset Management (TAM) Plan is DTS' second as well as its most comprehensive. Like the 2018 TAM Plan, it represents a snapshot in time. During the last several years, DTS has made tremendous headway with its asset management program, having accomplished the following:

- Completed an asset management maturity assessment across the agency for both bus/paratransit and rail modes
- Developed an updated asset management policy and defined TAM goals and objectives
- Completed a comprehensive asset inventory for bus, paratransit, and rail assets
- Completed comprehensive condition assessments for all bus and paratransit facilities
- Developed State of Good Repair backlog estimates
- Developed 20-year capital renewal projections both for constrained and unconstrained funding scenarios
- Made significant progress in the documentation of systems needs, roadmapping, and future onboarding of rail assets into Maximo EAM

This TAM Plan addresses all nine elements required by FTA for Tier I public transit agencies (an agency is considered "Tier I" if it operates 101 vehicles across all fixed route modes or if it operates any type of rail). As part of its implementation program, DTS has documented the five Federal compliance activities as well as 13 additional action plans DTS intends to pursue over the next several years. DTS will be tracking and monitoring the progress of the activities according to the outlines produced in this document. These are documented in Chapter 7.

DTS will be adding rail assets as a core part of future TAM Plans. Preparation for this is already largely complete through maturity, inventory development, and systems work.

## Appendix A – Inventory Data Sources and Assumptions

### A.1 - Data Sources

All data sources were provided by DTS and/or OTS unless otherwise indicated.

Asset Category	Data Source	Costing Information
<b>Facilities</b>		
<b>Building Components</b>	<ul style="list-style-type: none"> <li>Facilities.xlsx</li> <li>AssetsBasis_Bus as of 8-31-2020.rpt.xlsx</li> </ul>	<ul style="list-style-type: none"> <li>AssetsBasis_Bus as of 8-31-2020.rpt.xls</li> <li>Transit Industry Research (MTA)</li> </ul>
<b>Building Equipment</b>	<ul style="list-style-type: none"> <li>Facilities.xlsx</li> </ul>	<ul style="list-style-type: none"> <li>AssetsBasis_Bus as of 8-31-2020.rpt.xls</li> <li>Transit Industry Research (MTA)</li> </ul>
<b>Stations</b>		
<b>Bus Stop Shelters</b>	<ul style="list-style-type: none"> <li>Bus Stops.xlsx</li> </ul>	<ul style="list-style-type: none"> <li>DTS Staff</li> </ul>
<b>Systems</b>		
<b>Communications, ITS, Revenue Collection, UPS</b>	<ul style="list-style-type: none"> <li>Components.xlsx</li> </ul>	<ul style="list-style-type: none"> <li>AssetsBasis_Bus as of 8-31-2020.rpt.xls</li> <li>Transit Industry Research (MTA)</li> <li>Online Research</li> </ul>
<b>Vehicles</b>		
<b>Revenue Vehicles</b>	<ul style="list-style-type: none"> <li>Buses: Bus 01_25_21.xlsx</li> <li>Paratransit: Handi-van.xlsx</li> <li>DTS Updates 3/24/2022 to align with FY 2021 NTD Data</li> </ul>	<ul style="list-style-type: none"> <li>DTS Staff</li> </ul>
<b>Non-Revenue Vehicles</b>	<ul style="list-style-type: none"> <li>Bus 01_25_21.xlsx</li> <li>Handi-van.xlsx</li> <li>DTS Updates 3/24/2022 to align with FY 2021 NTD Data</li> </ul>	<ul style="list-style-type: none"> <li>DTS Staff</li> <li>Online Research</li> </ul>

## A.2 - Data Assumptions

- If multiple costs were provided for the same building component or equipment type, an average of those costs was used for the unit replacement cost of the specified asset.
- Cost Year was assumed to be the same year as the date of purchase unless otherwise indicated or specified in the data provided by DTS.
- Pearl City Building A and B costs were calculated as follows.

*Buildings A and B combined cost = Total Facility Buildings cost<sup>1</sup> – Building C cost<sup>2</sup> – Building D cost<sup>2</sup>*

*Building A cost = Building A weight<sup>3</sup> \* (Buildings A and B combined cost)*

*Building B cost = Building B weight<sup>3</sup> \* (Buildings A and B combined cost)*

<sup>1</sup> The Pearl City Total Facility Buildings Cost was provided in the AssetsBasis\_Bus as of 8-31-2020 file

<sup>2</sup> Building C Cost and Building D Cost were taken from inventory

<sup>3</sup> Building A and B weights determined by square footage provided in facility condition inspection reports

- Facility walls: Exterior wall cost of \$500 per square foot, interior wall cost of \$30 per square foot (Online and industry research)
- Bus stop shelters with missing date built were assigned a date of 1990 or 2000 based on the shelter type.  
Type A, Type B, Type C, Dogbone, and Non-standard shelters: 1990  
Plexiglass and Metal Roof shelters: 2000

## **Appendix B – Facility Condition Assessment Forms**

### **B.1 - Sample Form for Administrative/Maintenance Facilities**



## Administration / Maintenance Facility Assessment Form



Asset Number:	10-0001
Asset Name:	Test Facility A
Street Address:	
Inspector Company:	
Inspector Name:	
Others Present for Inspection:	
Inspection Date:	11/25/2020
Year of Construction:	
Age at Time of Construction :	
Year of Major Renovations:	
Building Gross Area [square feet]:	
Number of Floors:	
Site Area [square feet]:	
Number of Revenue Vehicles Served:	
Notes:	

### Asset Condition Ratings



<sup>A</sup> Condition 2 indicates asset (or significant portion of an asset) is close to, or in need of, rehab/replacement and should be considered a pending investment need. While the majority of an asset may be in good condition, inspector should select condition 2 if a sufficient proportion of the asset is in condition 2 to indicate that a reinvestment/repair action is warranted.

<sup>B</sup> Some asset types may be expected to have a condition of 3.0 or higher as a minimum standard acceptable condition (conditions below a 3 are highlighted in data form for review).

#### Additional Notes:

- Refer to Appendix B of the FTA Condition Assessment Calculation Guidebook for detailed scoring guidance by asset type
- If unsure between two ratings, mark the lower score and describe in notes.
- Mark "N/A" if a Sub-Component is not present at the site.

[Click Here for FTA Condition Assessment Calculation Guidebook](#)

## Administration / Maintenance Facility Assessment Form

Asset Number: 10-0001 | Asset Name: Test Facility A

Inspection Date: 11/25/2020



Asset	Condition Rating (1-5)	Quantity	Units	Last Renovation	Comments	Photo No.
<b>Substructure</b>						
Foundation	3: Fair		/Sq. Ft			
Basement	3: Fair		/Sq. Ft			
<b>Shell</b>						
Superstructure/Frame	1: Poor		/Sq. Ft			
Shell Appurtenances	2: Marginal		/Sq. Ft			
Exterior Windows/Doors/Finishes	3: Fair		/Sq. Ft			
Roofing Surface	4: Good		/Sq. Ft			
Roof Drainage Systems	5: Excellent		/Sq. Ft			
<b>Interiors</b>						
Partitions	Please Select		/Sq. Ft			
Floors	Please Select		/Sq. Ft			
Ceilings	Please Select		/Sq. Ft			
Doors	Please Select		/Sq. Ft			
Stairs	N/A		Each			
Furnishings	Please Select		/Sq. Ft			
<b>Conveyance</b>						
Elevators	Please Select		Each			
Escalators	Please Select		Each			
<b>Plumbing</b>						
Fixtures/Drains	Please Select		/Sq. Ft			
Water Distribution	Please Select		/Sq. Ft			
Sanitary Waste	Please Select		/Sq. Ft			
Rain Water Drainage	Please Select		/Sq. Ft			
<b>HVAC</b>						
Energy Supply	Please Select		/Sq. Ft			
Heating Equipment	Please Select		/Sq. Ft			
Air Conditioning Equipment	Please Select		/Sq. Ft			
Ventilation/Air Handling	Please Select		/Sq. Ft			
Distribution System	Please Select		/Sq. Ft			
Controls	Please Select		/Sq. Ft			
<b>Fire Protection</b>						
Wet Systems	Please Select		/Sq. Ft			
Dry Systems	Please Select		/Sq. Ft			
Controls/Alarm	Please Select		/Sq. Ft			
Emergency Systems	Please Select		/Sq. Ft			
<b>Electrical</b>						
Service/Distribution	Please Select		/Sq. Ft			
Lighting/Wiring	Please Select		/Sq. Ft			
Security	Please Select		/Sq. Ft			
Data/Comm	Please Select		/Sq. Ft			
Emergency Systems	Please Select		/Sq. Ft			
<b>Shop Equipment</b>						
Wastewater Treatment	Please Select		Each			
Paint Booth	Please Select		Each			
Fuel Systems	Please Select		Each			
Vehicle Wash	Please Select		Each			
Hoists/Lifts/Cranes	Please Select		Each			
Misc Equipment	Please Select		Each			
<b>Site</b>						
Stormwater Systems	Please Select		/Sq. Ft			
Roadways/Driveways	Please Select		/Sq. Ft			
Employee Parking Lots/Pavements	Please Select		/Sq. Ft			
Landscape/Grounds	Please Select		/Sq. Ft			
Fencing/Walls	Please Select		/L. Ft			
Site Lighting	Please Select		/Sq. Ft			
Site Utilities	Please Select		/Sq. Ft			
Sidewalks/Furnishings/Signage	Please Select		/Sq. Ft			

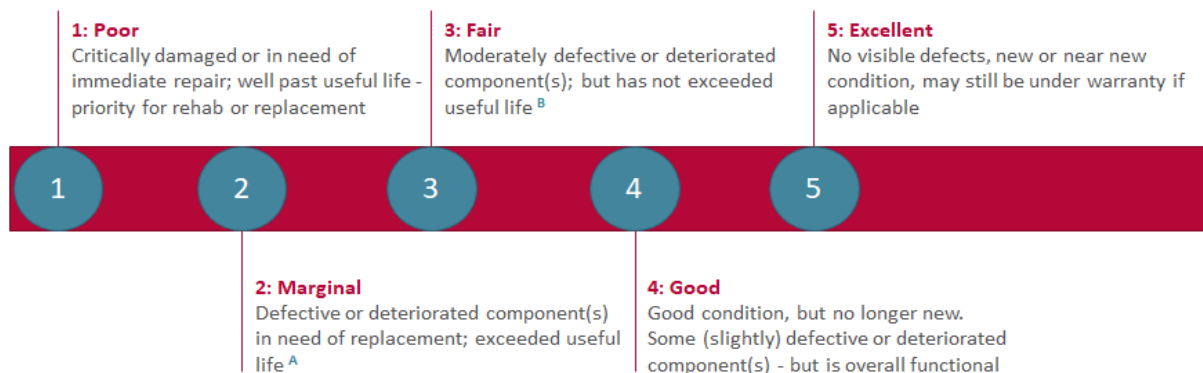
## **B.2 - Sample Form for Passenger/Parking Facilities**

## Passenger / Parking Facility Assessment Form



Asset Number:	10-0002
Asset Name:	Test Facility B
Street Address:	
Inspector Company:	
Inspector Name:	
Others Present for Inspection:	
Inspection Date:	11/25/2020
Year of Construction:	
Age at Time of Construction :	
Year of Major Renovations:	
Building Gross Area [square feet]:	
Number of Floors:	
Site Area [square feet]:	
Notes:	

### Asset Condition Ratings



<sup>A</sup> Condition 2 indicates asset (or significant portion of an asset) is close to, or in need of, rehab/replacement and should be considered a pending investment need. While the majority of an asset may be in good condition, inspector should select condition 2 if a sufficient proportion of the asset is in condition 2 to indicate that a reinvestment/repair action is warranted.

<sup>B</sup> Some asset types may be expected to have a condition of 3.0 or higher as a minimum standard acceptable condition (conditions below a 3 are highlighted in data form for review).

#### Additional Notes:

- Refer to Appendix B of the FTA Condition Assessment Calculation Guidebook for detailed scoring guidance by asset type
- If unsure between two ratings, mark the lower score and describe in notes.
- Mark "N/A" if a Sub-Component is not present at the site.

[Click Here for FTA Condition Assessment Calculation Guidebook](#)

## Passenger / Parking Facility Assessment Form

Asset Number: 10-0002 | Asset Name: Test Facility B

Inspection Date: 11/25/2020



Asset	Condition Rating (1-5)	Quantity	Units	Last Renovation	Comments	Photo No.
<b>Substructure</b>						
Foundation	3: Fair		/Sq. Ft			
Basement	3: Fair		/Sq. Ft			
<b>Shell</b>						
Superstructure/Frame	1: Poor		/Sq. Ft			
Shell Appurtenances	2: Marginal		/Sq. Ft			
Exterior Windows/Doors/Finishes	3: Fair		/Sq. Ft			
Roofing Surface	4: Good		/Sq. Ft			
Roof Drainage Systems	5: Excellent		/Sq. Ft			
<b>Interiors</b>						
Platform	Please Select		/Sq. Ft			
Access Passageways	N/A		/Sq. Ft			
Partitions	Please Select		/Sq. Ft			
Floors	Please Select		/Sq. Ft			
Ceilings	Please Select		/Sq. Ft			
Doors	Please Select		/Sq. Ft			
Stairs	Please Select		Each			
Furnishings	Please Select		/Sq. Ft			
<b>Conveyance</b>						
Elevators	Please Select		Each			
Escalators	Please Select		Each			
<b>Plumbing</b>						
Fixtures/Drains	Please Select		/Sq. Ft			
Water Distribution	Please Select		/Sq. Ft			
Sanitary Waste	Please Select		/Sq. Ft			
Rain Water Drainage	Please Select		/Sq. Ft			
<b>HVAC</b>						
Energy Supply	Please Select		/Sq. Ft			
Heating Equipment	Please Select		/Sq. Ft			
Air Conditioning Equipment	Please Select		/Sq. Ft			
Ventilation/Air Handling	Please Select		/Sq. Ft			
Distribution System	Please Select		/Sq. Ft			
Controls	Please Select		/Sq. Ft			
<b>Fire Protection</b>						
Wet Systems	Please Select		/Sq. Ft			
Dry Systems	Please Select		/Sq. Ft			
Controls/Alarm	Please Select		/Sq. Ft			
Emergency Systems	Please Select		/Sq. Ft			
<b>Electrical</b>						
Service/Distribution	Please Select		/Sq. Ft			
Lighting/Wiring	Please Select		/Sq. Ft			
Security	Please Select		/Sq. Ft			
Data/Communications	Please Select		/Sq. Ft			
Emergency Systems	Please Select		/Sq. Ft			
<b>Fare Collection Equipment</b>						
Turnstiles	Please Select		Each			
Ticket Vending Machines	Please Select		Each			
Miscellaneous Equipment	Please Select		Each			
<b>Site</b>						
Stormwater Systems	Please Select		/Sq. Ft			
Roadways/Driveways	Please Select		/Sq. Ft			
Passenger Parking Lots/Pavements	Please Select		/Sq. Ft			
Landscaping/Grounds	Please Select		/Sq. Ft			
Fencing/Walls	Please Select		/L. Ft			
Site Lighting	Please Select		/Sq. Ft			
Site Utilities	Please Select		/Sq. Ft			
Parking Gates/Equipment	Please Select		Each			
Sidewalks/Furnishings/Signage	Please Select		/Sq. Ft			

## Appendix C – Maturity Workshops

Two asset management maturity workshops were conducted via videoconference with the relevant stakeholders, one focused on Bus and one focused on Rail assets.

### Workshop #1 – RAIL

Date	10/27/2020
Number of Participants	15
Participants	<ul style="list-style-type: none"><li>• DTS:<ul style="list-style-type: none"><li>• Director of Rapid Transit</li><li>• Planner</li><li>• Chief Safety and Security Officer</li><li>• Senior Rail Operations and Maintenance Manager</li><li>• Facilities Compliance Officer</li><li>• Track Compliance Officer</li><li>• Communications Systems Manager</li><li>• Manager Revenue Systems</li></ul></li><li>• HART</li><li>• LOMC-CSC</li><li>• LOMC-RSS</li><li>• LOMC-VTS</li></ul>

### Workshop #2 – BUS

Date	11/13/2020
Number of Participants	10
Participants	<ul style="list-style-type: none"><li>• DTS:<ul style="list-style-type: none"><li>• Director of Rapid Transit</li><li>• Planner</li><li>• Chief, Paratransit Service and Operations Branch</li><li>• Chief, Facilities, Operations, and Equipment Branch</li><li>• Civil Engineer</li></ul></li><li>• OTS:<ul style="list-style-type: none"><li>• VP, Maintenance</li><li>• Technical Equipment Coordinator</li><li>• VP, Transportation</li></ul></li><li>• LOMC-RSS</li></ul>

## Appendix D – Public Comments

Public comments received and their resolution are presented below.

Comment Number	Commenter	Comment	Response
1	Trevor Nagamine, Neighborhood Board No. 25	The draft Transit Asset Management Plan notes that DTS has a substantial backlog in replacing transit and paratransit vehicles, with approximately 40% of the current fleet of revenue vehicles already beyond its useful life. This also accounts for \$185 million, or about two-thirds, of the total transit capital backlog as it exists today. Can DTS provide a response regarding the size of the backlog and what concrete steps the Department intends to take to address this backlog?	Thank you for your comment. Funding requirements for vehicle replacement must compete with a wide range of other capital needs both within DTS and at a City-wide level. To the extent possible, DTS leverages available City resources through the use of Federal funds. City funds are leveraged as the local match for Federal formula grant funding, and we apply for competitive grant funds as well in order to both support vehicle replacement and adopt new technology, for instance, through the procurement of electric buses. Although portions of the fixed route and paratransit fleet have been kept in service longer than the number of years technically deemed to constitute a vehicle's "useful life", our transit asset management partner, Oahu Transit Services, Inc., treats safety as a priority and through preventive maintenance and as-needed repairs and replacement, ensures that all vehicles in transit service remain in safe, working condition.



<b>Comment Number</b>	<b>Commenter</b>	<b>Comment</b>	<b>Response</b>
2	Kathleen Rooney, Ulupono Initiative	I was looking at the draft transit asset management plan and noticed that there are 934 bus shelters included. Does the TAM process try to identify those bus stops that need shelter/improvement (and thus incorporated into the asset management plan over time)?	Thank you for your inquiry. The condition assessments undertaken under the TAM planning process covers all passenger facilities that include enclosed structures for passengers for items such as ticketing, information, restrooms, and concessions, but does not include identifying bus stops that need shelter/improvement. Additional information on bus shelters was included to give an overall perspective on the range of transit assets that DTS oversees. Identifying bus stops that need shelter/improvement falls outside of the TAM planning process and is undertaken as part of day-to-day transit operations.