Transit Asset Management Plan

SEPTEMBER 2022

ACCOUNTABLE EXECUTIVE ACCEPTANCE

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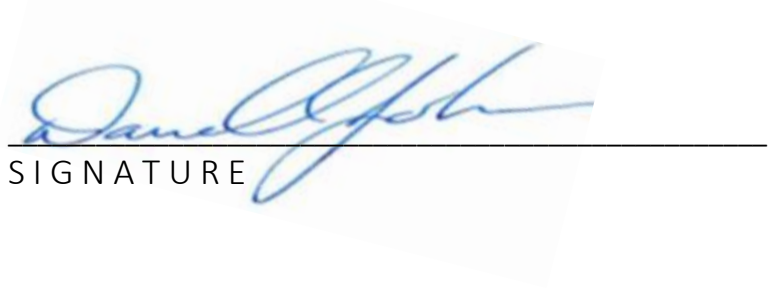

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Table of Contents

List of Figures

List of Tables

Executive Summary

Introduction

In July 2016, the Federal Transit Administration (FTA) published the Transit Asset Management (TAM) Final Rule [49 CFR Part 625]. Recipients and sub-recipients of federal funds that own, operate, or manage capital assets used for providing public transportation must develop and implement TAM Plans. The plans must include an asset inventory and condition assessment, an asset management policy, and a prioritized list of investments to support the state of good repair of the agency's capital assets, among others.

The Orange County Transportation Authority (OCTA) serves as the multi-modal transportation agency and provides most of the public transportation services for Orange County, CA. The agency operates 53 fixed bus routes which include local routes, community routes, limited-stop routes, and Metrolink rail feeder routes. These routes reflect a balancing of service levels in response to the COVID-19 pandemic. OCTA also operates paratransit services throughout the county. The agency has 502 vehicles available for fixed route revenue service; 248 vehicles for paratransit services[1]; and 177 non-revenue vehicles to support maintenance, operations, and administrative functions. OCTA also operates and maintains five maintenance and operating bases, two park and ride facilities, and five multi-modal transportation centers. These facility and station assets are comprised of 54 buildings and structures totaling over 500,000 square feet. While the agency's assets predominantly support bus and paratransit service today, the OC Streetcar is scheduled to begin operations in 2024. The future OC Streetcar assets will be included in TAM plans after that system becomes operational. OCTA provides funding for the Metrolink commuter rail service, however the assets for this service are reported by the operator, Southern California Regional Rail Authority.

Various departments within OCTA combine to track and monitor the state of good repair (SGR) of these assets and to plan for the capital replacement of assets when they have reached the end of their useful life. Three processes stand out in terms of influencing OCTA's TAM plan development: the Comprehensive Business Plan (CBP), the 20-Year Fleet Outlook, and the facility condition assessment process.

The TAM Plan, in combination with the above listed processes, is used to develop the 20-year list of prioritized transit capital needs and will be updated at least every four years per federal requirements. It is important to note that the TAM plan is a long-term planning document and is less useful for the annual budgeting process since it is normally updated only every four years. The document can inform the budget process, however there may be new needs that emerge between updates which need to be addressed.

[1] OCTA 20-Year Fleet Outlook, FY2022-41, Revised 10-28-2021

The first-generation TAM Plan for the OCTA was completed in August 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.

TAM Plan Update Approach and Considerations

A primary objective of this TAM Plan Update is to document the various interdependent business processes, activities, and tools needed to manage the agency's transit assets to ensure safe, reliable, and high-quality service over the long-term. Another objective is to effectively integrate the new TAM requirements into the agency's current practices. The following steps have been taken as part of developing the TAM Plan update:

- Review of the latest TAM federal guidance and best practices
- Interviews with senior staff to assess current practices at OCTA
- Updating of the TAM policy
- Updating of OCTA's planning level asset inventory
- Procurement of consultant contracts to assist with: (a) preparation of Facility Condition Assessments (FCAs), and (b) preparation of the TAM Plan update
- Application of the FTA Transit Economics Requirements Model (TERM Lite) to estimate the 20-Year transit capital needs

A recent assessment of current OCTA TAM practices indicated the following:

OCTA has made significant strides in asset management maturity since it developed its first TAM Plan in 2018. OCTA's target setting and NTD reporting processes are well established.

The CBP, which is updated every two years, has established links with the TAM Plan, but further steps should be taken to improve alignment between the two.

The CBP assumes grants will meet the future higher zero-emission vehicle replacement costs. This is important to understand as OCTA better aligns the TAM Plan with the CBP.

Revenue and non-revenue vehicle asset data is robust and well tracked within Ellipse, an Enterprise Asset Management (EAM) system. Facilities data is currently tracked at the primary level (building level), and some assets (e.g., systems assets) are not in Ellipse. OCTA does not mine lifecycle cost for decision making purposes given system constraints and limitations.

OCTA is in the process of implementing INFOR as the new EAM system. INFOR EAM will replace Ellipse and is expected to produce many improvements over the current system. However, it is not scheduled to go live until 2023 and hence was not leveraged in the development of this TAM Plan update.

OCTA uses a "sinking fund" to incrementally save for future anticipated capital and maintenance expenditures. This funding mechanism has allowed OCTA to budget for capital purchases and minimize its capital replacement backlog. For the time being, the sinking fund

assumes all CNG buses are replaced with CNG-cost buses, but not with the higher priced Zero-emission buses (ZEBs) required under California regulations.

OCTA continues to use an assumed bus life of 18 years for forecasting purposes and is examining the costs and benefits associated with extending bus useful life to this level. However, questions remain as there is limited empirical data for vehicles having completed the full 18 years and even less with ZEBs.

Key Findings and Implementation Steps

Key findings of the plan include:

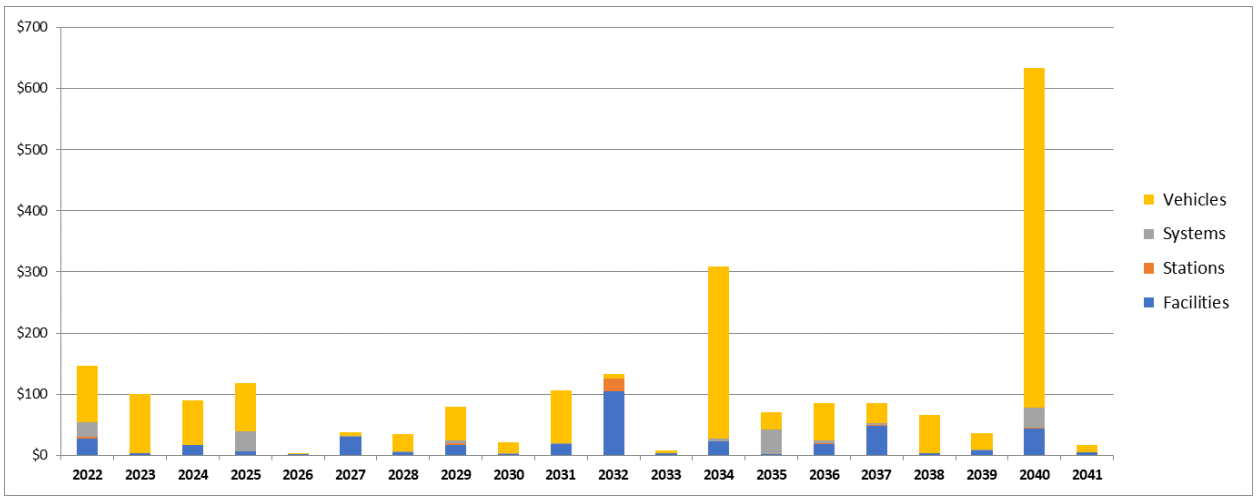
- **OCTA's revenue vehicles are in a state of good repair**
- **OCTA's facilities are in good condition overall**
- **Major reinvestment needs coincide with the switch to zero-emission buses in 2034 and 2040**
- **The SGR backlog is expected to grow over the next twenty years given the incremental costs associated with zero-emission buses and infrastructure**

To develop a prioritized list of the OCTA's 20-year transit capital needs, the study team applied the FTA Transit Economics Requirements Model (TERM Lite), described further in Chapter 4. The valuation of OCTA's existing transit asset inventory is estimated at approximately $725 million (in 2021 dollars). Revenue vehicles represent the largest share of asset holdings (57%). Facilities – including bus maintenance and administrative facilities – constitute the second largest share of OCTA's asset holdings (30%). The remaining 13% of assets consists primarily of support systems including fare collection, communications, and IT systems along with minor investments in passenger station related assets.

Backlog is deferred reinvestment in asset rehabilitation, replacement, and annual capital maintenance. Virtually all transit agencies carry some backlog from year to year. OCTA's current SGR backlog is estimated to be approximately $54.4 million, or 7.5% of the total value of OCTA transit assets. OCTA's facilities and revenue vehicles are in a state of good repair overall.

From a needs perspective, OCTA's 20-year unconstrained capital projection is shown on the following page in **Figure ES-1**, segmented by asset category. Needs are shown in Year of Expenditure dollars ($YOE). Revenue vehicle replacement costs, mainly replacement and rehab of the bus fleets, dominate the forecast. The numbers reflect the switch to zero-emission vehicles, including two major spikes in 2034 and 2040. 2040 also corresponds to the first year where California regulations require 100% of revenue vehicle purchases be zero-emissions.

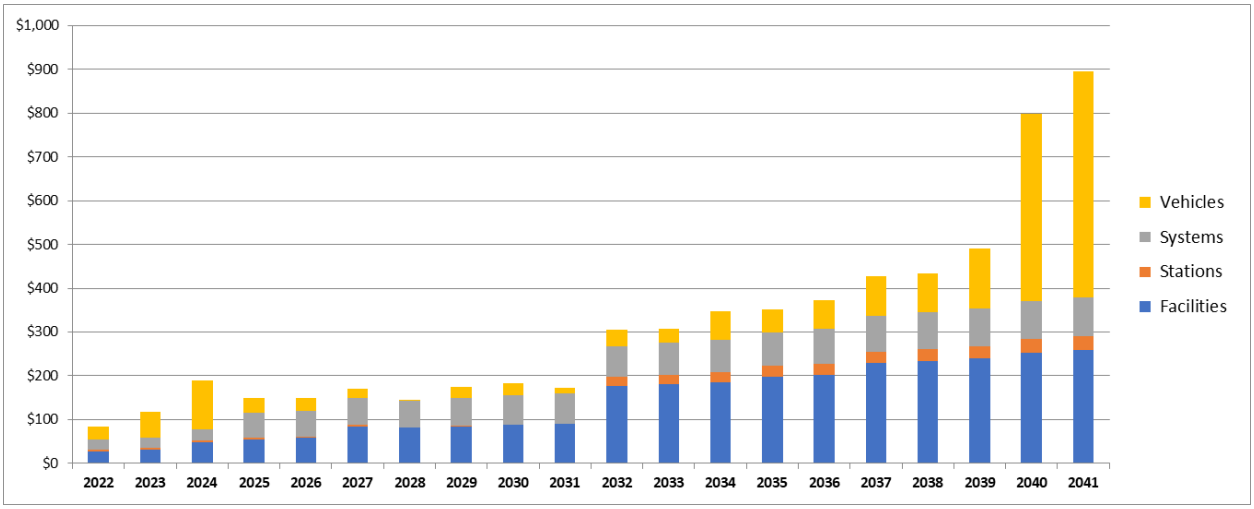
Table ES - 1. Unconstrained Reinvestment Needs by Asset Category (Millions of $YOE)



TERM Lite incorporates revenue forecast estimates from OCTA's CBP to establish a 20-year constrained budget. The constrained capital needs for each year of the TAM Plan horizon as well as the resulting backlog, year over year, can be determined by computing the expected capital needs over a 20-year period. The projected backlog is shown in **Exhibit ES-2**, below.

OCTA's expected capital funding is insufficient to fully control the size of the backlog, resulting in long-term backlog growth. The primary driver of this backlog growth is the significantly higher cost of transitioning the revenue fleet to zero-emission technology, leading to increased competition across all asset types for limited capital funds. This effectively drives up the size of the investment backlog for all asset types (not just the zero-emission buses themselves). The impact of this increased competition for expected funding capacity becomes more apparent in the later years of the forecast, as the bus fleet reaches a 100% zero-emission fleet.

Table ES - 2. Constrained Scenario: SGR Backlog Projection for 2022 to 2041 (Millions of $YOE)



Looking forward, the CBP identifies constrained investment assumptions and priorities for Bus and other OCTA modal programs. OCTA's bus capital priorities over the next three fiscal years (FY2023-2025) include, in decreasing order, the following asset implementation investments:

- **Large Bus Replacement:** $164.9 million
- **Vehicle Modifications:** $33.6 million
- **Facility Modifications:** $20.1 million
- **Small Bus Replacement:** $17.7 million
- **Support Equipment:** $11 million

OCTA's largest capital cost is tied to revenue vehicles, hence it is critical to keep the 20-Year Fleet Outlook updated on a regular basis. Currently, OCTA intends to extend the regular purchase of Compressed Natural Gas (CNG) buses into the next several years – the last CNG vehicles are expected to be put in service in 2025. The State of California mandates 100% zero-emission bus purchases by 2040. Current plans call for the bulk of OCTA zero-emission buses to phase in starting in 2034, and zero-emission demand response vehicles begin phasing in 2029. Accurate future costs of ZEBs are highly uncertain at this time given status of ZEB markets, changing technologies, and the future cost of power. However, OCTA has plans to initiate a study to quantify the life cycle costs of ZEBs to gain a better understanding of major cost drivers and potential cost mitigation strategies.

From an asset management planning perspective, OCTA is investing in the transition to a new Enterprise Asset Management System, INFOR, to replace the Ellipse system. Moving forward, INFOR is expected to have much greater data mining capabilities for current assets, and to include the OC Streetcar assets as well.

A major activity over the next several years is going to be the development of a robust OC Streetcar asset inventory, complete with detailed acquisition and installation costs, loading the information into INFOR, in preparation for the next TAM Plan update.

Chapter 1: Introduction

1.1 OCTA Overview

The OCTA was created in 1991 by combining several transportation operating and planning agencies into one authority. As an organization, OCTA is comprised of six distinct programs with unique characteristics and objectives; however, these programs work together to accomplish OCTA's Authority-wide mission, "To develop and deliver transportation solutions to enhance quality of life and keep Orange County moving." The programs include Bus Operations, Rail, Measure M2, the 91 Express Lanes, Non-Program Specific Projects, and Motorist and Taxicab Services.

The Bus Operations program delivers local fixed-route, express (temporarily suspended), limited-stop, Metrolink rail feeder, and complementary paratransit services for Orange County. The agency is expected to begin operating the OC Streetcar line in 2024. OCTA also provides a vanpool subsidy program; however, the agency does not have direct capital responsibility for these assets.

OCTA also serves as one of the five member-agencies that provide funding and oversight for the regional rail system, Metrolink. The Metrolink program is operated as a Joint Powers Authority (JPA) by the Southern California Regional Rail Authority (SCRRA). The five agencies participate in the JPA serving the counties of Los Angeles, Orange, Riverside, San Bernardino, and Ventura. OCTA is responsible for participating and providing the funding necessary to operate the three lines that serve Orange County. These lines include Orange County (OC) Line, the Inland Empire-Orange County (IEOC) Line, and the 91 Line. These routes service rail commuters between Orange, Los Angeles, San Diego, San Bernardino, and Riverside Counties. SCRRA is responsible for operating the service and managing the rolling stock assets used to provide service. These assets will be reported under the SCRRA TAM Plan.

OCTA's mission, values, and goals are presented on the following page. OCTA's asset management policy, presented in **Appendix C**, is intended to be consistent with and supportive of the agency's goals and priorities.

OCTA Vision
An integrated and balanced transportation system that supports the diverse travel needs and reflects the character of Orange County.

OCTA Mission
Develop and deliver transportation solutions to enhance quality of life and keep Orange County moving.

The Board of Directors has developed six values and five goals to guide OCTA in achieving this vision and mission. These apply to the entire organization and encompass every division and employee of OCTA.

OCTA Values

- **Integrity:** Deliver as promised and do so ethically, fairly, and with transparency.
- **Customer Focus:** Treat our customers with care, consideration, and respect, providing friendly and reliable professional service responsive to their needs.
- **Can-do Spirit:** Tackle challenges with innovation, vision, and strategic thinking.
- **Communication:** Provide consistent, timely, and reliable information in an open, honest, and straightforward manner.
- **Teamwork:** Work well together from a sense of shared purpose and mutual respect.
- **Safety:** Work to ensure the ongoing safety of the traveling public and our employees.

OCTA Goals

- **Mobility**: Deliver programs, projects and services to improve the movement of people and goods throughout Orange County and the region.
- **Public Service**: Enhance customer satisfaction by understanding, connecting with and serving our diverse communities and partners.
- **Fiscal Sustainability**: Ensure fiscal health through prudent financial management and by protecting and leveraging available revenue sources.
- **Stewardship**: Embrace responsible policies and practices designed to promote environmental sustainability and enhance the safety and quality of life in Orange County.
- **Organizational Excellence:** Continue the tradition of being a high-performing organization through employee development and efficient business practices.

1.2 Transit Capital Program

The Bus Operations program represents the agency's core business unit. OCTA currently operates 53 fixed bus routes which include local routes, community routes, inter/intra-county express routes (temporarily suspended), limited-stop routes, and Metrolink rail feeder routes. OCTA also operates complementary paratransit services.

The agency has 502 vehicles available for fixed route revenue service, 248 vehicles for paratransit services, and 177 non-revenue vehicles to support maintenance and administrative functions. OCTA also operates and maintains five maintenance and operating bases, two park and ride facilities (Brea and Fullerton), and five multi-modal transportation centers (Fullerton, Goldenwest, Laguna Beach, Laguna Hills, and Newport).

Revenue vehicles represent the largest share of the agency's transit assets (close to 60%), followed by facilities and stations, and support systems. The Operations Division is responsible for procuring, maintaining, rehabbing, and retiring the revenue vehicles throughout their useful lives. The Capital Programs Division is responsible for constructing, maintaining, rehabbing, or remodeling the supporting facilities. Support systems consist of farebox, communications, and IT Systems. These assets are managed by Operations and the Information Systems department.

1.2.1 20-Year Fleet Outlook

The purpose of the 20-Year Fleet Outlook is to provide a 20-year view of the fleet composition adequate to deliver planned levels of service for both fixed-route bus and for demand response service. It shows fleet expansion and replacement cycles to help develop a procurement schedule.

The 20-Year Fleet Outlook is updated at least on an annual basis. It captures many key capital replacement decisions for asset management, including useful life assumptions; year of new vehicle introductions; number of units; year of retirements, etc. This resource is a key input for the TAM plan update.

Inputs from the Fleet Outlook are also incorporated into the Comprehensive Business Plan and subsequently inform capital requests in the annual budget development. Staff from the Planning Division, Finance and Administration Division, and the Operations Division provide input into the budget development process, discuss planned vehicle procurements, and ensure the assumptions used in the Fleet Outlook are aligned with the Making Better Connections Service Plan, the CBP, NTD Annual Report, and the annual budget. The current 20-Year Fleet Outlook (FY2022-41) is included in **Appendix G**.

Consistent with the OCTA Zero-Emission Bus (ZEB) Rollout Plan and California Air Resources Board requirements, the 20-Year Fleet Outlook features a gradual implementation of zero-emission vehicles, both battery electric and hydrogen fuel cell. The fixed route fleet includes CNG vehicle replacements for a considerable time into the future (through 2039 for the Gillig buses). ZEB's are introduced gradually and with accelerated fashion starting in 2034. Ten hydrogen buses are assumed starting in 2037, in replacement of the ten that were procured in 2019. For the demand response fleet, OCTA assumes 50% ZEB starting in 2029 and gradually increasing to 100% ZEB replacements. By 2031, all future demand response vehicle procurements are expected to be ZEB.

1.2.2 Capital Program Assumptions and Uncertainties

The following lists assumptions and uncertainties associated with the capital plan (as discussed in the CBP):

Bus Useful Life Benchmark: OCTA made the decision to extend bus useful life benchmark for 40' and 60' buses to 18 years to avoid further reductions to fixed route bus service levels, which is a change from the previous 14-year policy. The policy has not been changed with the COVID-19 pandemic.

Service Levels: OCTA had to adjust service during the COVID-19 pandemic. The assumption for FY2020-21 is at 1.45 million revenue vehicle hours, a 20% increase from the previous year. OCTA is reinstating service to 1.625 million revenue hours as reflected in the Making Better Connections Service Plan.

Lifecycle Cost Tracking: OCTA does not currently data mine lifecycle cost for decision making purposes. The migration to the new INFOR Enterprise Asset Management system over the next several years is expected to improve this ability.

Transit Revenue: SB 1 gas tax that was approved in 2017 is assumed at $5 million and will grow annually with the Consumer Price Index (CPI). The capital replacement fund will be maintained. OCTA assumes that Federal revenue will grow at an average of 2.1% per year over the 20-year period.

Shift to ZEB Technology: The California Air Resources Board (CARB) implemented its Innovative Clean Transit (ICT) regulation in December 2018[2]. The initiative mandates transit agencies to develop individual plans to transition to zero-emission bus fleets by 2040. OCTA's plan was filed in June 2020. This is a major force shaping OCTA's 20-Year fleet outlook, one that is already "baked in" to current plans.

1.3 Comprehensive Business Plan

The CBP is a business planning tool designed to assist OCTA in implementing its strategic goals and objectives. The CBP encapsulates OCTA's programs and outlines their goals and objectives, as articulated by the Board of Directors. This is accomplished within the framework of sound business practices to provide an effective and efficient multi-modal transportation network to the residents of Orange County. Through financial modeling and divisional input and review, a comprehensive study of economic influences and programmatic needs and objectives are incorporated into a business planning document to ensure the financial viability of OCTA's programs over a 20-year horizon. The CBP helps identify the financial resources available for the bus capital needs identified in this plan and provides funding assumptions for the constrained needs scenario analysis.

1.4 TAM Benefits

Asset Management applies to all industries. The overarching goal of a Transit Asset Management program is to ensure that public transport providers manage their assets in a consistent, measurable SGR.

[2] https://ww2.arb.ca.gov/resources/fact-sheets/innovative-clean-transit-ict-regulation-fact-sheet

FTA defines TAM as a strategic and systematic process through which an organization procures, operates, maintains, rehabilitates, and replaces transit assets to manage their performance, risks, and costs over their lifecycle to provide safe, cost-effective, and reliable service to current and future customers. The term “asset” refers to physical equipment and infrastructure including rolling stock, right-of-way, stations, facilities, systems, tools, etc. that make up a transit system.

In 2012, MAP-21 mandated—and in 2015, the Fixing America’s Surface Transportation Act (FAST) reauthorized—FTA to develop a rule to establish a strategic and systematic process of operating, maintaining, and improving public transportation capital assets effectively through their entire life cycle. The FTA TAM Final Rule was published in 2016. The TAM Final Rule Fact Sheet is presented in **Appendix D**.

FTA's national Transit Asset Management System Rule:

Defines “state of good repair”

Requires grantees to develop a TAM plan

Establishes performance measures

Establishes annual reporting requirements to the NTD

Requires FTA to provide technical assistance.

The benefits of the asset management activities in this plan are listed in **Table 1-1** below.

Table 1-1. Benefits of Transit Asset Management

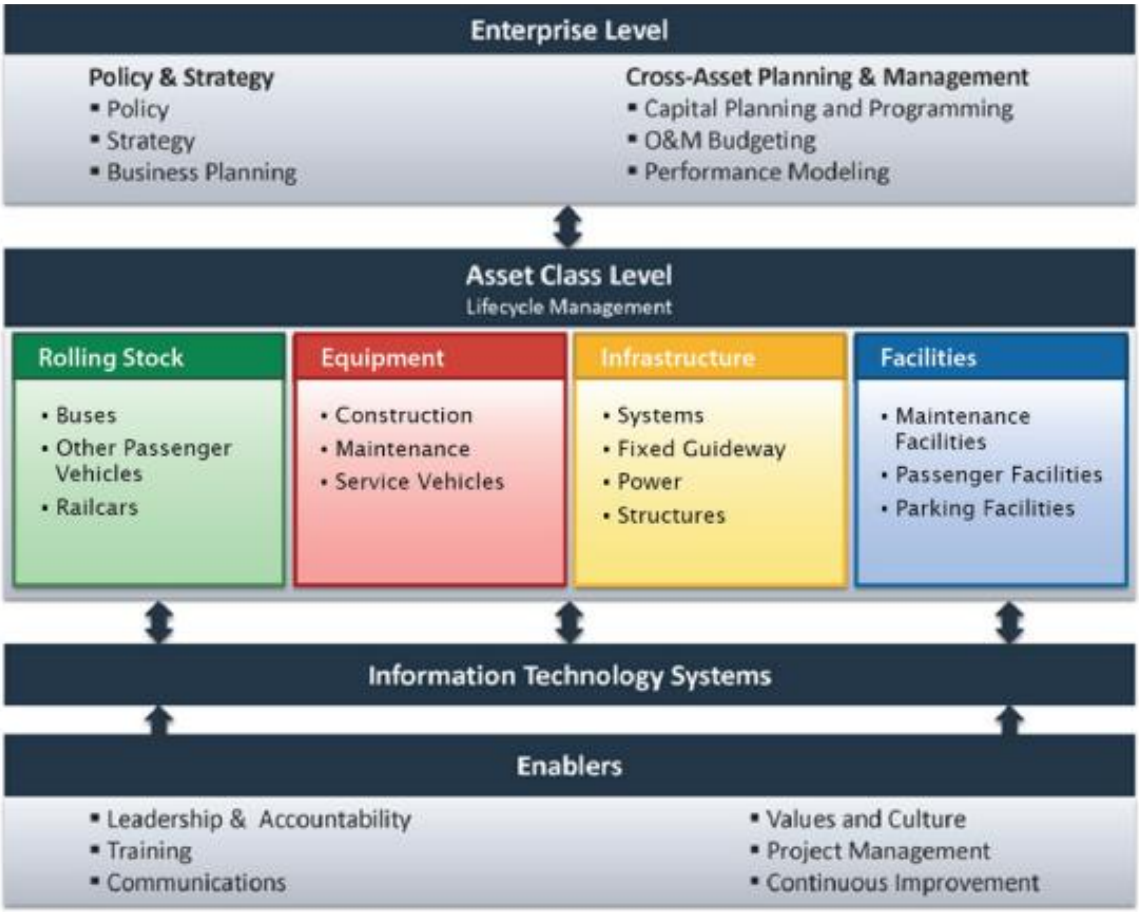
Agency Business Benefits	Asset Management Approach
Improved customer service	Improves on-time performance and service operations, vehicle and facility cleanliness; reduces missed trips, slow orders, and station shutdowns
	Focuses investments on customer-centered goals and metrics
Improved productivity and reduced costs	Maintains assets more effectively, using condition-based approaches and using predictive and preventive maintenance strategies (where these can be employed) to reduce costs while improving service delivery
Optimized resource allocation	Better aligns spending with an agency's goals and objectives to obtain the greatest return from limited funds
	Incorporates life-cycle cost, risk and performance trade-offs into capital programming and operations and maintenance budgeting
Improved stakeholder communications	Provides stakeholders with more accurate and timely customer-centered performance indicators
	Provides tools to communicate forecasted performance metrics (including level of service) based on different levels of funding

Sources: USDOT, FTA. Asset Management Guide: Focusing on the Management of our Transit Investments, Update November 2016.

1.5 TAM Plan Process

The development of an informed TAM Plan is an iterative process that requires regular input from multiple divisions and ongoing updates and monitoring. Moreover, the plan must align with a range of internal business processes, include policy and strategy, enterprise level cross-asset planning and management, lifecycle management at the asset class level, information technology systems, and other enablers, as described in **Figure 1-1** on the following page.

Figure 1 - 1. Transit Asset Management Framework



Source: Federal Transit Administration, Transit Asset Management Guide, Update November 2016

Regarding asset class level, OCTA has used FTA's TERM Model and corresponding FTA TERM Categories (Vehicles, Facilities, Stations, and Systems) to prepare the needs analysis for year's TAM Plan update. These categories permit a simple mapping to "Rolling Stock, Equipment, Infrastructure, and Facilities" categories required for FTA NTD reporting.

One key purpose of this TAM Plan is to maintain the importance of TAM to the entire OCTA organization.

OCTA conducted assessment interviews with asset class managers and specialists, holding executive management workshops, and regular dialogue and discussion with asset owners throughout the process. **Appendix E** includes the 2022 TAM Plan Assessment Interviews Memo, which provides a summary of interviews and insights into OCTA's current TAM practices.

The second key purpose is for OCTA to demonstrate compliance with the FTA reporting requirements related to the MAP-21 rulemaking and the NTD.

The third key purpose is to develop a roadmap for TAM Implementation. This includes a program of activities which will guide OCTA efforts in the short, medium, and long-term.

Benefits, as identified previously, in addition to compliance with FTA requirements, are expected to include improved customer service, improved productivity and reduced costs, optimized resources allocation, and improved stakeholder communications. Finally, the TAM Plan will support an orderly implementation of SGR programs and projects.

1.6 TAM Plan Required Elements

In July 2016, FTA published a Final Rule for TAM requiring nine main elements of reporting shown in **Table 1-2**, in addition to new NTD reporting requirements. The rule requires FTA grantees to develop asset management plans for their public transportation assets including vehicles, facilities, equipment, and other infrastructure. Table 1-2 serves both as a listing of the requirements and as a look-up table to identify where in the TAM Plan the elements are located.

Figure 1 - 2. FTA TAM Plan Requirements

TAM Plan Elements		Description	OCTA TAM Plan Chapter
1	Asset Inventory	List of transit capital assets and their condition (TAM and NTD)	Chapter 3
2	Condition Assessment	Asset condition ratings; facilities/stations from onsite assessment	Chapter 3
3	Decision Support Tools	Methodology/tools used to create TAM Plan (e.g., Transit Economic Requirements Model Lite or TERM Lite)	Chapter 4
4	Prioritization	Prioritized list of SGR projects, using criteria such as safety and cost	Chapter 4
5	TAM and SGR Policy	Policies, strategies, executive directions to support goals for TAM Plan	Chapter 2, Appendix C
6	Implementation Strategy	Processes to follow to achieve TAM Plan	Chapter 5
7	List of Key Annual Activities	Activities deemed critical to achieving TAM goals for the year	Chapter 5
8	Identification of Resources	Estimate of financial resources necessary to implement TAM Plan	Chapter 5
9	Evaluation Plan	Continuous TAM improvement plan with milestone and timelines	Chapter 5
NTD	Performance Measures	Agency-and FTA-required performance measures/targets	Chapter 3

Sources: FTA TAM final rule, Subpart C – Transit Asset Management Plans, 625.25 Transit Asset Management Plan Requirements, (b) Transit asset management plan elements (1) through (9); Subpart D -Performance Management, 625.43 SGR performance measures for capital assets

Beyond this introduction, this TAM Plan consists of four sections and a series of appendices as follows:

Chapter 2: Asset Management Policy and Goals– This Chapter presents OCTA's vision for asset management-documentation of asset management policy, governance for asset management, and drivers for program implementation.

Chapter 3: TAM Inventory and Condition Assessment – This Chapter summarizes OCTA's asset inventory and major asset holdings as well as the methodology by which the inventory is maintained. The chapter also presents a snapshot of the condition of all assets, targets for SGR measures, and facility condition results from 2022

Chapter 4: Reinvestment Needs and Prioritization – This Chapter presents OCTA's decision support tools and process for capital project prioritization. The chapter also presents OCTA's 2022 backlog and 20-year capital investment need projections.

Chapter 5: Implementation Strategy – The last Chapter presents OCTA's implementation program for asset management. This includes governance, implementation timeline and action plan, and continuous improvement.

Appendices:

A. Acronyms and Abbreviations
B. Glossary
C. TAM Policy
D. FTA TAM Final Rule Fact Sheet
E. TAM Practices Memorandum
F. Initial Performance Targets Memorandum
G. 20-Year Fleet Outlook
H. 20-Year Investment Needs

Chapter 2: Asset Management Policy and Goals

This Chapter presents OCTA's vision for asset management-documentation of asset management policy, goals, governance for asset management, roles and responsibilities, and drivers for program implementation.

2.1 Capital Asset Management Policy

OCTA owns and operates assets for multiple modes of transportation including freeways (toll lane equipment and systems) and transit (fleet vehicles, facilities, and equipment). OCTA manages all capital assets in compliance with Federal Transit Administration (FTA) Circular 5010.1D. The Finance and Administration Division tracks OCTA's current asset holdings with a unit price of $5,000 or more.

On a biennial basis, OCTA surveys and documents the condition of the capital asset inventory and updates the OCTA Capital Asset Management Manual when needed. OCTA's TAM assets account for approximately 70% of the agency's capital asset inventory, while freeway related assets and land assets account for the remaining 30%. By definition, the TAM plan relates to the 70% of assets which are used to provide public transit services.

2.2 TAM Goals

OCTA developed a TAM policy and associated goals intended to support and formalize implementation of the OCTA TAM program, maintain assets in a SGR, and communicate to all relevant stakeholders. A copy of the OCTA TAM Policy is included in Appendix C. The scope of assets identified under this policy include Vehicles (revenue and non-revenue), Facilities (Administration and Maintenance), Stations (Access/ parking, Shelters, and Structures), and Systems (Communications, AVL, and Revenue Collection).

The policy itself is to maintain OCTA transit assets in a SGR through financial stewardship and reinvestment, transparency, and promoting a culture that supports asset management best practices. The agency developed five TAM goals to guide its asset management program. On the following page, **Table 2-1** summarizes the TAM goals that were developed during a series of three Management Workshops held in 2018.

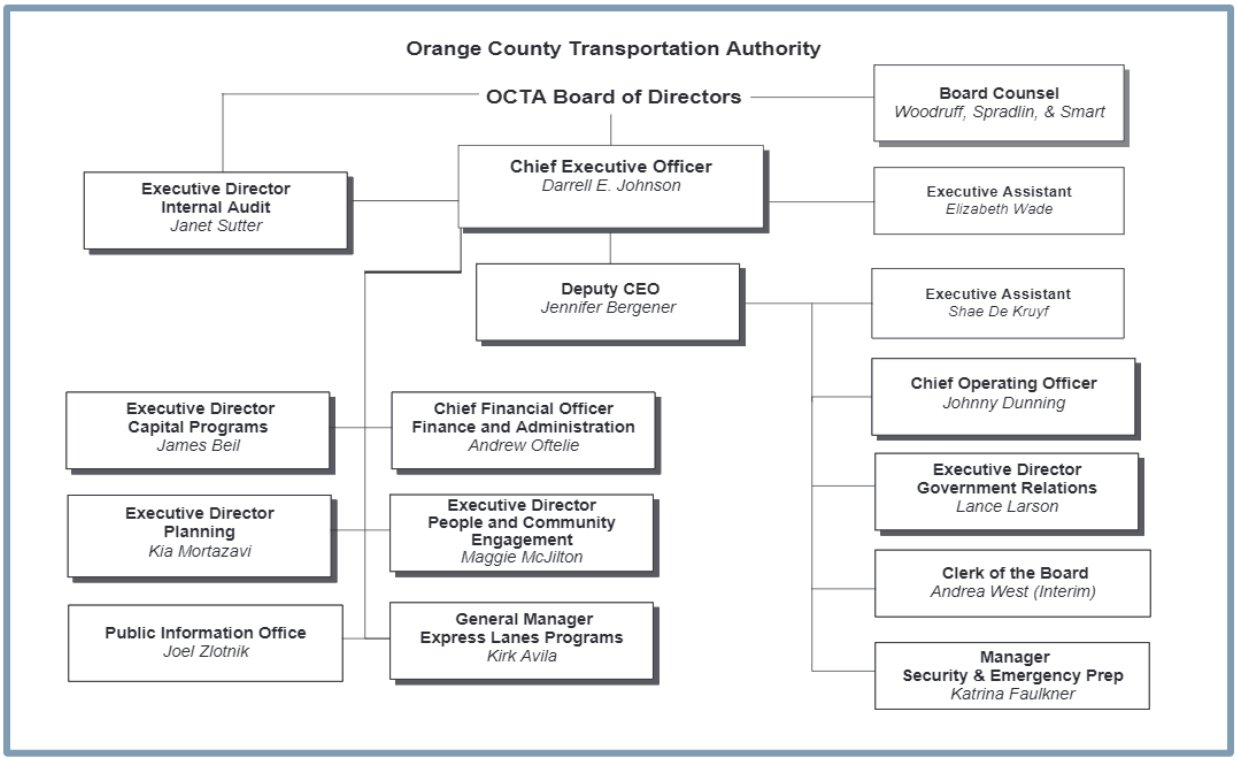
Table 2 - 1. OCTA Asset Management Goals

TAM Themes	TAM Goals
Stewardship and Maintenance	Maintain Condition of assets in SGR to support safe, secure, reliable and quality service
Stewardship, Safety, and Reliability	Prioritize capital replacement and rehabilitation based on safety and reliability for our customers and employees
Financial Sustainability	Support fiscal sustainability through use of data and best practices to balance asset useful life and lifecycle costs Promote asset management and incorporate lifecycle cost management in planning, design, and delivery of capital projects
Organizational Excellence	Provide leadership to promote and communicate an asset management culture

2.3 Governance Structure

Figure 2-1 on the following page presents OCTA's organization chart and identifies the executive management team. The CEO serves as the Accountable Executive for the agency's TAM Plan. According to the Final Rule, the Accountable Executive must be a single, identifiable person who has ultimate responsibility for carrying out the safety management system of a public transportation agency. The CEO fulfills this role at OCTA and is supported in this task by TAM practices carried out in multiple divisions. The CEO is also the signatory for OCTA's Public Transportation Agency Safety Plan (PTASP).

Figure 2 - 1. OCTA Organization Chart



The Planning Division is a major stakeholder in asset management, being responsible for coordinating TAM agency wide. This also includes maintaining OCTA's asset level inventory and monitoring and reporting on TAM/SGR strategic and operational performance (e.g., National Transit Database reports and narratives. Other major stakeholder divisions include Finance and Administration; Operations; and Capital Programs (especially with OC Streetcar asset inventory development and turnover). Finally, the People and Community Engagement Division plays an important support role with risk management and learning and development.

Chapter 3: TAM Inventory and Condition Assessment

This Chapter provides a description of the decision support tools used to support the development of this plan, as well as a summary of its capital project prioritization approach. This Chapter also provides an analysis of OCTA's SGR backlog and 20-Year reinvestment needs. The contents of this Chapter address FTA TAM Elements 1 and 2.

3.1 TAM Inventory

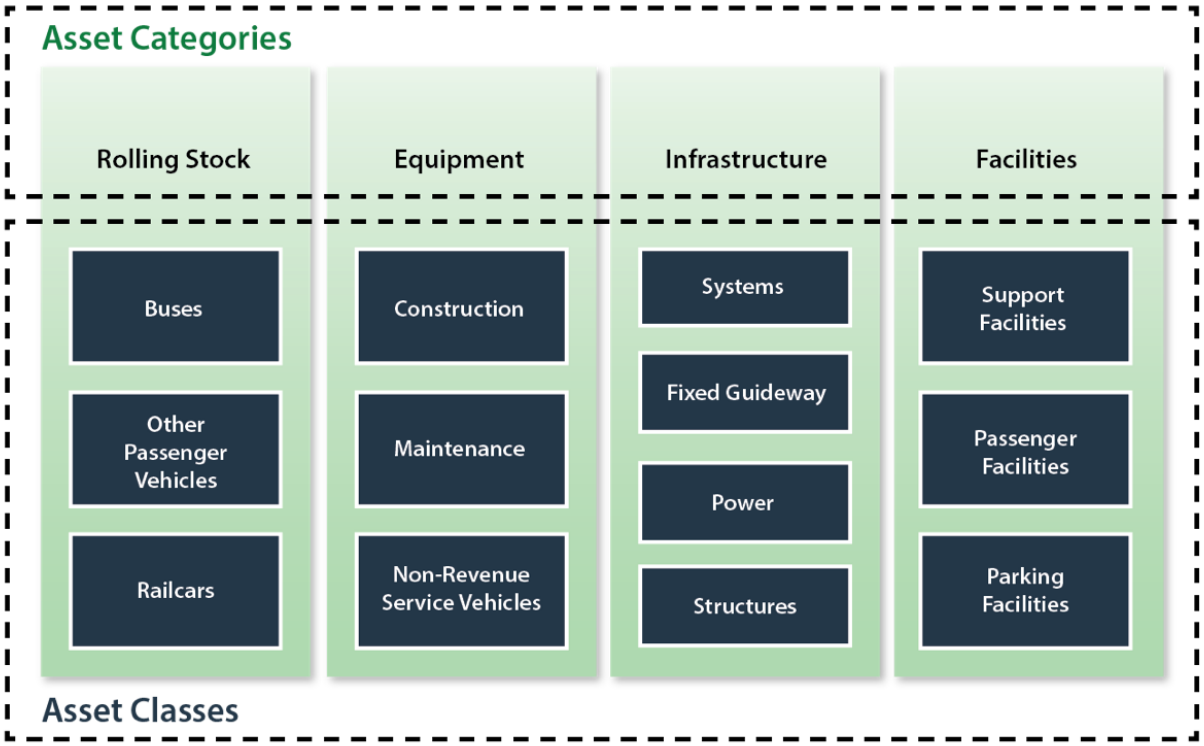
This chapter documents the full range of OCTA's transit assets, including the types of assets used to support transit service, as well as the quantities, replacement values, life cycle needs and conditions of those assets. The chapter begins with a high-level overview of OCTA's major asset holdings, followed by a more in-depth analysis of OCTA's full inventory of capital assets. The chapter concludes with the results of recent field-based condition assessments of OCTA's facilities. Finally, the chapter also includes discussion of the processes used to develop and maintain both the inventory and condition data.

OCTA operates and maintains approximately $725 million in physical assets (in 2021 dollars). This investment represents a significant local commitment to the county's transit services. Effective management of those assets is essential to assuring their long-term preservation and to the continued delivery of safe, reliable, and efficient services to the county's transit riders and supporters.

3.1.1 TAM Asset Categories

On the following page, **Figure 3-1** summarizes the asset categories and classes established by the FTA TAM guidance. These include four main categories of assets (Rolling Stock, Equipment, Infrastructure, and Facilities) and the classes of assets related to these. The asset categories include both bus and rail assets and structures. OCTA predominantly owns and operates bus assets and support structures. The agency does own some rail right-of-way but does not currently operate rail service. The OC Streetcar (a 4.15-mile streetcar system) is expected to begin revenue operations in 2024. OC Streetcar assets are not included in this TAM Plan, but once in operation, OCTA will report on the rail vehicles and associated infrastructure. OCTA operates and maintains close to $725 million in physical assets. This investment represents a significant local commitment to the county's transit services. A comprehensive understanding of those assets is essential to assuring their long-term preservation and to the continued delivery of safe, reliable, and efficient services to the county's transit riders and supporters.

Figure 3 - 1. Asset Categories



Source: Federal Transit Administration, Transit Asset Management Guide, Update November 2016

The following are the asset categories applicable to current OCTA transit operations:

Rolling Stock: 750 revenue vehicles including 40' and 60' buses, and cutaway buses

Equipment: 177 non-revenue vehicles, operations equipment, and IT systems

Infrastructure: Not currently applicable (Rail Only)

Facilities: Five (5) Maintenance and Operations Bases, five (5) multi-modal transportation centers, and two (2) park and rides

In January 2017, in accordance with the FTA TAM Final Rule, OCTA established SGR Performance Targets for each of the applicable asset categories and classes. Targets and narrative reports are updated annually. OCTA's SGR Performance Targets are discussed in greater detail in Chapter 3.3 of this plan. The OCTA TAM Initial Performance Targets Memo is included in **Appendix F**.

OCTA has used FTA's TERM Model and corresponding FTA TERM Categories (Vehicles, Facilities, Stations, and Systems) to prepare the needs analysis for year's TAM Plan update. These categories permit a simple mapping to "Rolling Stock, Equipment, Infrastructure, and Facilities" categories required for FTA NTD reporting. In this report, when Stations are reported separately, then the term "Facilities" refers to Administrative and Maintenance Facilities only.

3.1.2 TAM Data Sources

The current asset inventory documents over 2,500 individual capital assets. The primary data source for this effort was the Accounting Department's depreciation report. The depreciation report provides a listing of all assets owned by OCTA with a unit cost of $5,000 or more. Note that the OCTA asset inventory goes beyond the $50,000 minimum threshold required by FTA guidance. Also, as noted in **Chapter 2.1**, the TAM inventory is distinct from the Capital Asset Inventory required for financial auditing purposes. However, there is overlap in terms of both asset records and data sources. TAM assets account for approximately 70% of OCTA's total capital assets; with freeway related assets (toll lane equipment) and land accounting for the remaining 30%. This mix will change once the OC Streetcar system enters revenue service.

To ensure consistency with other efforts, the TAM inventory was reconciled with the Biennial Capital Asset Inventory and the 20-Year Bus Fleet Outlook (October 2021 update).

OCTA's asset inventory provides a detailed listing of the agency's existing asset holdings as of January 1, 2022. Specifically, the inventory documents all major capital assets used to support OCTA transit services, including each asset's type, quantity, replacement cost, date entered service, location, expected useful life, and asset ID. Depending on asset type, the inventory also documents additional attributes including current asset condition (observed), make and model, location, mode supported, and asset status.

3.1.3 Existing Asset Base

OCTA's existing asset inventory was compiled as of January 1, 2022. The valuation of OCTA's existing $725 million asset inventory is divided by asset category in **Figure 3-2** and **Table 3-1** on the following page (all values in 2021 dollars).

Figure 3 - 2. Existing Asset Base by Category (Percentage of Valuation)

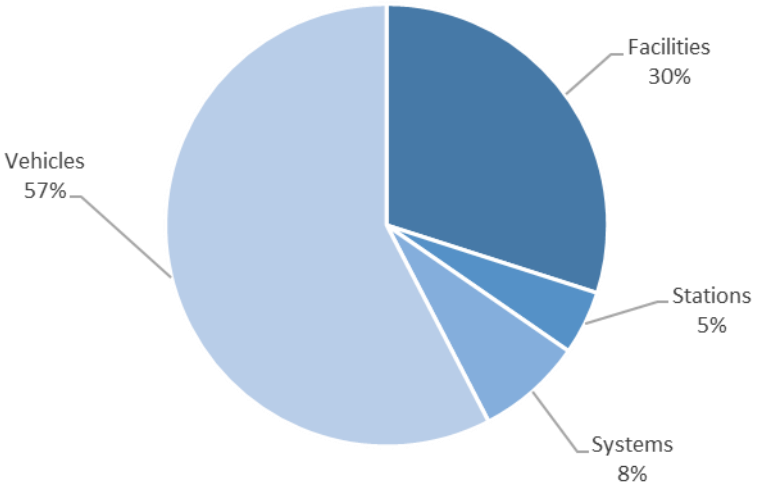


Table 3 - 1. Replacement Cost of Existing OCTA Assets

Category	Sub-Category	Millions of $2021	Share of Total Asset Base
Facilities	Buildings	$166.0	22.9%
	Site/Parking	$51.2	7.1%
Stations	Buildings	$12.9	1.8%
	Parking and Access	$20.9	2.9%
Systems	Communications/IT	$35.7	4.9%
	Revenue Collection	$20.4	2.8%
Vehicles	Revenue Vehicles	$409.9	56.6%
	Non-Revenue Vehicles	$7.7	1.1%
Total: Existing Assets		**$724.7**	**100.0%**

Note: totals may not add to 100% due to rounding.

Based on this assessment, revenue vehicles represent the largest share of all OCTA assets (by replacement value). This large share reflects the nature of OCTA's transit services – a large bus and paratransit operator. Facilities – including maintenance and operations facilities and transportation centers – constitute the second largest share of OCTA's asset holdings (roughly one-third of assets by value) which is again consistent with the holdings of a large bus operator. The remaining assets consists primarily of support systems including fare collection, communications, and IT systems along with minor investments in passenger station related assets.

3.1.4 Expansion Assets

In addition to the $725 million of existing assets, OCTA has plans both to expand revenue fleets for bus and paratransit services and acquire electric bus charging stations and related infrastructure as required to support the transition to 100% zero-emission busses by 2040. The

acquisition value of these assets is estimated to total just over $73.9 million in 2021 dollars. The expansion assets include both fleet expansions (to support additional riders and service) and non-fleet expansion (to address safety and operational objectives):

Fleet Expansion

Five 40-foot Electric Buses ($5.3 million)
Fifty-one Paratransit Vehicles ($12.0 million)

Other Expansion Investments

Electric Bus Charging Stations ($1.4 million)
Electric Bus Infrastructure ($55.2 million)

The Comprehensive Business Plan assumes an annual 1.1% growth in demand for the OC ACCESS paratransit service. To meet this demand, the CBP assumes the same 1.1% growth in full-size paratransit vehicles which equates to 51 additional vehicle purchases over the 20-year plan (from 2022 to 2041).

The actual number and size of additional paratransit vehicles purchased will depend on the service delivery model to accommodate the anticipated growth. It is assumed that the major transition of ZEB paratransit vehicles into the fleet will occur in 2029 and 2031.

Each of these expansion assets is documented in OCTA's asset inventory (where they are explicitly tagged as expansion assets). Along with the inventory records for existing OCTA assets, these expansion asset records are then used to help project long-term capital investment needs, including both expansion asset acquisition costs and their eventual rehab and replacement needs.

3.1.5 Asset Replacement Cycle Assumptions

Table 3-2 on the following page presents the expected replacement (useful life) and rehabilitation life cycle assumptions for a sample of OCTA asset types. These assumptions are presented to help the reader better understand how asset inventory data are used both to assess the size of the current level of deferred investment ("SGR backlog") and to project future reinvestment needs (as presented in the next chapter). Note that most asset types do not undergo an explicit rehabilitation program, hence the rehabilitation cycle column has been left blank.

Table 3 - 2. Sample OCTA Life Cycle Inputs

Asset Category	Type	Replacement Value (Millions of $2021)	Useful Life (Years)	Rehabs
Facilities	Generators	$4.4	25	
	Roof	$7.1	30	
	Bus Washer	$1.6	15	Midlife
	CNG Refueling Station	$3.4	25	
	Lifts - Fixed	$4.0	15	
Systems	Computers/Hardware	$5.5	5 to 12	
	Radio Comms	$29.3	4 to 12	
Stations	Shelters	$3.6	10 to 20	
Vehicles	Fixed Route	$392.3	18	At 1/3rd and 2/3rds life
	Paratransit	$53.8	7	

3.1.6 Third-Party Owned Assets

In accordance with FTA TAM Plan guidance, transit providers are asked to include a list of third-party owned assets if the agency has some direct capital responsibility for the assets. FTA also requests that agencies provide a list of these assets on NTD reporting forms. OCTA leases two bus passenger facilities. According to the terms of the leases, OCTA is responsible for ongoing maintenance and for providing any needed capital improvements for the following:

Laguna Beach Bus Station

OCTA Bus Depot at Fullerton Transportation Center

3.2 Condition Assessment

As part of the development of this TAM Plan, OCTA employed two types of condition assessment methodologies:

Modeled asset conditions (from TERM Lite) for vehicles and support systems

Onsite Facility Condition Assessments (FCAs) for facilities

The big picture update is that OCTA revenue vehicles are in a state of good repair and the facilities are in a good condition overall. TERM Lite was used to assess the physical condition of all vehicles and support systems. Specifically, TERM Lite uses useful life-based decay curves to *estimate* the current (and expected future) conditions of OCTA assets. Since vehicle asset conditions are evaluated using industry-standard useful life benchmarks (ULBs), TERM Lite's decay curved based condition estimates provide reasonably accurate assessments.

In contrast, onsite condition data provide a detailed "snapshot" of the current physical condition of OCTA assets. These condition data are the product of detailed, visual condition assessments performed on-site at OCTA facilities (including maintenance and admin facilities). Vehicle and

Equipment Assets are visually inspected during the Biennial Capital Asset Inventory process in even numbered years. These data are therefore extremely valuable for the assessment of near- to medium-term maintenance and facility reinvestment needs and priorities.

Note that the on-site condition observations and TERM Lite's condition estimates both rely on a common 5-point condition rating scale – which runs from excellent (5), through good (4), adequate (3), marginal (2) and poor (1) (see **Table 3-3** below). While technically an "integer" scale, the results of the onsite condition assessment can be combined to yield weighted average condition values for facilities, stations, and other asset types. Similarly, TERM Lite's asset decay curves are designed to produce continuously declining (non-integer) predictions of condition as assets age. Most notably, assets are assumed to have reached the end of their useful life once their condition (whether observed or estimated) falls below condition 2.5.

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

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

3.2.1 Modeled Condition Results (TERM Estimates) – Vehicles and Support Systems

The TERM Lite derived average condition scores for vehicles and support systems are shown in **Table 3-4** on the following page. This table also presents the condition distribution for these asset types. The results illustrate that 83% of the vehicle and systems assets are in adequate condition or better (by replacement value). The majority of the assets estimated to be in marginal or worn condition consist of revenue collection equipment and non-revenue vehicles. Note that the assumed expected useful life values for many of these asset types are under review as some are possibly too short (resulting in asset condition estimates that are below actual conditions).

Table 3 - 4. Estimated Condition of Non-Facility Assets as of 12/31/21

Category	Sub-Category	Value (Millions of $2021)	Average Condition	Excellent	Good	Adequate	Marginal	Worn
Systems	Communications	$34.2	3.1	3%	4%	84%	2%	6%
	ITS	$1.4	3.9	42%	40%	8%	10%	1%
	Revenue Collection	$20.4	2.3	0%	0%	2%	90%	8%
Vehicles	Non-Revenue Vehicles	$7.7	3.1	24%	12%	31%	15%	18%
	Revenue Vehicles	$642.0	3.1	2%	33%	51%	14%	0%
Total (Estimated Asset Conditions)		$705.8		2%	30%	51%	15%	1%

Note: totals may not add to 100% due to rounding.

3.2.2 On-Site Condition Assessment Findings: Facilities and Stations

In late 2021, OCTA procured a consultant to conduct detailed on-site condition assessments of all bus maintenance facilities, administrative facilities, and transportation centers. The approach involves sending inspectors in the field to physically observe the asset and assign a condition rating based on a specially designed form, with sub assets and sub-sub assets if applicable. The results of these assessments for facilities and station assets are presented in **Table 3-5** and **Table 3-6** on the following pages. Specifically, these tables present the weighted average condition values for each inspected facility and station (with the weights determined by the replacement values of the inspected facility components).

Based on the FTA's *Weighted Average Condition* method, facilities must achieve an overall score of 3 or better (using rounded numbers) to be considered in a state of good repair. Based on this definition, 53 of 54 OCTA facility buildings and all 13 facility sites are in a SGR (only restroom #2 at Fullerton Park and Ride, with a condition of 2.48, falls just below the 2.5 condition threshold).

Table 3 - 5. OCTA Condition Assessments Results: Maintenance Facilities (2021)

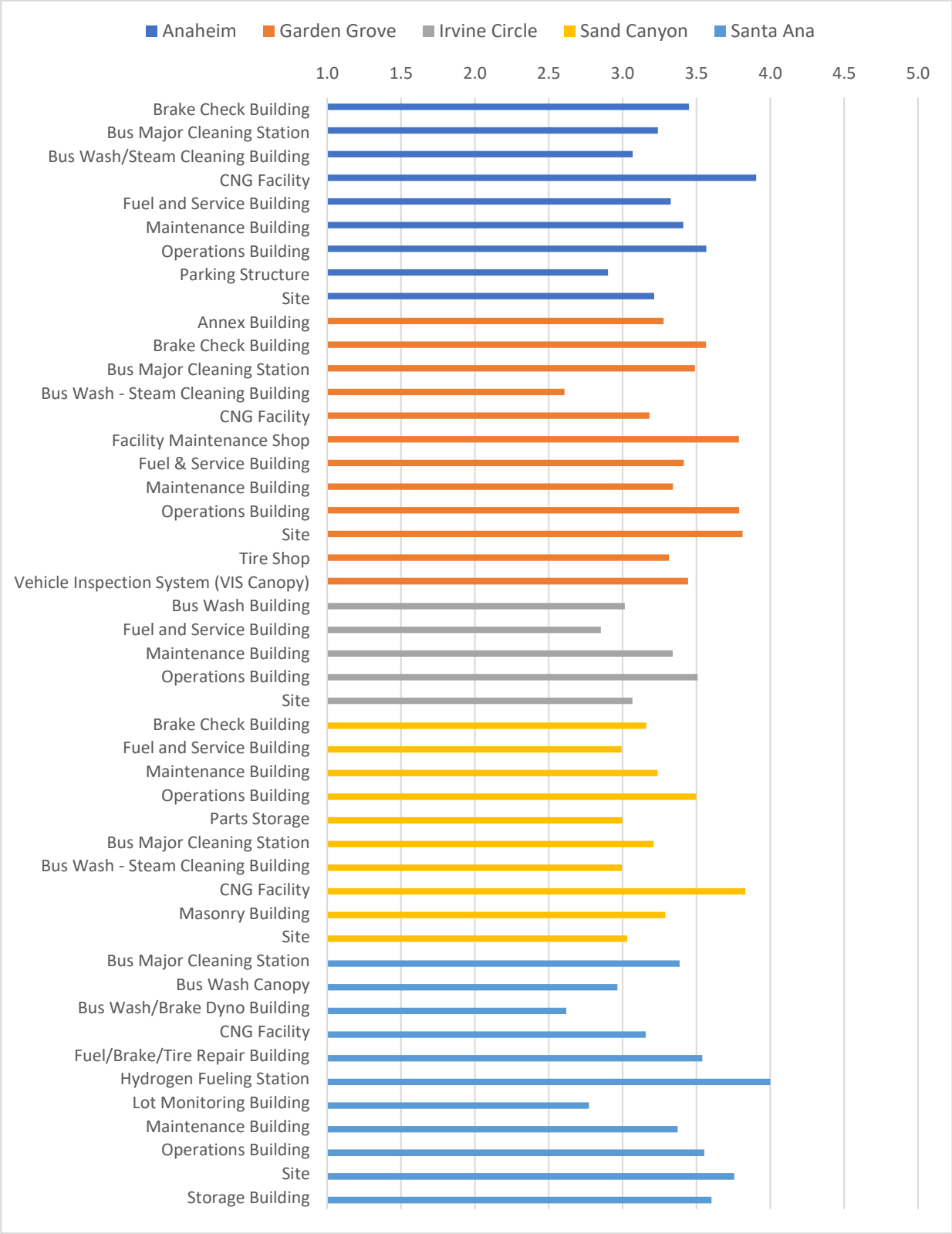
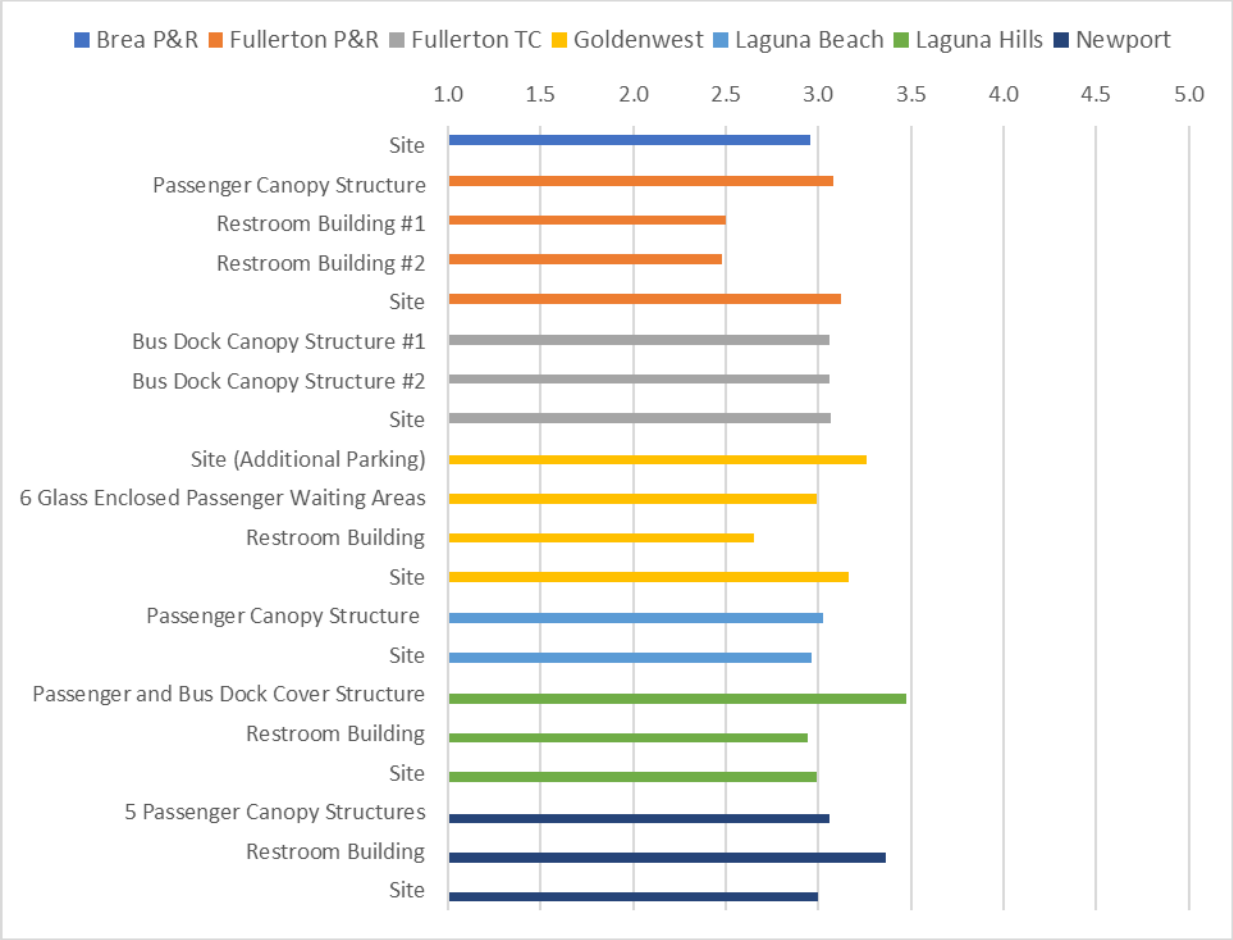


Table 3 - 6. OCTA Condition Assessment Results: Stations (2021)



Similarly, **Table 3-7** on the following page presents the average condition as well as the physical condition distribution of the facility components included in the on-site condition assessments (across all inspected facilities). Based on the physical inspections, 92% of the inspected components were in either good or adequate condition, with very few facility components found to be in either marginal or worn condition.

Table 3 - 7. OCTA Condition Assessment Results (Stations and Facilities Combined) – By Component Group (2021)

Facility Component Group	Value (Millions of $2021)	Average Condition	Excellent	Good	Adequate	Marginal	Worn
Substructure	$25.6	3.8	0%	84%	16%	0%	0%
Shell	$49.5	3.3	0%	37%	53%	9%	0%
Interiors	$14.2	3.3	1%	39%	53%	7%	0%
Plumbing	$12.4	3.7	0%	71%	27%	2%	0%
HVAC	$8.1	3.0	0%	26%	50%	18%	5%
Fire Protection	$8.2	3.4	0%	50%	38%	12%	0%
Electrical	$19.6	3.0	1%	19%	61%	19%	0%
Equipment	$31.3	3.0	0%	7%	83%	9%	1%
Conveyance	$0.7	3.0	0%	36%	47%	0%	17%
Site Development	$15.7	3.1	3%	27%	53%	18%	0%
Bus Parking Lot	$27.4	3.8	0%	75%	25%	0%	0%
Employee Parking	$10.7	3.7	0%	74%	26%	0%	0%
Station Parking	$11.3	3.2	0%	16%	84%	0%	0%
Bus Driveway	$7.1	3.0	0%	2%	98%	0%	0%
Non-Real Properties	$5.7	3.0	0%	5%	87%	8%	0%
Total	**$247.4**	**3.3**	**0%**	**41%**	**51%**	**7%**	**0%**

Note: totals may not add to 100% due to rounding.

3.3 State of Good Repair (SGR) Performance Targets and Results

Under FTA's Final Rule, grantees are required to track current performance and establish performance targets based on the measures outlined in **Table 3-8** below.

Table 3 - 8. Performance Measure Definitions

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

Based on these definitions, a comparison of OCTA's current performance (based on current data) and OCTA's targets for these measures, are presented in **Table 3-9**, **Table 3-10**, and **Table 3-11** on the following page; for rolling stock, equipment, and facilities respectively, for 2021. The source for the information is the 2021 National Transit Database submission, A-90 form.

Table 3 - 9. Current Performance Measures and Their Targets: Rolling Stock

Vehicle Type (NTD Reporting Categories)	ULB	Performance Measure	2021 Target	2021 Actual
AB – Artic. Bus	18*	Percent that has exceeded ULB	No more than 10%	0.00%
BU - Bus	18*	Percent that has exceeded ULB	No more than 10%	0.00%
CU - Cutaway	7	Percent that has exceeded ULB	No more than 10%	7.06%

* OCTA's TAM performance targets assume a ULB of 18 years, but this is not reflected in the capitalization policy.

Table 3 - 10. Current Performance Measures and Their Targets: Equipment

Equipment Type (NTD Reporting Categories)	ULB	OCTA Mileage Target**	Performance Measure	2021 Target	% Over ULB**
Automobiles	5-10*	100,000	Percent that has exceeded ULB	No more than 20%	48.51%
Trucks and other Rubber Tire Vehicles	4-8*	70,000 - 100,000	Percent that has exceeded ULB	No more than 17%	33.33%

* OCTA updated the Non-Revenue Vehicle Fleet Policy in November 2021. The policy defines useful life for the non-revenue fleet in terms of vehicle age (years) or target mileage, whichever is later.

** NTD Annual Reporting does not include information about mileage targets and evaluates performance based on the percentage of vehicles which have met their ULB. OCTA uses both ULB and mileage to assess the condition.

Table 3 - 11. Current Performance Measures and Their Targets: Facilities

Facilities (NTD Reporting Category)	Performance Measure	2021 Target	2021 Actual*
Administrative / Maintenance	TERM score of 3 or better - physical Inspection	100% of Facilities at 3 or above	100.0%
Passenger / Parking	TERM score of 3 or better - physical Inspection	100% of Facilities at 3 or above	100.0%

* Note: The Facility Condition Assessment field work was conducted in March-April 2022. Detailed inventory project files were incorporated into OCTA's asset inventory for the purposes of this TAM Plan. However, the condition assessment results will affect the 2022 condition assessment reports to NTD. One building at Fullerton Transit Center scored at 2.48, so rounds to 2.0 for Federal reporting. The 2022 actual performance score for passenger/parking facilities is estimated at 92% down from 100% in 2021.

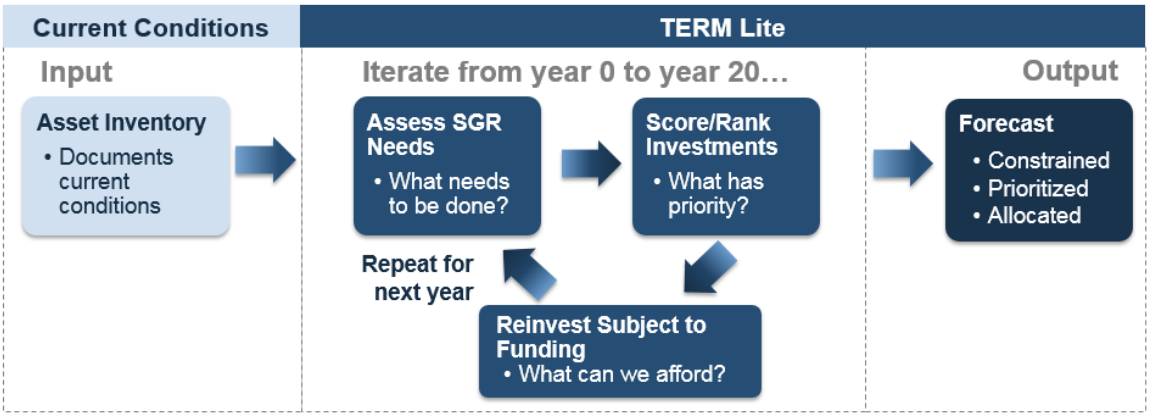
Chapter 4: Reinvestment Needs and Prioritization

This Chapter provides a description of the decision support tools used to support the development of this plan, as well as a summary of its capital project prioritization approach. This Chapter also provides an analysis of OCTA's SGR backlog and 20-year reinvestment needs. The contents of this Chapter address FTA TAM Elements 3 and 4.

4.1 Decision Support Tools

Decision support tools provide transit agencies information to support decision making, including investment prioritization, and support performance monitoring of SGR programs. TERM Lite is the FTA's decision support tool, initially developed to determine capital reinvestment needs for a nationwide analysis of transit SGR. TERM Lite uses asset inventories and life cycle plans to determine capital reinvestment needs and analyze changes to the SGR backlog over time. TERM Lite uses the process illustrated in **Figure 4-1**, to project reinvestment needs over a 20-year period.

Figure 4 - 1. TERM Lite Process for Projecting Reinvestment Needs



There are three types of reinvestment needs calculated by TERM Lite:

Replacement, which is based on an individual asset's age compared to useful life. Some asset types are not "replaceable", such as tunnels, and are kept in perpetuity. These asset types are designated as such in the model and never receive full replacement value.

Rehabilitation, the number and cost of which are determined by OCTA. The cost is calculated as a percentage of full replacement value, and the timing is based on percentage of useful life consumed (i.e., midlife = 50%).

Annual capital maintenance (ACM) is only applicable to a handful of asset types as it is generally used for large infrastructure assets which require a periodic, low level of reinvestment for maintenance. ACM is normally below 1% of the replacement value of an asset.

Along with reinvestment needs, TERM Lite determines which assets receive reinvestment under constrained funding using a prioritization routine (detailed in **Chapter 4.4**) and which assets

enter/leave the SGR backlog based on that funding allocation. This analysis is redone each year of the 20 years of analysis.

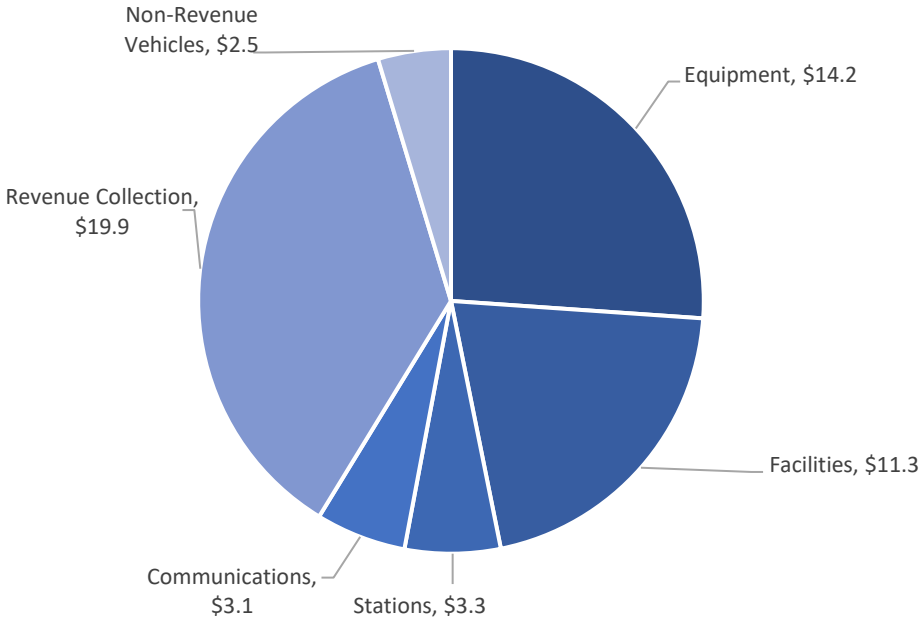
4.2 SGR Backlog

To quantify the SGR backlog, FTA's TERM Lite tool was used to determine which OCTA assets exceed their expected useful lives, or have deferred capital maintenance needs (i.e., rehabilitation or annual capital maintenance). These calculations are based solely on OCTA's asset inventory data and agency input assumptions regarding asset's useful life and replacement costs.

Based on this TERM analysis, OCTA's current SGR backlog as of December 31, 2021, is estimated at approximately $54.4 million. In other words, as of January 2022, it would require roughly $54.4 million to bring all assets into compliance with OCTA's SGR Targets. Given that OCTA's transit assets have an estimated total replacement value of $725 million, the SGR backlog is equivalent to roughly 7.5% of all OCTA assets (by value).

The composition of OCTA's backlog is shown in **Figure 4-2**. This chart shows asset types determined to be in the backlog (based on expected useful life) currently. OCTA's backlog is dominated by revenue collection (37%), maintenance equipment (26%), and facility and station reinvestment needs (27%), with this later group including facility and station buildings, parking, and site assets. The remaining backlog consists of reinvestment needs for communications (6%), and non-revenue vehicles (5%).

Figure 4 - 2. Estimated Current SGR Backlog ($2021 Millions)



4.3 20-Year Reinvestment Needs Forecast

4.3.1 Unconstrained Needs Analysis

The unconstrained needs analysis is designed to determine the level of investment required to address OCTA's total reinvestment needs for the upcoming 20-year period. This analysis assumes that OCTA has unlimited access to reinvestment funding and has the planning and project management capacity to address each reinvestment need within a one-year period (i.e., as the replacement needs materialize). While unattainable in the real world, this analysis is helpful in identifying all existing and upcoming capital needs as well as a method to assess the gap between total needs and expected funding capacity.

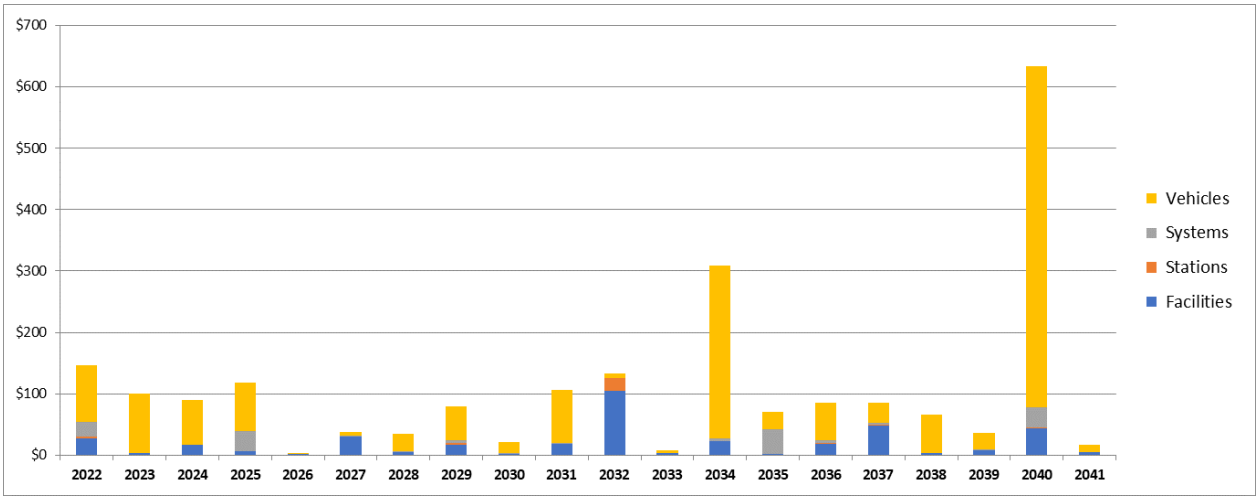
To assess OCTA's unconstrained needs, the TERM Lite model was run for a 20-year time span, assuming no funding constraint and 2.4% cost inflation; therefore, all needs are in Year of Expenditure (YOE) dollars. In this scenario, the current SGR backlog can be eliminated in the first year of analysis. The resulting unconstrained 20-year needs are shown in **Table 4-1** below, grouped in five-year increments by asset type. The average annual needs amount provides a sense of the typical level of annual funding required to attain and maintain full SGR throughout all four of the five-year periods.

Table 4 - 1. OCTA Unconstrained 20-Year Needs: 2022-2041 (Millions of $YOE)

Asset Type	2022-2026	2027-2031	2032-2036	2037-2041	20-Year Total
Facilities	$55.9	$71.2	$151.1	$107.5	$385.6
Stations	$3.4	$2.5	$22.4	$3.5	$31.8
Systems	$57.0	$11.4	$49.0	$38.0	$155.3
Vehicles	$342.6	$194.6	$380.9	$688.1	$1,606.2
Total	$458.8	$279.7	$603.4	$837.0	$2,178.9
Annual Average	$91.8	$55.9	$120.7	$167.4	$108.9

Figure 4-3 on the following page presents TERM's estimates of OCTA's annual, unconstrained reinvestment needs for the full 20-year time horizon, segmented by asset category. Note that the unconstrained reinvestment needs are dominated by the rehab and replacement needs for bus fleets, including both existing and planned expansion vehicles. Also note that the unconstrained reinvestment needs include the switch to ZEBs. The major spikes in needs in 2034 and 2040 reflect the coincident replacement timing for large numbers of bus vehicles. **Appendix H** provides a summary of OCTA's total unconstrained reinvestment needs by Fiscal Year: 2022-2041.

Figure 4 - 3. Unconstrained Reinvestment Needs by Asset Category (Millions of $YOE)



4.3.2 Constrained Funding Analysis

OCTA is not expected to receive the level of capital funding required to meet the total reinvestment needs as identified by the unconstrained needs analysis presented above, at least not in all time periods. For this reason, TERM Lite was also run "constrained". Specifically, the constrained run assumes OCTA will receive the level of reinvestment funds documented in OCTA's 20-year capital budget plan.

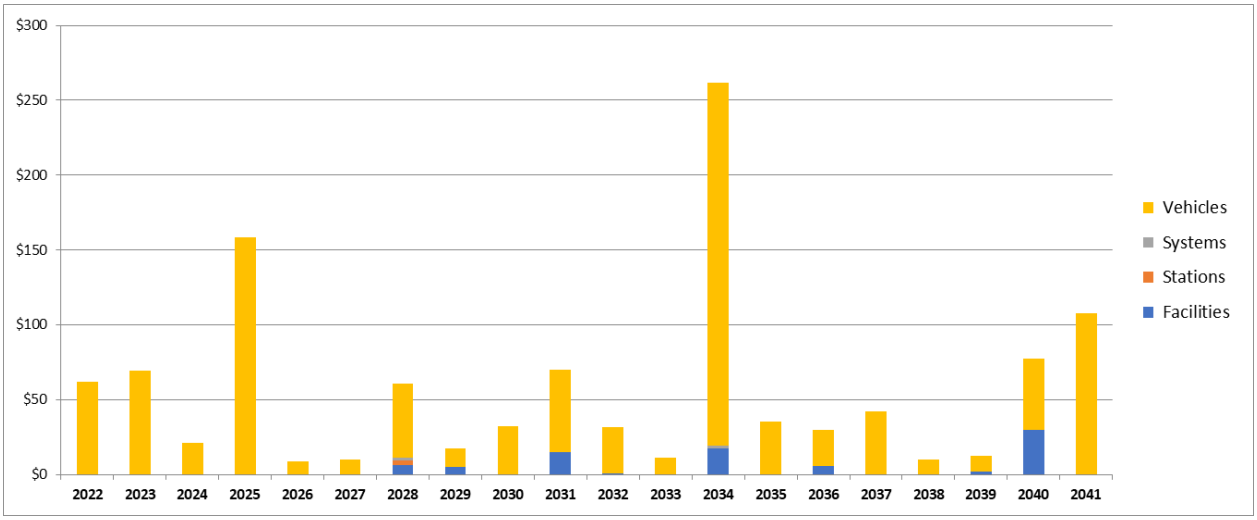
The constrained analysis is designed to highlight two key issues:

First, given that reinvestment funds are expected to be less than is required to address all outstanding reinvestment needs in all periods, how should these funds be prioritized (i.e., what assets should the funds be spent on)?

Second, given that some reinvestment needs will not be addressed, what will happen to the SGR backlog? Will it decline, remain constant, or will it grow and if so by how much?

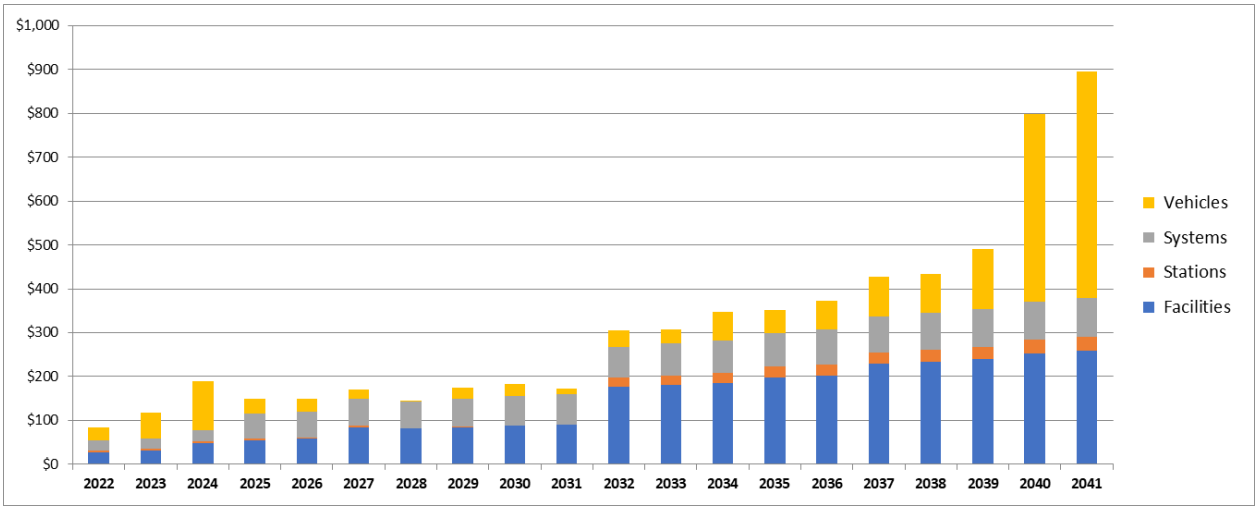
The results of the constrained analysis are presented in **Figure 4-4** and **Figure 4-5** on the following page. First, Figure 4-4 shows how TERM Lite chose to invest the $1.1 billion in reinvestment funding estimated to be available over the upcoming 20-year period (using TERM Lite's internal prioritization routine). Note that all budgeted funds were expended (as total funding is insufficient to address all needs). Moreover, consistent with the unconstrained run, a very large share of the total funding is expended on revenue vehicles (buses and cutaways) with most of the remaining dollars spent on facilities and systems asset needs.

Figure 4 - 4. Constrained and Prioritized Expenditures: 2022 to 2041 (Millions of $YOE)



Next, **Figure 4-5** below presents the total SGR backlog projection associated with this constrained funding scenario. Based on this analysis, OCTA's expected capital funding is insufficient to fully control the size of the backlog, resulting in long-term backlog growth. The primary driver of this backlog growth is the significantly higher cost of zero-emission buses, leading to increased competition across all asset types for limited capital funds. This effect drives up the size of the investment backlog for all asset types (not just the zero-emission buses themselves). The impact of this increased competition for expected funding capacity becomes more apparent in the later years of the forecast, as the bus fleet attains 100% zero-emission buses.

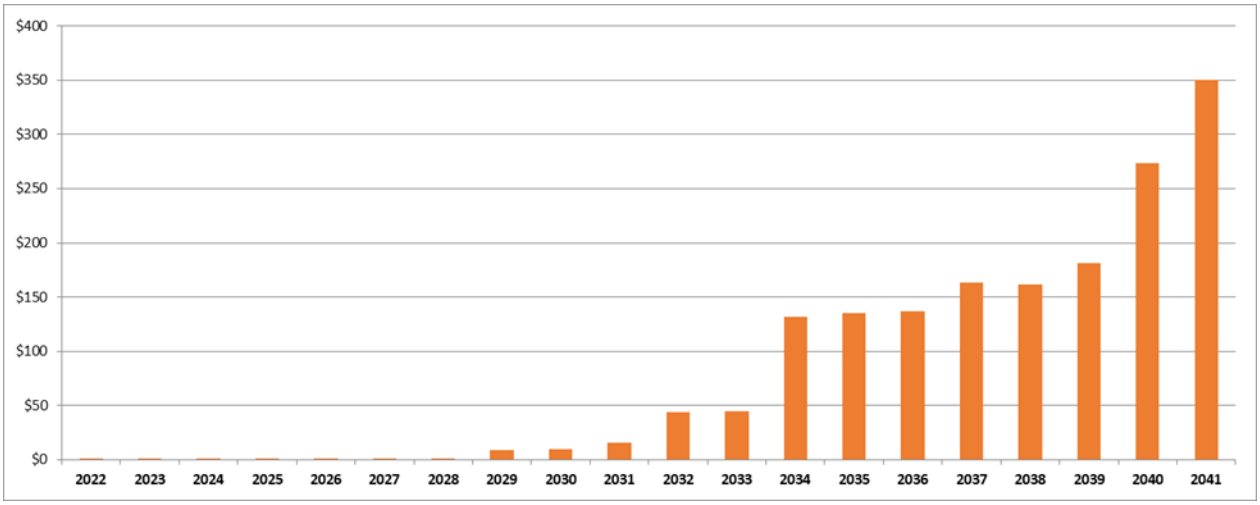
Figure 4 - 5. Constrained Scenario: SGR Backlog Projection for 2022 to 2041 (Millions of $YOE)



A major factor impacting capital needs projections over the next 20 years is the gradual investment in ZEBs consistent with OCTA's 20-Year Fleet Outlook and Zero-Emissions Bus Rollout Plan. The ZEB market may mature and bring down the cost of ZEBs over time. The CBP assumes Compressed Natural Gas (CNG) bus costs over the 20-year time horizon which are significantly lower than both Battery Electric Buses (BEBs) and Fuel Cell Electric Buses (FCEB). The difference

in these two assumptions explains the resulting growing backlog in the next decade shown below. Grants and other funding sources are assumed to address this gap. **Figure 4-6** below is an extract of Figure 4-5 above but focused only on the differences in vehicle costs – ZEB (current costs) on the one hand, versus CNG costs assumed in the CBP, on the other.

Figure 4 - 6. ZEB Vehicle and Supporting Infrastructure Costs vs. CNG Vehicle Costs ($Millions)



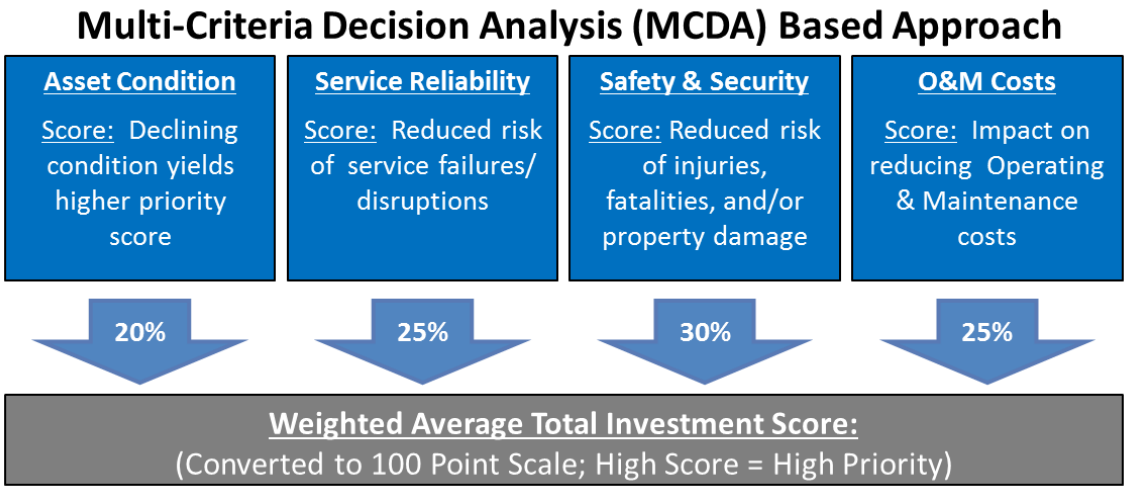
4.4 Capital Project Prioritization

TERM Lite uses a Multi-Criteria Decision Analysis (MCDA) approach to rank individual asset investments based on the criteria shown in **Figure 4-7** on the next page. The prioritization criteria used in the model include asset condition (age-based estimates), service reliability ratings, safety and security ratings, and O&M cost impacts. Asset conditions apply to individual assets as they decay, described in Chapter 3, where the lower the condition the higher the priority for replacement.

The ratings for the other criteria are based on the impact of each asset type on the defined outcome. For example, a revenue vehicle will be rated much higher for service reliability than the elevator in an administrative building. Each criterion is then weighted against others to determine how important those criteria are with respect to one another as shown below. For OCTA needs analysis, the four criteria were weighted as shown in **Figure 4-7** on the next page, with roughly equal weights across each criterion. This weighting reflects the outcome of both internal discussions between OCTA staff regarding the importance of each criterion to OCTA decision making, as well as some analyses assessing the long-term impact of adopting various criteria weightings.

TERM Lite considers all the possible reinvestment actions with their respective priority each year and reinvests in assets subject to funding constraints. This results in an SGR backlog forecast, where the lower priority assets are deferred for investment, and guidance on when each reinvestment should occur based on the higher priority rankings.

Figure 4 - 7. TERM Lite Multi-Criteria Analysis Prioritization Process



It is important to note that the prioritization routine in TERM Lite works at an individual asset level and only applies when there is a funding constraint. The model will reinvest in the highest priority assets until the budget constraint is hit, and the remainder of assets with needs are deferred until their priority increases or there is room in the budget.

Expansion assets are not prioritized along with SGR reinvestments. TERM Lite assumes that all planned expansion assets are acquired outside of the budget constraint.

However, when expansion assets require reinvestment for rehabilitation or replacement those actions will be prioritized and fall under the budget constraint.

As OCTA will not be able to fully eliminate the backlog with its current funding strategy, the prioritization of assets in the backlog can inform initial investment decisions. The TERM Lite model has been used to categorize OCTA's reinvestment needs into three "Investment Tiers" as shown in **Table 4-2** below. Within this analysis, each tier reflects a differing level of reinvestment priority, with "Tier 1" representing the highest priority needs ("what should we do first") and "Tier 3" the lowest priority ("what do we postpone if we have to"). The reinvestment tiers are based on default 100-point TERM lite prioritization scores.

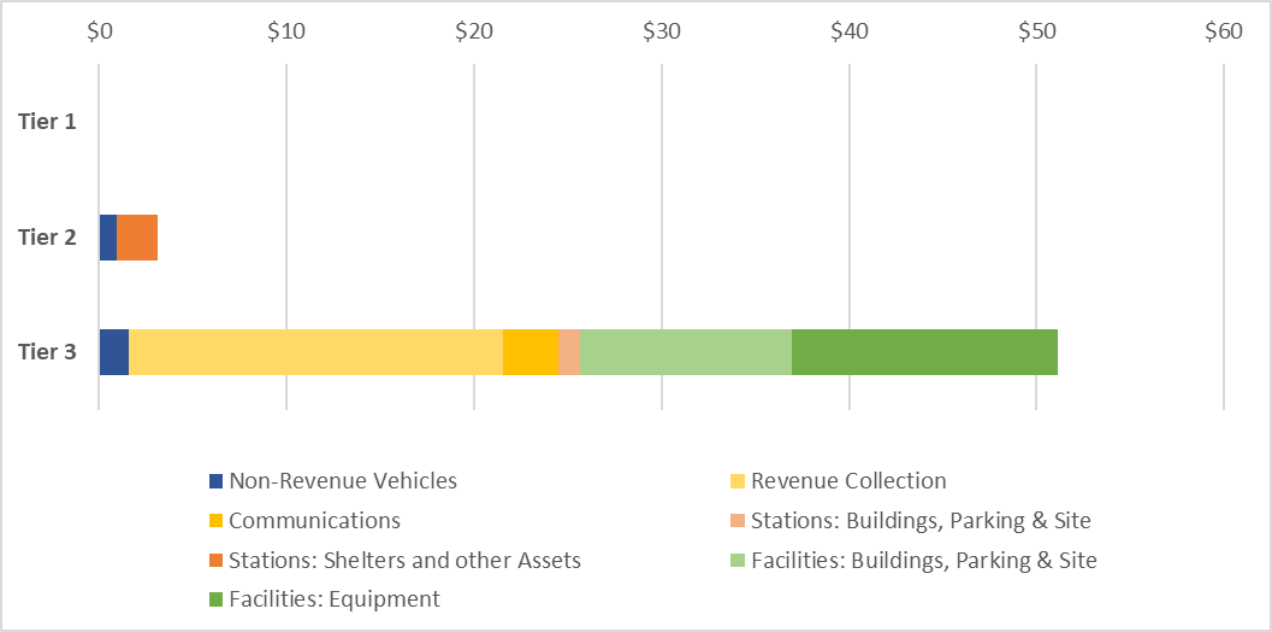
Table 4 - 2. Prioritization Score Thresholds

Tier	Prioritization Score Thresholds (100-point scale)	Description
Tier 1	Over 85	Highest Priority (do first)
Tier 2	70 to 85	Mid-Level Priority
Tier 3	Under 70	Lowest Priority (do if funds available)

Investment Priorities Within OCTA's Current Backlog

As of 2022, OCTA does not have any backlog assets in Tier 1 category (the highest level for reinvestment criticality). Rather, $3.2 million (6%) of OCTA assets fall into Tier 2 (mid-level criticality), with the remaining $51.2 million (94%) falling in the lowest (least critical) priority tier, Tier 3. Tier 2 assets consist of older non-revenue vehicles and bus shelter assets. In contrast, the Tier 3 needs include a mix of non-revenue vehicles, revenue collection equipment, communications equipment, and a range of station and facility assets. This analysis suggests that, while OCTA has an estimated $54 million in deferred needs, most of these needs are not "critical" in nature, as shown in **Figure 4-8** below.

Figure 4 - 8. SGR Backlog: Priority Tiers (Millions of $2021)



The analysis above is based on the current backlog and not the next 20 years when ZEB's will need to be considered in the prioritization analysis.

TERM Lite Analysis Assumptions:

Assumes a constrained budget based on CBP funding for bus capital

Assumes 18-year useful life benchmark for 40-and 60-foot buses

Replaces assets per their useful life in fixed-asset ledger or based on condition assessment

OC Streetcar assets are not included in this TAM Plan Update

The California Air Resources Board has mandated the gradual implementation of Zero-Emission Buses. OCTA published its Zero-Emission Bus Rollout Plan in June of 2020 where the transition to a ZEB fleet by 2040 is documented. The plan is built on what was known at the time about technology and cost – this will evolve over time based on OCTA's operating experience and technology innovations. The modeling assumptions are based on the October 28, 2021, 20-Year Fleet Outlook projections

Current fixed-route service level (consistent with CBP)

Paratransit fleet grows by 1.1% per year (consistent with CBP)
Assumes inflation/escalation factor of 2.4% per year

Chapter 5: Implementation Strategy

5.1 Key Annual Activities

The FTA TAM Final Rule requires that TAM Plans be updated at least every four years. When a major system change occurs, such as the introduction of the OC Streetcar, an additional update is required. Assuming OC Streetcar opens as scheduled in 2024, FTA recommends a full update of the TAM Plan shortly following this date, for what would effectively become a midcycle update. Following this, OCTA can go back to the normal four-year cycle of 2026, 2030, etc.

The Final Rule also requires additional NTD reporting be provided on an annual basis. There are some additional management activities that will need to be performed during years in between the plan updates. With its TAM Plans, OCTA has procured consultants to assist with both the preparation of the Facility Condition Assessments (FCAs), and the preparation of the TAM Plan documents. **Table 5-1** below presents a list of annual activities that are either required elements of the TAM Plan or essential to supporting the Plan:

Table 5 - 1. Key Annual Activities

Year	Activity	Lead Division(s)	Support Divisions
2022	TAM Plan Update (2nd generation)	Planning	Operations, Finance, Capital Programs
	SGR Policy Update	Planning	Operations, Finance, Capital Programs
	Transit Asset Inventory Update (Planning level; excludes OC Streetcar)	Planning	Operations, Finance
	Facility Condition Assessments (FCA) Update	Capital Programs	Operations
	NTD Annual Reporting: Forms and Narrative	Planning, Finance, Capital Programs	Operations
	a. TAM Performance Measure Targets (A-90)		
	b. Other Forms (e.g., A-15, A-20, A-30, A-35)		
	OC Streetcar Inventory Development	Operations	Planning
	Biennial Capital Asset Inventory update	General Services	Operations, Finance
	Comprehensive Business Plan: Financial forecast	Finance	Planning, Operations
	20-Year Bus Fleet Outlook update	Planning	Operations

Year	Activity	Lead Division(s)	Support Divisions
2023	NTD Annual Reporting: Forms and Narrative	Planning, Finance	Operations
	OC Streetcar Capital Asset Inventory Development	Operations	Planning
	Procurement for 2024 TAM Plan update (FCA for OC Streetcar only, TAM Plan update)	Capital Programs, Planning	Operations, CAMM
	20-Year Bus Fleet Plan update	Planning	Operations
2024	"Midcycle" TAM Plan Update	Planning	Operations, Finance, Capital Programs
	NTD Annual Reporting: Forms and Narrative	Planning, Finance	Operations
	Facility Condition Assessments (FCA) Update for OC Streetcar facilities only	Capital Programs	Operations, Planning
	OC Streetcar Operations and Maintenance Plan; and Rail Fleet Management Plan	Operations	
	Biennial Capital Asset Inventory update	General Services	Operations, Finance
	Comprehensive Business Plan: Financial forecast	Finance	Planning, Operations
	20-Year Bus Fleet Outlook update	Planning	Operations
2025	NTD Annual Reporting: Forms and Narrative (including new OC Streetcar target and reporting for slow zones)	Planning, Finance	Operations
	Procurement for 2026 TAM Plan update (FCAs, TAM Plan update)	Capital Programs, Planning	Operations, CAMM
	OC Streetcar Operations and Maintenance Plan; and Rail Fleet Management Plan	Operations	
	20-Year Bus Fleet Outlook update	Planning	Operations
2026	TAM Plan Update	Planning	Operations, Finance, Capital Programs
	NTD Annual Reporting: Forms and Narrative	Planning, Finance	Operations
	Biennial Capital Asset Inventory update	General Services	Operations, Finance
	Comprehensive Business Plan: Financial forecast	Finance	Planning, Operations
	20-Year Bus Fleet Outlook update	Planning	Operations

5.2 Agency Roles and Responsibilities

Table 5-1 on the previous page identifies some of the key annual activities that support transit asset management. The second column of the table identifies the lead Division or Department responsible for each task. Some activities are recurring activities year to year, some are one-time or do not have annual recurrence. The activities require input from various departments. For many activities, the tasks needed to support the TAM plan are an extension of current roles and responsibilities. There are a few activities (e.g., Facility Condition Assessments, TAM plan updates) which will likely require additional resources or consultant support.

Ongoing tracking of the asset inventories is led by the various departments (often with support from other departments):

Revenue and Non-Revenue vehicles – Operations and Accounting and Financial Reporting

Support systems: farebox equipment, communication, and IT systems
– Operations, IS, and Accounting and Financial Reporting

Facilities – Operations, Capital Programs, and Accounting and Financial Reporting

NTD Annual Reporting – Accounting and Financial Reporting

5.3 Resources

Table 5-2 on the following page provides estimates of the Full Time Equivalent (FTE) staff and/or consultant support needed to deliver the TAM Plan required elements from 2022 to 2026. Most activities needed to support the TAM plan are met through current asset management practices at OCTA.

The one major exception is the introduction of the new INFOR EAM. This is considered a major capital project involving multiple FTEs, including outside support as well. The level of effort required to implement INFOR is not included in Table 5-2.

The table on the following page, **Table 5-2**, provides estimates only for staff time required to perform expected future tasks. The two activities requiring the most resources are the TAM plan update and the Facility Condition Assessments (FCAs). These activities are required every four years. Both efforts were supported by consultant contracts for the 2018 and 2022 plans. An additional “midcycle” TAM update is assumed for 2024 to include OC Streetcar assets.

Table 5 - 2. Resources for New TAM Efforts (Estimated in FTE's and Consultant Contracts)

Year	Activity	Lead Dept.	FTE's
2022	TAM Plan Update	Planning	0.20*
	State of Good Repair Policy Update	Planning	-
	Transit Asset Inventory Update: Vehicles, Equipment, & Facilities (planning level inventory)	Planning	0.10
	Facility Condition Assessments (FCA) Update	Capital Programs	0.10**
	NTD Annual Reporting: Forms and Narrative a. TAM Performance Measure Targets (A-90) b. Other Forms	Planning, Finance	0.05 - -
	OC Streetcar Inventory Development	Operations	0.2
2023	NTD Annual Reporting: Forms and Narrative	Planning, Finance	0.05
	OC Streetcar Inventory Development	Operations	0.20
	Procurement for 2024 TAM Plan update (FCA for OC Streetcar only, TAM Plan update)	Capital Programs, Planning	0.10
2024	Midcycle TAM Plan Update	Planning	0.20
	NTD Annual Reporting: Forms and Narrative	Planning, Finance	0.05
	OC Streetcar Operations and Maintenance Plan; and Rail Fleet Management Plan	Operations	-
	Facility Condition Assessments (FCA) for OC Streetcar facilities only	Capital Programs	0.15
2025	NTD Annual Reporting: Forms and Narrative	Planning, Finance	0.05
	Procurement for 2026 TAM Plan update (FCAs for all facilities, TAM Plan update)	Capital Programs, Planning	0.10
2026	TAM Plan Update	Planning	0.20
	NTD Annual Reporting: Forms and Narrative	Planning, Finance	0.05

* In addition to staff time, a consultant was hired to support the development of the TAM plan. The contract for this work was between $150,000 and $175,000.

** Facility Condition Assessments (FCA's) were conducted by a consultant team over an 8-month period beginning in early 2022. The contract for this work was approximately $150,000.

5.4 Performance Monitoring

5.4.1 TAM Plan Updates

As described above, performance monitoring is carried out through various management activities. These activities help to inform the status of the agency's transit capital assets, and the anticipated schedule for rehabs and replacements. The revenue fleet accounts for the largest share of the agency's transit assets (57%). Therefore, the 20-Year Fleet Outlook is updated annually or more to provide a current estimate of the fleet needs for the foreseeable future. This list informs the CBP 20-year forecasted revenues and expenditures, which is updated every two years. The CBP in turn helps to inform the annual budget process.

Facilities assets (including maintenance, administration, passenger and parking facilities) are physically inventoried every two years through the Biennial Capital Asset Inventory. Beginning in 2018 and in accordance with the FTA TAM Final Rule, comprehensive, on-site, facility condition assessments (FCAs) will be conducted at least every four years. This effort provides a level of detail regarding the condition of OCTA facilities that was not previously available. This data will help inform the agency's prioritized capital asset needs and, in turn, inform the CBP and the annual budget process. Preparations for the next round of FCAs are expected to start again in the next three years.

While the TAM Plan itself is only required to be updated every four years, the OCTA management activities that support the TAM Plan occur on a much more frequent basis.

As a management tool, the TAM Plan updates will provide the opportunity to review current practices and policies, establish TAM goals that align with the agency's mission, vision and goals, and identify areas for improvement.

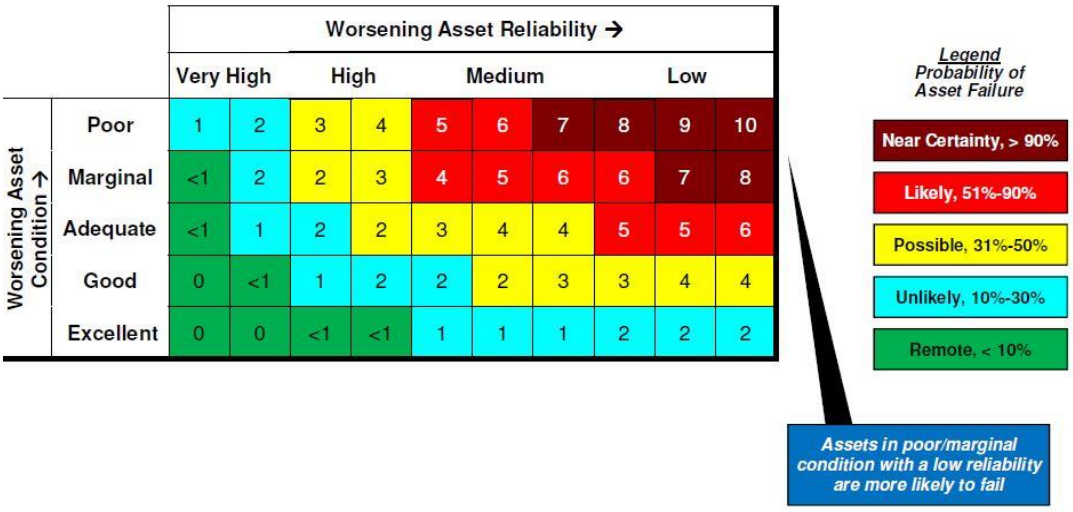
The NTD annual reporting activities provide feedback regarding the agency's progress toward its TAM performance targets. Each year the agency will report on the condition of its vehicles, equipment, and facilities assets and the progress towards the established targets. Beginning in 2019, a narrative has been provided to describe progress and/or address any areas of concern. This work is led by the Planning Department.

5.4.2 Risk Management

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 OCTA's risk management system, enabling future iterations of this Plan to focus on the largest asset-related risks faced by the agency.

In the interim, OCTA can use a simple asset risk register (see **Figure 5-1** on the following page for an example) to examine a risk's cause and effect, as well as the risk "owner," or the division responsible for addressing this area. Prioritization of the capital program can be accomplished more thoroughly by assigning safety, security, and service delivery risk categories to the analysis.

Figure 5 - 1. Risk Criteria/Probability of Failure Matrix



Subsequent reviews of the Plan can consider the under-managed risks identified through this process to shape the refinement of the objectives, strategies, and implementation of projects/ actions contained herein.

5.5 Asset Management Software System

As of 2022, Ellipse is the inventory system of record for asset management. Ellipse data information flows into OneSolution (formerly IFAS) but not the other way around. OneSolution is the system of record for accounting purposes of assets. OCTA recently procured and is actively populating INFOR as its new Enterprise Asset Management System. The new system will replace Ellipse entirely and is expected to go live in 2023.

Within Ellipse, data completeness and accuracy vary by asset category. According to TAM staff, vehicle (revenue and non-revenue) data is very robust. Facilities asset data is in the process of being populated in Ellipse at a “secondary” level of detail. Each successive round of Facility Condition Assessment is helpful in this regard.

Condition assessments are not incorporated into OneSolution.

5.6 FTA TAM Performance Measures

While the task is focused on TAM and SGR, it will benefit all performance measurement and reporting at OCTA. Per the new FTA TAM rules, agencies must set targets for the following SGR performance measures, which focus on condition and useful life (see **Table 5-3** on the following page for definitions).

Table 5 - 3. Performance Measure Definitions

Asset Type	Definition
Facilities	The percentage of facilities within an asset class, rated below condition 3 on the FTA TERM scale
Rolling Stock	The percentage of revenue vehicles within a particular asset class that have either met or exceeded their ULB
Equipment	The percentage of non-revenue, support-service and maintenance vehicles that have either met or exceeded their ULB

As part of the annual review process, OCTA will review performance reporting to identify areas for improvement, and ultimately shape the refinement of the objectives, strategies, and implementing projects/actions for future iterations of this Plan. This does not preclude mid-year review of performance reporting and interim adjustments to TAM objectives, strategies, and implementing projects/actions as needed. Per the FTA TAM Final Rule, beginning in 2018 (for the 2019 fiscal year), OCTA must report on progress versus performance targets for a designated set of performance measures.

The FTA requires one composite condition rating for each facility, from bus maintenance facilities to stations. Surveying of the major components (e.g., HVAC, superstructure, elevators, and parking lots) is required, with each component receiving a score. The scores are then averaged to arrive at the overall rating for a given facility. For this TAM Plan, an engineering consultant was engaged to inspect and rate facility subcomponents and determine replacement costs for each component, based on current materials costs and prevailing wages.

Non-revenue vehicles (**Table 3-10**) are not retired until they've reached the ULB or met the established mileage target, whichever is later. In the current non-revenue fleet, there are a number of vehicles that have surpassed the ULB but not yet met the mileage target and therefore have not yet been retired.

5.7 Policy, Governance, and Accountability

OCTA developed its TAM Policy in 2018. The Policy was updated in 2020 and again for this 2022 TAM Plan. The policy is signed by the accountable executive for the TAM Program. The TAM Policy (Appendix C) formalizes the roles and responsibilities for TAM at OCTA and outlines the procedures and decision support tools to be followed and used to maintain OCTA's transit assets in SGR.

5.8 Continuous Improvement and Next Steps

This TAM Plan update sets objectives, strategies, and performance measures for continually improving how the OCTA manages its assets.

To successfully implement this Plan and advance the agency's TAM maturity, an annual review of progress and performance measures will influence the revision of these documents and the development of new projects to further OCTA's progress towards the TAM vision.

The main components of the continuous improvement plan involve paying close attention to stakeholder involvement; processes, mainly TAM Plan monitoring and updates; and finally risk management. In the coming years the transition to INFOR EAM will be a key focus to have system of record information for multiple modes in one place, including the new OC Streetcar.

Looking forward, the Comprehensive Business Plan identifies constrained investment assumptions and priorities for the Bus and other modal programs. OCTA's bus capital priorities over the next three fiscal years (FY2023-2025) include, in decreasing order:

- **Large Bus Replacement:** $164.9 million
- **Vehicle Modifications:** $33.6 million
- **Facility Modifications:** $20.1 million
- **Small Bus Replacement:** $17.7 million
- **Support Equipment:** $11 million

OCTA's largest capital cost is tied to revenue vehicles, hence the importance of keeping the 20-Year Fleet Outlook updated on a regular basis. Currently, OCTA intends to extend the regular purchase of Compressed Natural Gas (CNG) buses into the next several years – the last purchase is expected to occur in 2025. The State of California mandates 100% zero-emission bus purchases by 2040. Current plans call for the bulk of OCTA zero-emission buses to phase in starting in 2034, and zero-emission demand response vehicles begin phasing in 2029. Currently, both the zero-emissions vehicles themselves and charging/fueling infrastructure are extremely costly, and it is hoped these costs will come down in the next decade as the industry matures. Grants and other funding sources need to be aggressively pursued.

From an asset management planning perspective, OCTA is investing in the transition to a new Enterprise Asset Management System, INFOR, to replace the Ellipse system. Moving forward, INFOR is expected to have much greater data mining capabilities for current assets, and to include the OC Streetcar assets as well.

A major activity over the next several years is going to be the development of a robust OC Streetcar asset inventory, complete with detailed acquisition and installation costs, loading the information into INFOR, in preparation for the next TAM Plan update.

OCTA plans to evaluate progress toward asset management objectives annually.

Appendix A - Acronyms and Abbreviations

ACM - Annual Capital Maintenance

BEB - Battery Electric Bus

CAMM - Contacts Administration and Materials Management Department

CBP - Comprehensive Business Plan

CARB - California Air Resources Board

CEO - Chief Executive Officer

COO - Chief Operating Officer

CNG - Compressed Natural Gas

EAM - Enterprise Asset Management

EPA - Environmental Protection Agency

FAST - Fixing America's Transportation Act

FCA - Facility Condition Assessment

FCEB - Fuel Cell Electric Bus

FTA - Federal Transit Administration

MAP21 - Moving Ahead for Progress in the 21st Century Act

MCDA - Multi-Criteria Decision Analysis

NTD - National Transit Database

O&M - Operations and Maintenance

OCTA - Orange County Transportation Authority

PTASP - Public Transportation Agency Safety Plan

SGR - State of Good Repair

TAM - Transit Asset Management

TERM - Transit Economic Requirements Model

TERM Lite - Transit Economic Requirements Model Lite

ULB - Useful Life Benchmark

USDOT - United States Department of Transportation

YOE - Year of Expenditure

ZEB – Zero-Emission Bus

Appendix B - Glossary

Accountable Executive – A single person identified at a transit provider who has ultimate responsibility for the safety management system, TAM practices and policy, as well as control or direction over the human and capital resources needed to develop and maintain the safety and TAM plans.

Asset Types/ Categories – In this report, following the TERM hierarchy, assets are divided into four major categories: Vehicles, Facilities, Guideways, and Systems. Asset types are within each category. For instance, vehicles include revenue and non- revenue vehicles.

Backlog – Deferred reinvestment in asset rehabilitation, replacement, or annual capital maintenance

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 in the field to collect data, document, and measure condition and performance. Condition assessment can also be estimated through modeling.

Condition Rating Levels – Rating levels established by the FTA to categorize the physical condition of assets. The five levels are: 5 (excellent), 4 (good), 3 (adequate), 2 (fair), and 1 (poor).

Decision Support Tool – A decision support tool is an analytic process or repeatable methodology that: (1) Helps prioritize capital projects to maintain SGR of assets based on available condition data and objective criteria; or (2) Assesses financial requirements of asset investments over time.

For example, the FTA Transit Economic Requirements Model for local agencies (referred to as TERM Lite) uses a transit provider's asset inventory condition data to predict future SGR needs.

Facilities – Facilities include all assets related to maintenance and administrative facilities, as well as stations and substation enclosures.

Guideway – Includes track and associated structures, line equipment, signals, power equipment, and substations.

INFOR EAM – Enterprise Asset Management Vendor system product acquired by OCTA for implementation in the 2022-2024 timeframe.

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, Chapter20019 requires transit agencies to develop a Transit Asset Management Plan and to implement a Transit Asset Management System.

State of Good Repair – A capital asset is in SGR if it meets the following objective standards:

1. *The capital asset can perform its designed function*
2. *The use of the asset in its current condition does not pose an identified unacceptable safety risk*
3. *The life-cycle investment needs of the asset have been met or recovered, including all scheduled maintenance, rehabilitation, and replacements*

Transit Economics 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.

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 - Expected life of an asset. Expected useful lives for individual assets are driven by several factors that include historical performance, manufacturer recommendations, and transit provider policy. The ULB is distinct from the depreciation schedule, i.e., capitalization policy.

Vehicles – includes both revenue vehicles (e.g., buses, light rail vehicles), and non-revenue vehicles (e.g., trucks, passenger vans).

Appendix C - TAM Policy

PURPOSE

To manage the Orange County Transportation Authority (OCTA) Transit Asset Management (TAM) program, maintain assets in a State of Good Repair (SGR), and communicate to all relevant stakeholders.

ORGANIZATIONAL UNITS AFFECTED

This policy affects most organizational units, most specifically: Chief Executive Office (Accountable Executive), Operations Division, Planning Division, Capital Programs Division, Finance and Administration Division, and People and Community Engagement Division.

POLICY

Maintain OCTA transit assets in a SGR through financial stewardship and reinvestment, transparency, and promoting a culture that supports asset management. The scope includes all OCTA assets identified under the TAM Program, i.e., vehicles, facilities, stations, and systems. The following TAM goals were developed to support the TAM program:

A. Maintain condition of assets in SGR to support safe, secure, reliable, and quality service.

B. Prioritize capital replacement and rehabilitation based on safety and reliability for our customers and employees.

C. Support fiscal sustainability through use of data and best practices to balance asset useful life and lifecycle costs.

D. Promote asset management and incorporate lifecycle cost management in planning, design, and delivery of capital projects.

E. Provide leadership to promote and communicate an asset management culture.

DEFINITIONS

A. TAM – Transit Asset Management

B. SGR – State of Good Repair

C. Accountable Executive – a single, identifiable person who has ultimate responsibility for carrying out the safety management system of a public transportation agency

D. EAM – Enterprise Asset Management system

E. FTA – Federal Transit Administration

F. SMS – Safety Management System

PROCEDURE

A. Accountable Executive

The OCTA Chief Executive Officer (CEO) has overall responsibility for overseeing the development of the TAM Program and related procedures, in cooperation with the executive leadership team, and reporting to the Board of Directors on the status of asset management for OCTA. In this context, the CEO is referred to as the "Accountable Executive".

B. Supporting Divisions

Multiple OCTA divisions support OCTA's Asset Management policy, with support stemming from the following departments and divisions:

1. Operations Division is a stakeholder in asset management and serves as the custodians for much of the asset inventory, including the OC Streetcar. Operations Division also participates in operations planning that supports TAM. Specific support includes stewardship and SGR maintenance of these assets. Maintenance has an important role in keeping capital asset inventories current, conducting condition assessments, providing field input regarding replacement/rehabilitation strategies, recommending Useful Life Benchmarks, and implementing TAM program action items.
2. Planning Division is a stakeholder in asset management, responsible for:
    a. Coordinating TAM agency-wide
    b. Development, monitoring and reporting of OCTA TAM/SGR strategic and operational performance, including targets and performance measures
    c. Capital programming
    d. Maintaining TAM planning level inventory
    e. Supporting TAM Plan updates and the implementation plan
3. Capital Programs Division is a stakeholder for TAM and is responsible for maintenance and repairs to existing facilities and development of expansion facilities. Capital Programs manages the contract for the TAM facility condition assessments for all OCTA facilities**.**
4. Finance and Administration Division is a stakeholder for TAM from several perspectives:
    a. The Information Systems Department has a role in supporting the underlying information systems that support OCTA TAM program. These include the Enterprise Asset Management system anchoring the OCTA's asset infrastructure and the OneSolution Financial Accounting system. In addition, this Department is responsible for the maintenance of its own asset infrastructure, including servers, computers, and software.

b. Accounting and Financial Reporting, Financial Planning and Analysis Departments have a role for TAM to supply asset information and lead the Budgeting and Comprehensive Business Plan processes and coordinate National Transit Database annual reporting.
c. General Services implements the Biennial Capital Asset Inventory every two years and updates the Capital Asset Inventory Manual.
d. Finally, the Contracts and Procurement Department has an important role in working with buyers in the organization to optimize lifecycle cost procurement processes.

5. People and Community Engagement Division has an important support role for TAM as follows:

   a. Risk Management has a role in informing the TAM program and capital project prioritization with respect to asset risk. By conducting and maintaining an agency-wide asset risk register, this group will provide safety and security recommendations as input to the capital project prioritization process and help implement TAM program action items.

   b. Health, Safety and Environmental Compliance is responsible for updating and maintaining the Public Transportation Agency Safety Plan, which documents all aspects of the agency's Safety Management System (SMS).

   c. Learning and Development has an important role in fostering asset management training, maintenance training, and succession planning strategies across the organization.

C. Supporting Efforts

1. Biennial Capital Asset Inventory – General Services
2. 20-Year Fleet Outlook – Planning and Operations Divisions
3. Comprehensive Business Plan – Finance Division
4. Annual Budget – Finance Division
5. Facility Condition Assessments Report – Capital Programs Division
6. National Transit Database Annual Reporting – Finance Division
7. Public Transportation Agency Safety Plan – People and Community Engagement Division

D. Decision Support Tool

The decision support tool provides transit agencies information to support decision making, including investment prioritization, and performance monitoring of SGR programs. The support tool uses the planning level asset inventory for all active assets and lifecycle plans to determine capital reinvestment needs, and to analyze changes to the SGR backlog over time. In

recent years, OCTA has applied a support tool developed by the Federal Transit Administration, the Transit Economic Requirements Model (TERM-Lite).

Along with reinvestment needs, the decision tool determines which assets receive reinvestment under constrained funding using a prioritization routine, and which assets enter/leave the SGR backlog based on that funding allocation.

EXCEPTIONS

This policy does not apply to the three historic vehicles owned by OCTA.

PROVISIONS AND CONDITIONS

Enforcement of the policy will be the responsibility of the CEO (Accountable Executive).

RELATED DOCUMENTS

A. Transit Asset Management Plan

B. Public Transportation Agency Safety Plan

Appendix D - FTA TAM Final Rule Fact Sheet

FEDERAL TRANSIT ADMINISTRATION

Transit Asset Management
Final Rule Fact Sheet

The Moving Ahead for Progress in the 21st Century Act (MAP-21) required the Secretary to develop rules to establish a system to monitor and manage public transportation assets to improve safety and increase reliability and performance, and to establish performance measures, and the Fixing America's Surface Transportation (FAST) Act reaffirmed this requirement. On July 26, 2016, FTA published the Transit Asset Management (TAM) Final Rule. You may view the Final Rule at:

https://federalregister.gov/a/2016-16883

State of Good Repair

The purpose of the Final Rule is to help achieve and maintain a state of good repair (SGR) for the nation's public transportation assets. Transit asset management is a business model that uses transit asset condition to guide the optimal prioritization of funding. Currently, there is an estimated $85.9 billion transit SGR backlog.

The regulations apply to all Transit Providers that are recipients or subrecipients of Federal financial assistance under 49 U.S.C. Chapter 53 and own, operate, or manage transit capital assets used in the provision of public transportation.

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, and
3. Its lifecycle investments must have been met or recovered.

TAM Plans

Tier I vs. Tier II Applicability

The Final Rule groups providers into two categories: Tier I and Tier II.

Tier I	Tier II
Operates rail **OR** ≥ 101 vehicles across all fixed route modes **OR** ≥ 101 vehicles in one non-fixed route mode	Subrecipient of 5311 funds **OR** American Indian Tribe **OR** ≤ 100 vehicles across all fixed route modes **OR** ≤ 100 vehicles in one non-fixed route mode

TAM Plan Elements

The following graphic shows the TAM Plan elements that are required by each category of provider. Since Tier II providers generally operate less complex systems, their TAM Plan requirements are not as extensive.

1. Inventory of Capital Assets 2. Condition Assessment 3. Decision Support Tools 4. Investment Prioritization	Tier I & II
5. TAM and SGR Policy 6. Implementation Strategy 7. List of Key Annual Activities 8. Identification of Resources 9. Evaluation Plan	Tier I Only

Assets Included in Plan

It is expected that all assets used in the provision of public transit will be included in the TAM Plan asset inventory. This includes (with the exception of equipment) assets that are owned by a third party or shared resources. The inventory must include all service vehicles, and any other owned equipment assets over $50,000 in acquisition value. Agencies only need to include condition assessment for assets for which they have direct capital responsibility.

Plan Responsibility

Tier I providers must develop and carry out their own TAM plans. Tier II providers may develop their own plans or participate in a Group Plan, which is compiled by a Group Plan Sponsor (generally the State DOT or designated §5310 recipient). Tier II §5307 sub-recipients are not required to be offered a Group Plan, but may participate in one if a Sponsor invites them. Each Transit Provider must designate an Accountable Executive to ensure that the necessary resources are available to carry out the TAM plan and the Transit Agency Safety Plan, regardless of whether it develops its own TAM Plan or participates in a Group Plan.

Performance Management

Asset performance is measured by asset class, which means a subgroup of capital assets within an asset category. The following table shows assets for which performance needs to be reported to the NTD and the measure which will be reported.

Assets: *Only those for which agency has direct capital responsibility*	**Performance Measure**
Equipment: Non-revenue support-service and maintenance vehicles	Percentage of non-revenue vehicles met or exceeded Useful Life Benchmark
Rolling Stock: Revenue vehicles by mode	Percentage of revenue vehicles met or exceeded Useful Life Benchmark
Infrastructure: Only rail fixed-guideway, track, signals and systems	Percentage of track segments with performance restrictions
Facilities: Maintenance and administrative facilities; and passenger stations (buildings) and parking facilities	Percentage of assets with condition rating below 3.0 on FTA TERM Scale

Useful Life Benchmark

The expected lifecycle of a capital asset for a particular Transit Provider's operating environment, or the acceptable period of use in service for a particular Transit Provider's operating environment

Target Setting

Targets should be set by each transit provider or TAM plan sponsor for each applicable asset class for the coming year. Initial targets must be set by January 1, 2017 and then every fiscal year thereafter. It is recognized that Transit Providers may not have complete data while setting initial targets. To the extent feasible, targets should be supported by data such as the most recent condition data and reasonable financial projections for the future, but the overall end goal is to be in a system-wide SGR.

Timeframes/Reporting

TAM Plans

A TAM plan must be updated in its entirety at least every 4 years, and it must cover a horizon period of at least 4 years. An initial TAM plan must be by October 1, 2018.

NTD

Each entity developing a TAM Plan will have to report annually to FTA's National Transit Database (NTD). This submission should include: (1) projected targets for the next fiscal year; (2) condition assessments and performance results; and (3) a narrative report on changes in transit system conditions and the progress toward achieving previous performance targets.

Additional Information

Mshadoni Smith (Mshadoni.Smith@dot.gov)

Final Rule Docket Number: FTA-2016-16883

https://www.transit.dot.gov/TAM

April 2017

Appendix E – TAM Practices Memorandum

E.1 Overview

This memorandum (memo) summarizes the results of the Transit Asset Management (TAM) practices at the Orange County Transportation Authority (OCTA) as of December 2021. Virtual interviews were conducted with 13 senior staff representing multiple departments on December 10th, 13th, and 14th. The interviewees were asked to provide responses to up to eight questions regarding various aspects of Asset Management.

E.2 Interviewee List

The staff interviewed for this TAM Plan update are shown below in **Appendix Table 1** below.

Appendix Table 1. Staff Interviewee List

Interviewee	Position
George Olivo	Program Manager, Facilities Engineering
Katrina Faulkner	Department Manager, Security and Emergency Preparedness
Sean Murdock	Director, Finance and Administration
Cliff Thorne	Director, Maintenance - Administration
Dayle Withers	Department Manager, Maintenance - Administration
Louis Luxenberg	Section Manager II, Maintenance-Specialty Shops Admin
Marie Latino	Section Manager III, Maintenance Resource Management
Victor Velasquez	Department Manager, Financial Planning and Analysis
Adriann Cardoso	Department Manager, Programming
Pia Veesapen	Director, Contracts Admin and Materials Management
Benjamin Torres	Department Manager, Accounting and Financial Reporting
Bill Mao	Director, IS Administration
Kim Tucker	Section Manager III, Transit Service Planning

E.3 Key Findings

OCTA has made significant strides in asset management maturity and development since it started developing its first TAM plan in 2018. OCTA currently has an agency-wide TAM policy and TAM plan, both of which are being used to guide planning and decision-making. OCTA's target setting and NTD reporting are well established.

Related to the TAM plan is the CBP which is updated every two years. There is recognition that although the agency has established some links between the TAM plan and the CBP, further steps should be taken to improve alignment. Similar to the process conducted in 2018, a Facilities consultant was hired for a systematic Facilities Condition Assessment (FCA) consistent with Federal requirements and to dovetail with the 2022 TAM Plan efforts for condition and NTD reporting.

OneSolution (still known to some as IFAS) is the current system of record for financial accounting purposes. OneSolution accounts for every capitalized asset over $5,000. Ellipse, OCTA's current computer maintenance management system, is the system of record for work order management. OneSolution and Ellipse are only partially integrated. Revenue and non-revenue vehicle asset data is robust and well tracked within Ellipse. Facilities data is currently tracked at the "primary" asset level (i.e., building level). Some assets (mainly systems-type assets) are not in Ellipse. OCTA does not data mine lifecycle cost for decision making purposes given system constraints and limitations. Condition assessments are conducted and tracked separately and are not incorporated into Ellipse.

As mentioned above, asset purchases are capitalized over $5,000. Even though the FTA "minimum"' for TAM inventory purposes is $50,000, there is consensus to go to the $5,000 level for the TAM Plan and corresponding inventory, as has been done for the 2018 TAM Plan.

The Planning department houses OCTA's "planning level" TAM Inventory. This inventory is distinct to both the OneSolution fixed asset ledger and the asset listings in Ellipse. The planning level inventory's primary function is for TAM Planning purposes, including being the repository for asset ULB's across the enterprise and the TERM Lite runs conducted to forecast backlog and renewal capital needs over 20 years.

Three additional areas were noted as having potential significant future impacts on asset management at OCTA:

OCTA is in the process of implementing INFOR as the new Enterprise Asset Management (EAM) system. INFOR EAM will replace Ellipse at OCTA and is expected to produce many improvements over the current system, including:

- Ability to easily track total cost of ownership / lifecycle maintenance costs for assets
- Ability to accommodate all asset types including linear assets (OC Streetcar)
- Two-way interface with OneSolution
- Highly enhanced facility data hierarchies and asset management capabilities
- FTA reporting functionality
- Workflow simplification and integration

OCTA has established a multi-department committee to oversee the design of ***the implementation, which is scheduled to "go live" in the spring of 2023.***

OCTA continues to use an assumed bus useful life of 18 years for forecasting purposes and is ***currently studying the costs and benefits associated with extending bus useful life to this level. However, questions remain as there is very limited empirical data for vehicles having completed the full 18 years.***

Completion of the OC Streetcar (currently expected for 2024) will present changes to asset management policies, as OCTA will then ***be responsible for new types of rail assets. These assets will not be included in the 2022 TAM plan update but will need to be included in the 2026 TAM Plan update or a prior, out of cycle update.*** It is critical for OCTA to establish the OC Streetcar asset data hierarchies early on and obtain the relevant information (e.g., replacement costs) from the existing contractors.

Rail assets associated with Metrolink service in Orange County are assumed to be addressed by Metrolink's TAM plan.

The following section details staff responses to individual questions asked within the interviews.

E.4 Detailed Findings

Are you aware of the 2018 TAM Plan and FTA Update Requirements?

The majority of staff interviewed were aware of the previous 2018 TAM Plan and its purpose as well as the ongoing process to update it. Not surprisingly, few were aware of specific FTA update requirements. Most departments represented have read or referenced the 2018 TAM plan for some portion of their ongoing planning processes. The TAM Plan is housed within the Planning department and staff generally understood that Planning should be contacted with TAM-related inquiries. The 2018 TAM Plan was signed by the Deputy CEO at the time.

Are you aware of the OCTA Asset Management Policy? Do you have access to it? Do you have any comments on its effectiveness? Do you think any changes are warranted?

The OCTA Asset Management Policy was executed by the CEO in September 2018. The policy outlines the policy itself, constraints on the policy, as well as roles and responsibilities associated with Asset Management for OCTA. Staff were generally familiar with the policy (several had resurfaced it and re-read it in advance of the interviews) and had no major comments for improvement. One person commented that the OC Streetcar team should be added to the key roles and responsibilities given the future onboarding of OC Streetcar inventory data and related items. The OC Streetcar is OCTA's first major "linear" asset and, upon completion, will be a 4.15-mile streetcar system.

Which departments or groups are involved in updating OCTA's asset inventory? What are the strengths and weakness of this process?

There are three primary types of asset inventory maintained at OCTA, in addition to a handful of small manual inventory processes for assets such as security cameras or access control devices. The first type, at one end of the spectrum, is the inventory maintained by Finance & Administration in OneSolution. This inventory is maintained primarily for financial accounting purposes. It includes all items over $5,000 in value. It includes a useful life assumption (for the years of depreciation) as well as depreciation schedule for each item. One interviewee mentioned that a second useful life field could be available in the inventory to do a what-if analyses of varying the life of assets. This was discussed in the wake of the 2018 TAM Plan but never implemented. Finance staff have established an OrgKey for various asset types and track the manager and custodian for each OrgKey. The level of granularity is not suitable for maintenance management, nor is it 100% suitable for asset management projections in TERM Lite.

The second type of inventory, at the other end of the spectrum, in the Operations Department, specifically Maintenance-Administration and Maintenance Resource Management, are primarily responsible for updating OCTA's asset inventories in Ellipse. Ellipse is a computerized maintenance management system (CMMS) used for materials management and for work order management. Ellipse is still in use today though OCTA is in the process of designing and configuring the INFOR EAM. Currently the system is expected to go live in March 2023. Today and through October 2022, Ellipse will still be the CMMS of record, not INFOR. Ellipse handles revenue and non-revenue vehicles, facilities, and some systems but not all.

In the middle of the spectrum is the third inventory type, a planning level inventory that resides in the Planning department. The planning level inventory was first developed in 2018 for the purposes of the 2018 TAM Plan and has not been updated since.

Finally, there are a few other types of inventories in various parts of the organization. Certain groups maintain listings in MS Excel for their purposes, such as the Security & Emergency Preparedness Dept. that maintains a small inventory of cameras and equipment. Within General Services, Luis Perez (not interviewed) maintains a separate inventory of assets that have been physically tagged for periodic inventory checks.

The interviewees generally recognized that multiple inventories being maintained by various departments may be partially duplicative and there may be an opportunity to consolidate efforts. They agreed this was particularly true with the additional functionality provided by the INFOR EAM, assuming it is configured appropriately.

What are the strengths and weakness of OCTA's facility condition assessment process?

For staff familiar with the Facility Condition Assessment (FCA) process, responses to this question were consistent. OCTA currently assesses facility condition every four years using an outside consultant team. The current project manager for that effort stated an external review

was beneficial and better than provided by in-house forces. For the purposes of integrating with and informing the TAM plan, this process is sufficient. The maintenance of an ongoing facility condition inventory, however, is a process where OCTA is developing competency. Pieces of information have been integrated into Ellipse but other data lives in a spreadsheet. With the transition to INFOR EAM, OCTA is building in the primary and secondary levels of inventory as required by FTA for Facility Condition Assessment. This is expected to increase the ease of reporting, streamline consulting contracts in the future, and provide analytics to predict equipment failures and time maintenance/replacements.

The weakness if there is one, is all of OCTA's FCA's are performed in quick succession the year of the TAM Plan update. FTA typically recommends performing one quarter of the facility condition assessments each year. Since this is an outsourced function, wanting to avoid lengthy and complicated consulting contracts are fully understandable. In both cases, all facilities are inspected every four years.

What do you think of OCTA's ULBs and do you think any changes are warranted? (Facilities, Vehicles, Systems)

The interviewees welcomed the opportunity that TAM Plan updates afford to discuss these policy decisions in a semi-formal way. Staff acknowledged the ongoing evaluation of potential cost impacts of changing the ULB to 18 years. Because none of the vehicles have reached 18 years, there will be further evaluation of the ULB for revenue vehicles to understand long-term impacts. Several noted that OCTA has few US peers with the 18-year ULB. Few if any have reached this milestone and we heard feedback about the magnitude of maintenance costs beyond 14 years. There is general understanding that OCTA needs to establish useful lives for all assets (not just buses and non-revenue vehicles). To a large extent this effort was completed in 2018 for the first TAM Plan.

OCTA tracks repairs/costs associated with major assets but establishing a useful life at a more granular level of detail, especially for facilities, would allow OCTA to better anticipate maintenance and replacement costs.

There was general acknowledgment and hope that, though not possible now with Ellipse, the incoming INFOR EAM system would enable total cost of ownership data mining, helping OCTA make better decisions for ULBs, for all assets.

What are the strengths and weaknesses of the System(s) of record for OCTA asset management? Comment on the Ellipse to INFOR migration.

For Financial Accounting, OneSolution is the system of record and this is not expected to change. The current maintenance management system is Ellipse, which is generally regarded as cumbersome and can make it difficult for staff to pull reports on assets. There are multiple complaints about Ellipse, including poor customer service, difficulty in data mining, lack of functionality for FTA reporting, and insufficient adoption, among others.

One key issue noted by maintenance staff is that Ellipse is unable to handle multiple work orders in one request – a maintenance worker must enter a work order for each seat replaced, even if they complete a whole bus worth of seats in one shift. Additionally, Ellipse is not well-integrated with existing systems and many departments and groups still maintain separate inventories of assets within spreadsheets. Ellipse does track major historical costs associated with assets, but it does not provide analytics to help OCTA predict when a component of an asset may need to be replaced in order to avoid failures – this is a feature OCTA is looking to implement with INFOR.

Staff responses were consistent in looking forward to the transition to INFOR. OCTA has established a committee, representing several departments, to oversee the design of the implementation scheduled to be complete in the spring of 2023. With the transition, the committee is focused on creating a single inventory of record to consolidate most existing efforts, using analytics to develop total cost of ownership and ULB's for all assets, simplifying reporting of data, and incorporating OCTA's first linear assets (OC Streetcar). A goal spanning multiple departments is to establish a true "Total Cost of Ownership" for the lifetime of all assets at OCTA and to use this information to inform the timing of maintenance and replacement.

In several of the interviews, the idea of augmenting the INFOR EAM with a planning level inventory for TAM purposes was welcomed as a potentially effective strategy.

What are your thoughts about improved integration between the CBP and the 2022 TAM Plan?

Although not everyone could answer, responses on this question were consistent - staff are overwhelmingly supportive of improved integration/alignment between the two processes/documents. It was acknowledged that the CBP process is much more mature than the TAM Plan, but that both documents have the same outlook – 20 years. The CBP is a way for OCTA to reconcile long term plans (e.g., the Bus Financial Plan) and execute purchases. The TAM Plan focused on both the short, medium and long terms, but TERM Lite's strengths of projection are best suited for the mid to long-term. Yet the TAM Plan also is supposed to contain near-term renewal priorities and projects.

Ways the TAM Plan could improve the CBP: Expanded discussion of backlog, scenarios, and discussion of State of Good repair in general.

Ways the CBP can improve the TAM Plan: Better consistency in setting the constrained investment scenarios.

What are your thoughts about future onboarding of OC Streetcar data?

During the interviews, the news came out that the expected commissioning of the OC Streetcar would likely be postponed to 2024.

The OC Streetcar will be managed by an O&M Contractor (Herzog) with the appropriate interfaces with OCTA staff. However, OCTA will continue to be the owner of all assets and as such will be responsible for TAM Plan and NTD reporting of OC Streetcar assets.

The onboarding of OC Streetcar data will happen concurrently with the integration of INFOR which as mentioned above is expected during 2023. The transition to INFOR was partially motivated by the need to store data for the agency's first major linear asset. As construction is ongoing, staff generally understood the value in working with the contractors (Operations & Maintenance, Construction, and Rolling Stock) on designing appropriate architectures and data repositories to welcome the OC Streetcar. OC Streetcar assets will not be included in the 2022 TAM plan update but will be in the next iteration.

Appendix F - Initial Performance Targets Memorandum

ATTACHMENT

ch2m

TECHNICAL MEMORANDUM

OCTA SGR TAM Initial Performance Targets

PREPARED FOR:	OCTA	Gary Hewitt
DATE	12/22/2016	
PREPARED BY:	Yonel Grant	
PROJECT NUMBER:	474652	
REVISION NO.:	1	

The CH2M team met with OCTA staff on December 15, 2016 to set a draft set of Transit Asset Management (TAM) State of Good Repair (SGR) performance targets for National Transit Database (NTD) reporting. The new TAM rules will affect the agency's October 2018 NTD submission. However, FTA has made it mandatory for agencies to internally to set up SGR performance targets by January 1, 2017.

Per the new FTA TAM rules, agencies must set targets for the following SGR performance measures, which focus on condition and useful life, depending on the asset type:

1. **Rolling Stock** (bus and rail) – percentage of revenue vehicles within a particular asset class that have either met or exceeded their useful life benchmark (ULB).
2. **Infrastructure** (rail fixed-guideway, track, signals, and systems) – percentage of track segments with performance restrictions (i.e. what percentage of revenue miles are slow zones) – This measure does not currently apply to OCTA.
3. **Facilities** – percentage of facilities (maintenance facilities and stations) within an asset class, rated below condition 3 on the TERM scale.
4. **Equipment** – percentage of non-revenue vehicles that have either met or exceeded their ULB.

Targets can be updated year to year. Each year through the NTD transmittal process, OCTA will need to provide a narrative for SGR performance for the prior year.

Discussion

The meeting was facilitated by CH2M and included a review of the timeline for both Transit Asset Management (TAM) and NTD reporting requirements; FTA resources; and a short discussion on performance measures. The group discussed OCTA Board policy and in-house service life assumptions for vehicles, which are both age-based and distance-based.

CH2M presented a recent guidance document from FTA showing the default Useful Life Benchmarks (ULBs) recommended by FTA. These are set at the point where vehicles reach 2.5 on the Transit Economics Requirements Model (TERM) scale. Transit agencies can adjust their ULBs with approval from FTA. It was later noted the guidance document applies to revenue vehicles, not non-revenue vehicles.

This introduction formed a strong basis for the discussion that followed, addressing Rolling Stock; Facilities; and Equipment (Non-Revenue Vehicles) in sequence. The following sets of tables summarizes each proposed OCTA ULB and proposed target, as well as the supporting rationale.

TECHNICAL MEMORANDUM
Draft OCTA Performance Targets

ch2m

1. Rolling Stock, Buses

Sub-Fleet / Age	Other Criteria	Minimum OCTA ULB	ULB	Performance Measure	Proposed Target	Current Fleet *	Rationale
60'	Diesel, CNG	12	14	Percent met or exceeded ULB	10% Fleet or less above ULB	36	To address procurement cycle
40'	CNG	12	14	Percent met or exceeded ULB	10% Fleet or less above ULB	501	To address procurement cycle
27'-32' (Fixed Route Cutaways)	CNG	7	7**	Percent met or exceeded ULB	10% Fleet or less above ULB	18	To address procurement cycle
24' (Demand Response Cutaways)	Gasoline	5-7	7*	Percent met or exceeded ULB	10% Fleet or less above ULB	273	To address procurement cycle

* As of June 30, 2016 – NTD data
** Different than FTA default ULB

Discussion on Rationale for the Rolling Stock Targets –

For simplicity, the group elected to select a single target (10% above ULB) for all sub-fleets within this category. The main rationale selected for setting the targets was to address the procurement cycle -- by the time the rolling stock goes through the procurement, acceptance testing and entry into revenue service, OCTA's experience has been this can take over one year. For example, when the new 40' CNG buses arrive, OCTA will be at or near 0% Fleet above ULB for that sub-fleet. The 10% target number provides a cushion to account for sometimes lengthy procurement cycles.

2. Facilities

Asset Type	Detail	Performance Measure	Proposed Target	Rationale
O&M Facility	Irvine (SC, CC), Santa Ana, Anaheim, Garden Grove	Above 3 on TERM Scale – Physical inspection	100% of facilities at 3 or above on TERM Scale	Current facilities in good condition; aspire for 100% at above 3 on TERM Scale (at least in "fair" condition)
Control Center	Garden Grove Annex	Above 3 on TERM Scale – Physical inspection	100% of facilities at 3 or above on TERM Scale	Same as above
Transportation Centers	Newport, Laguna Hills, Golden West, Fullerton	Above 3 on TERM Scale – Physical inspection	100% of facilities at 3 or above on TERM Scale	Same as above
Park and Ride Lots	Misc.	Above 3 on TERM Scale – Physical inspection	100% of facilities at 3 or above on TERM Scale	Same as above

Discussion on Rationale for Facilities Targets –

As of December 2016, OCTA does not have a current facility condition assessment process in place (but is working on one for 2017). Therefore, the current performance for Facility condition assessments as measured by the TERM scale is unknown. Current performance is marked as "TBD" though staff estimates all facilities are at least above "3" (Fair condition) on the TERM condition scale. The proposed target is that 100% of all facilities be above 3 on the scale, which is also an aspirational number. OCTA expects all of its facilities to be in a condition 3 or above.

3. Equipment

Asset Type	Minimum OCTA ULB	ULB	Performance Measure	Proposed Target	Current Fleet *	Rationale
Utility Sedans	5	8	Percent met or exceeded ULB	20% or less above ULB	93	Vehicles also need to meet mileage requirement
Patrol Cars/SUVs	3-5	5*	Percent met or exceeded ULB	0% or less above ULB	12	Important for patrol cars/SUVs to have optimal operating condition (the current 16 year old vehicle is an outlier, used for other purposes)
SUVs	5	8	Percent met or exceeded ULB	10% or less above ULB	10	Some vehicles have low usage
Fork Lifts, Tractors	10	15	Percent met or exceeded ULB	25% or less above ULB	32	Some vehicles have low usage
Electric Carts	10	15	Percent met or exceeded ULB	25% or less above ULB	13	Some vehicles have low usage
Trucks/Vans	5	10	Percent met or exceeded ULB	25% or less above ULB	56	Some vehicles have low usage

* Different than FTA default ULB

Rationale on Equipment Targets –

OCTA staff propose a variety of SGR targets for Equipment (0% to 25% above ULB), largely due to the variations that exist between various sub-fleets of non-revenue vehicles. OCTA has both a minimum age and minimum mileage requirements; some vehicles exceed the age before they exceed the mileage requirement. For this reason, vehicles are kept longer than the expected age-based useful life (e.g., fork lifts, electric carts). Patrol cars and SUVs assigned to the Sherriff were identified as safety/security critical so should have a 0% target.

Appendix G - 20-Year Fleet Outlook

20-YEAR FLEET OUTLOOK: FY 2022-2041 (Return to 1.625M RVH in FY24; Adjust Veh Life Span to Achieve 100% ZEB by 2040; 3,195 RVH//VEH) ***Revised: 10-28-2021***

With CARB ICT Regulation - Zero Emission Bus | **Red Font = 100% ZEB Vehicles** | **BLUE = Current Fleet** | **GREEN = Replacements** | **ORANGE = Expansion**

A - MOTOR BUS (FIXED ROUTE) FLEET

Service	Status	Length	Series	Manufacturer	Fuel	Model Year	LIFE	QTY	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
MB	AC	40'	5121-50	New Flyer	CNG	2007	16	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB	AC	40'	5501-99	New Flyer	CNG	2007	16	98	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB	AC	40'	5601-74	New Flyer	CNG	2007	17	71	71	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB	AC	40'	5675-78	New Flyer	CNG	2008	17	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB	AC	40'	7501-28	New Flyer	CNG	2007	18	26	26	26	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB	AC	40'	7529-92	New Flyer	CNG	2008	17	64	64	64	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MB	AC	60'	7601-20	New Flyer	CNG	2013	18	20	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0	0	0	0
MB	AC	40'	5701-99	New Flyer	CNG	2016	18	99	99	99	99	99	99	99	99	99	99	99	99	99	0	0	0	0	0	0	0	0
MB	AC	40'	5801-58	New Flyer	CNG	2016	18	58	58	58	58	58	58	58	58	58	58	58	58	58	0	0	0	0	0	0	0	0
MB	AC	60'	7621-36	New Flyer	CNG	2016	18	16	16	16	16	16	16	16	16	16	16	16	16	16	0	0	0	0	0	0	0	0
MB	AC	40'	5861-5866	New Flyer	CNG	2018	18	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0	0	0	0	0
MB	AC	40'	1111-20	New Flyer	HY	2019	18	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	0	0	0	0	0
MB	AC	40'	5121-50R	Gillig	CNG	2023	17	30	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0
MB	AC	40'	5501-99R	Gillig	CNG	2023	17	99	0	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	0	0
MB	AC	40'	5601-74R	Gillig	CNG	2024	16	71	0	0	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	0	0
MB	AC	40'	5675-78R	Gillig	CNG	2025	15	4	0	0	0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	0
MB	AC	40'	7501-28R	Gillig	CNG	2025	15	26	0	0	0	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	0	0
MB	AC	40'	7529-92R	Gillig	CNG	2025	15	64	0	0	0	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	0	0
MB	EXP	40'	New Series	New Flyer	EB	2022	18	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	0
MB	AC	40'	5501-99R	New Flyer	EB	2022	18	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	0
MB	AC	60'	7601-20R	TBD	ZEB	2031	18	20	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20
MB	AC	40'	5701-99R	TBD	ZEB	2034	18	99	0	0	0	0	0	0	0	0	0	0	0	0	99	99	99	99	99	99	99	99
MB	AC	40'	5801-58R	TBD	ZEB	2034	18	58	0	0	0	0	0	0	0	0	0	0	0	0	58	58	58	58	58	58	58	58
MB	AC	60'	7621-36R	TBD	ZEB	2034	18	16	0	0	0	0	0	0	0	0	0	0	0	0	16	16	16	16	16	16	16	16
MB	AC	40'	5861-5866R	TBD	ZEB	2036	18	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	6	6	6	6
MB	AC	40'	1111-20R	TBD	HY	2037	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10
MB	AC	40'	5121-50RR	TBD	ZEB	2040	18	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	30
MB	AC	40'	5501-99RR	TBD	ZEB	2040	18	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	99
MB	AC	40'	5601-74RR	TBD	ZEB	2040	18	71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	71
MB	AC	40'	5675-78RR	TBD	ZEB	2040	18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
MB	AC	40'	7501-28RR	TBD	ZEB	2040	18	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	26
MB	AC	40'	7529-92RR	TBD	ZEB	2040	18	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	64
MB	EXP	40'	New SeriesR	TBD	EB	2040	18	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
MB	AC	40'	5501-99RR	TBD	EB	2040	18	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
						SubTotal		502	512	513	513	513	513	513	513	513	513	513	513	513	513	513	513	513	513	513	513	513
			508.6071987			Required for Peak Service			342	346	428	428	428	428	428	428	428	428	428	428	428	428	428	428	428	428	428	428
						Spares			170	167	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
						Spare Ratio			49.7%	48.3%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%	19.9%
MB	CON	40'	53/5400	New Flyer	DSL	1998	18	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
						Total Fixed Route		522	532	533	533	533	533	533	533	533	533	533	533	533	533	533	533	533	533	533	533	533

B - DEMAND RESPONSE (ACCESS) FLEET

Service	Status	Length	Series	Manufacturer	Fuel	Model Year	LIFE	QTY	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DR	**AC**	**23'**	**6805/06**	**El Dorado**	**UNL**	**2010**	**12**	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	**AC**	**23'**	**6911-27**	**El Dorado**	**UNL**	**2013**	**9**	**17**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	**AC**	**23'**	**8501-99**	**Glaval**	**UNL**	**2014**	**8**	**97**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	**AC**	**23'**	**8601-99**	**Startrans**	**UNL**	**2016**	**8**	**98**	98	98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	**AC**	**23'**	**8701-33**	**Startrans**	**UNL**	**2016**	**8**	**32**	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	**AC**	**23'**	**6601**	**Startrans**	**UNL**	**2021**	**7**	**1**	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	AC	23'	6911-27R	TBD	TBD	2022	7	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	AC	23'	8501-99R	TBD	TBD	2022	7	97	97	97	97	97	97	97	97	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	AC	23'	8601-99R	TBD	TBD	2024	7	99	0	0	99	99	99	99	99	99	99	0	0	0	0	0	0	0	0	0	0	0
DR	AC	23'	8701-33R	TBD	TBD	2024	7	32	0	0	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0
DR	AC	23'	6911-27RR	TBD	50%ZEB	2029	7	20	0	0	0	0	0	0	0	20	20	20	20	20	20	20	0	0	0	0	0	0
DR	AC	23'	8501-99RR	TBD	50%ZEB	2029	7	97	0	0	0	0	0	0	0	97	97	97	97	97	97	97	0	0	0	0	0	0
DR	AC	23'	8601-99RR	TBD	100% ZEB	2031	7	99	0	0	0	0	0	0	0	0	0	99	99	99	99	99	99	99	0	0	0	0
DR	AC	23'	8701-33RR	TBD	100% ZEB	2031	7	32	0	0	0	0	0	0	0	0	0	32	32	32	32	32	32	32	0	0	0	0
DR	AC	23'	6911-27RRR	TBD	100% ZEB	2036	7	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20
DR	AC	23'	8501-99RRR	TBD	100% ZEB	2036	7	97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	97	97	97	97	97
DR	AC	23'	8601-99RRR	TBD	100% ZEB	2038	7	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	99	99	99
DR	AC	23'	8701-33RRR	TBD	100% ZEB	2038	7	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	32	32	32
OCF	AC	15'	6001-04	TBD	UNL	2019	5	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	EXP	23"	8801-02	TBD	TBD	2023	7	2	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0
DR	EXP	23"	8803-05	TBD	TBD	2024	7	3	0	0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0
DR	EXP	23"	8806-07	TBD	TBD	2025	7	2	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0
DR	EXP	23"	8808-10	TBD	TBD	2026	7	3	0	0	0	0	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0
DR	EXP	23"	8811-12	TBD	50%ZEB	2027	7	2	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0
DR	EXP	23"	8813-15	TBD	50%ZEB	2028	7	3	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0	0	0	0	0	0
DR	EXP	23"	8816-17	TBD	50%ZEB	2029	7	2	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0
DR	EXP	23"	8818-20	TBD	100% ZEB	2030	7	3	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0	0	0	0
DR	EXP	23"	8821-23	TBD	100% ZEB	2031	7	3	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0	0	0
DR	EXP	23"	8824-26	TBD	100% ZEB	2032	7	3	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0	0
DR	EXP	23"	8827-28	TBD	100% ZEB	2033	7	2	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0
DR	EXP	23"	8829-30	TBD	100% ZEB	2034	7	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0
DR	EXP	23"	8831-33	TBD	100% ZEB	2035	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3
DR	EXP	23"	8834-36	TBD	100% ZEB	2036	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3
DR	EXP	23"	8837-39	TBD	100% ZEB	2037	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3
DR	EXP	23"	8840-42	TBD	100% ZEB	2038	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3
DR	EXP	23"	8843-45	TBD	100% ZEB	2039	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3
DR	EXP	23"	8846-48	TBD	100% ZEB	2040	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
DR	EXP	23"	8849-51	TBD	100% ZEB	2041	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
OCF	AC	15'	6001-04R	TBD	UNL	2024	5	4	0	0	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0
DR	AC	23"	8801-02R	TBD	100% ZEB	2030	7	2	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0
DR	AC	23"	8803-05R	TBD	100% ZEB	2031	7	3	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0	0	0
DR	AC	23"	8806-07R	TBD	100% ZEB	2032	7	2	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0
DR	AC	23"	8808-10R	TBD	100% ZEB	2033	7	3	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	0	0
DR	AC	23"	8811-12R	TBD	100% ZEB	2034	7	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0
DR	AC	23"	8813-15R	TBD	100% ZEB	2035	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3
DR	AC	23"	8816-17R	TBD	100% ZEB	2036	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2
DR	AC	23"	8818-20R	TBD	100% ZEB	2037	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3
DR	AC	23"	8821-23R	TBD	100% ZEB	2038	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3
DR	AC	23"	8824-26R	TBD	100% ZEB	2039	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3
DR	AC	23"	8827-28R	TBD	100% ZEB	2040	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
DR	AC	23"	8829-30R	TBD	100% ZEB	2041	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
OCF	AC	15'	6001-04RR	TBD	UNL	2029	5	4	0	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0	0
DR	AC	23"	8801-02RR	TBD	100% ZEB	2037	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2
DR	AC	23"	8803-05RR	TBD	100% ZEB	2038	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3
DR	AC	23"	8806-07RR	TBD	100% ZEB	2039	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
DR	AC	23"	8808-10RR	TBD	100% ZEB	2040	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
DR	AC	23"	8811-12RR	TBD	100% ZEB	2041	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
OCF	AC	15'	6001-04RRR	TBD	UNL	2034	5	4	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	0	0	0
OCF	AC	15'	6001-04RRRR	TBD	UNL	2039	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4
					Total ACCESS			**247**	**248**	**250**	**253**	**255**	**258**	**260**	**263**	**265**	**268**	**271**	**274**	**276**	**278**	**281**	**284**	**287**	**290**	**293**	**296**	**299**
					Required for Peak Service				228	230	233	235	237	239	242	244	247	249	252	254	256	259	261	264	267	270	272	275
					Spares				20	20	20	20	21	21	21	21	21	22	22	22	22	22	23	23	23	23	24	24
					Spare Ratio				*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*	*8%*
					Total ACCESS fleet does not include OC Flex Vehicles																							
					Grand Total*			**753**	**764**	**767**	**770**	**772**	**775**	**777**	**780**	**778**	**781**	**784**	**787**	**789**	**795**	**798**	**801**	**804**	**807**	**806**	**809**	**812**
					**Grand Total Does not include Contingency Fleet*																							

Notes:

1. Year = Refers to Fiscal Year
2. AC = Active
3. EXP = Expansion
4. CON = Contingency (Future Fleet TBD)
5. MB = NTD definition for Fixed Route Motor Bus
6. DR = NTD definition for Demand Response
7. OCF = OC Flex
8. ACCESS Fleet total does not include OCFlex vehicles
9. Reg. 2023.1.ZEB Purchase Requirments: 25% 1-1-2023; 50% 1-1-2026; 100% 1-1-2029
10. Cutaway, Artics subject to ZEB on or after 1 1-2026 (see Section 2023.1.(c))

FIXED ROUTE AND ACCESS FLEET REPLACEMENT (Year Required in Service)

CARB ICT Reg.: ZEB Purchase Required:					25% ZEB				50% ZEB			100% ZEB													
Service	Status	Length	Fuel	LIFE	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	Total
MB	AC	40'	TBD	18		139	71	94									173		6	10			304		797
MB	AC	60'	TBD	18										20			16								36
DR	AC	23'	TBD	12	117	2	134	2	3	2	3	119	5	137	5	5	4	6	122	8	140	8	8	7	830
OCF	AC	15'	TBD	5			4					4					4					4			16
				Total	117	141	209	96	3	2	3	123	5	157	5	5	197	6	128	18	140	12	312	7	1,679

C - iShuttle and PROJECT V FLEET

Service	Status	Length	Series	Manufacturer	Fuel	Model Year	LIFE	QTY	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	CITY
MB	AC	27'	6324-36	El Dorado	CNG	2008	13	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	iShuttle
MB	AC	32'	6341-45	Ford El Dorado	CNG	2011	12	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	iShuttle
MB	AC	32'	6362-64	Ford El Dorado	CNG	2014	7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PrjV
MB	EXP	32'	6371-77	El Dorado	CNG	2018	7	7	7	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	iShuttle ProjV
MB	AC	30'	6324-36R	Gillig	CNG	2021	18	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	0	0	0	iShuttle
MB	AC	32'	6341-45R	TBD	TBD	2023	18	5	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	iShuttle
MB	EXP	32'	6371-77R	TBD	TBD	2025	7	7	0	0	0	7	7	7	7	7	7	7	0	0	0	0	0	0	0	0	0	0	iShuttle ProjV
MB	AC	30'	6324-36RR	Gillig	100% ZEB	2039	7	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	12	12	iShuttle
MB	AC	32'	6341-45RR	TBD	100% ZEB	2041	18	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	iShuttle
MB	EXP	32'	6371-77RR	TBD	100% ZEB	2032	7	7	0	0	0	0	0	0	0	0	0	0	7	7	7	7	7	7	7	0	0	0	iShuttle ProjV
MB	EXP	32'	6371-77RRR	TBD	100% ZEB	2039	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	7	iShuttle ProjV
							Total	27	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	

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Notes:

1. 12 ishuttle buses under Prop 116 agreement
2. 7 iShuttle buses under Proj V
3. 3 buses purchased for LH Proj V

iShuttle and PROJECT V FLEET REPLACEMENT (Year Required in Service)

Service	Status	Length	Fuel	LIFE	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	Total
MB	AC	32'	TBD	7				7							7							19			45
				Total	0	0	0	7	0	0	0	0	0	0	7	0	0	0	0	0	0	19	0	0	45

Fleet Mix by FY40-41 ICT Reg. Compliance (Excludes iShuttle and Project V) CNG: 0 ZEB: 809 Total: 809 %ZEB: 100.0%

Appendix H - 20-Year Investment Needs

20-Year Unconstrained Investment Needs (Millions of $YOE)

Category	Sub-Category	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Existing Assets - Rehab & Replace																					
									Paratransit												
Vehicles	Revenue Vehicles	$0.5	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.6	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.2	$0.0	$0.0	$3.2	$0.0	$0.0
									Motor Bus												
Facilities	Equipment	$15.9	$0.5	$0.9	$5.1	$1.6	$6.6	$4.1	$11.8	$0.9	$2.3	$9.9	$2.6	$4.5	$1.8	$12.2	$8.5	$1.1	$5.7	$5.7	$4.5
	Buildings, Site, Parking	$32.4	$0.0	$0.2	$0.0	$0.0	$24.6	$0.1	$0.5	$1.2	$0.0	$67.6	$0.0	$0.3	$0.5	$2.4	$39.6	$0.0	$1.5	$26.2	$1.8
Stations	Buildings, Site, Parking	$3.5	$0.0	$0.0	$0.0	$0.0	$0.5	$0.0	$2.1	$0.1	$0.3	$14.5	$0.0	$0.0	$0.0	$2.5	$0.6	$0.2	$0.0	$1.4	$0.5
Systems	Communications	$3.0	$0.2	$0.0	$32.2	$0.1	$0.5	$1.6	$2.6	$1.2	$1.3	$0.6	$0.2	$1.7	$39.3	$2.0	$1.8	$0.5	$1.6	$3.4	$0.2
	ITS	$0.2	$0.0	$0.0	$0.1	$0.0	$0.7	$0.1	$0.0	$0.8	$0.1	$0.1	$0.0	$0.2	$0.0	$0.0	$1.0	$0.0	$0.0	$1.2	$0.0
	Revenue Collection	$20.4	$0.0	$0.0	$0.0	$0.6	$0.2	$0.0	$2.3	$0.0	$0.0	$0.2	$0.0	$0.0	$0.0	$2.7	$0.2	$0.0	$0.0	$28.0	$0.0
Vehicles	Non-Rev Vehicles	$2.7	$1.5	$0.3	$2.0	$0.7	$2.5	$1.0	$0.2	$3.1	$0.7	$3.0	$1.9	$0.8	$2.3	$0.8	$3.4	$1.0	$0.2	$4.1	$0.6
	Revenue Vehicles	$77.3	$95.2	$72.0	$77.4	$0.0	$3.2	$22.2	$54.4	$12.5	$84.0	$2.6	$0.6	$273.5	$23.8	$56.2	$26.1	$57.1	$20.9	$532.0	$8.5
Expansion Assets - Acquisition																					
									Paratransit												
Vehicles	Revenue Vehicles	$0.0	$0.4	$0.6	$0.4	$0.6	$0.6	$0.6	$0.6	$0.9	$0.9	$0.9	$0.6	$0.6	$0.9	$0.9	$0.9	$0.9	$0.9	$0.9	$0.9
									Motor Bus												
Facilities	Equipment	$1.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$5.0	$0.0	$15.0	$0.7	$0.0	$17.3	$0.0	$5.3	$0.0	$0.0	$1.7	$29.9	$0.0
	Buildings, Site, Parking	$25.2	$0.2	$0.2	$0.2	$0.2	$2.7	$0.2	$0.2	$0.2	$0.2	$15.9	$0.2	$0.2	$0.2	$0.2	$10.0	$0.2	$0.2	$0.3	$0.3
Stations	Buildings, Site, Parking	$15.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$4.0	$0.0	$0.0	$0.0	$0.0	$0.7	$0.0	$0.0	$0.0	$0.0
Systems	Electrification	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.9	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Vehicles	Revenue Vehicles	$10.9	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expansion Assets - Rehab & Replace																					
									Paratransit												
Vehicles	Revenue Vehicles	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.7	$1.1	$0.8	$1.2	$0.7	$1.2	$0.7	$1.9	$2.4	$2.0	$2.1	$1.5
									Motor Bus												
Systems	Electrification	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Vehicles	Revenue Vehicles	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$5.0	$0.0	$0.0	$0.0	$0.0	$0.0	$5.8	$0.0	$0.0	$0.0	$0.0	$0.0	$16.7	$0.0
Total Needs																					
Total Expansion & Reinvestment		$207.9	$98.0	$74.2	$117.5	$3.8	$42.0	$34.9	$80.2	$21.7	$106.0	$120.9	$7.3	$307.6	$70.0	$87.1	$94.9	$63.3	$37.9	$652.0	$18.7

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