

San Francisco Municipal Transportation Agency

2018 State of Good Repair Report

October 2019

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Executive Summary

In FY 2018, the San Francisco Municipal Transportation Agency spent \$402 million on State of Good Repair needs, and has a TERM Lite score of 3.19.

The San Francisco Municipal Transportation Agency's (SFMTA) 2018 State of Good Repair Report provides an overview of the Agency's rehabilitation and replacement needs and investments. It also outlines the Agency's project prioritization, planning, and delivery practices related to maintaining a State of Good Repair. This year's Report will introduce a holistic Asset Management Strategy to be administered by the Agency's newly formed Asset Management Unit.

This is the sixth comprehensive annual State of Good Repair Report published by the SFMTA. The Agency is committed to issuing this Report annually as a matter of best practices shared by transit agencies across the region, country and world. The Report aims to track the progress of State of Good Repair investments and asset management practices compared to previous reporting periods. This document builds on previous State of Good Repair Reports and contains financial data and condition scores from the past few years.

The SFMTA has committed to investing an average of \$250 million annually in State of Good Repair. This is a commitment made to the Federal Transit Agency (FTA) in 2010. In FY 2017-18, the SFMTA spent \$402 million on State of Good Repair investments that maintain or renew the Agency's assets. This brought the Agency's five-year average investment since FY 2012-13 to \$285 million per year, significantly exceeding the Agency's \$250 million minimum goal and commitment to the FTA. Pursuant to Agency policy, these funds are directed first towards "Transit Service Critical" investments. Overall, the SFMTA owned and maintained \$14 billion of capital assets in FY 2017-18 across 15 Capital Programs.

This Report also provides data on the condition of the SFMTA's \$14 billion in capital assets. The FTA's Transit Economic Requirements Model Lite ("TERM Lite") calculates a condition score on a scale of 1 (poor) to 5 (excellent). The TERM Lite condition scores for FY 2017-18 assets averaged 3.19. A score of at least 2.5 is required for the FTA to recognize a transportation system as being in a State of Good Repair. This score represents a decline of 0.11 from the reported value of 3.30 in the 2017 State of Good Repair Report. The model calculated these scores based only on the age of the assets reported, excluding other factors such as specific operating conditions and level of use that impact the assets' condition. In the future, the Agency plans to do a condition assessment of all its assets to produce a TERM Lite score that more accurately reflects the true conditions of its assets.

This annual report describes data and analysis covering the fiscal year that began July 1, 2018 and closed June 30, 2019.

Part 1: Introduction

Agency Overview

We operate today's transportation system and work with our partners to plan the transportation system of tomorrow.

Who We Are

San Francisco voters established the San Francisco Municipal Railway (Muni) in 1912, creating the nation's first publicly owned transit system. In 1999, voters created the San Francisco Municipal Transportation Agency (SFMTA) by passing Proposition E, which merged Muni with the Department of Parking and Traffic to form an integrated Agency to manage city streets more effectively and advance the city's Transit First policy. In 2009, the SFMTA merged with the Taxi Commission to further streamline transportation management in San Francisco. A department of the City and County of San Francisco, the SFMTA currently manages all ground transportation in the city.

A Board of Directors governs the Agency, providing policy oversight and ensuring the public interest is represented. The Board's duties include approving the Agency's budget and contracts and authorizing proposed changes to fares, fees and fines. Its seven members are appointed by the Mayor and confirmed by the Board of Supervisors.

What We Do

The SFMTA plans, designs, builds, operates, regulates and maintains one of the most comprehensive transportation networks in the world. Directly managing five types of public transit in San Francisco (motor coach, trolley coach, light rail, historic streetcar and cable car), the Agency has kept people moving with Muni, the nation's eighth largest public transit system. The Agency also manages on- and off-street public parking, facilitates bicycling and walking, regulates taxis, and manages paratransit services for those unable to use fixed-route services.

Guided by its Strategic Plan, the Agency strives to deliver on priorities defined by the four goals of Safety, Travel Choices, Livability, and Service. The city's streets are made safer as the Agency implements a Vision Zero initiative with a goal of eliminating traffic deaths. The Agency moves "Muni Forward" with new trains and buses, and improvements to its Transportation Control Center to ensure consistent delivery of its scheduled service hours. The SFMTA's Bike Program is considered one of the best in the world; and advancing electric vehicle use, ongoing conservation efforts, and implementation of sustainable transportation and land use policies help improve the quality of life and environment in San Francisco. The Agency provides an outstanding workplace for staff who in turn strive to provide outstanding service to the community.

Vision: Excellent transportation choices for San Francisco.

Mission: We connect San Francisco through a safe, equitable, and sustainable transportation system.

10-Year Asset Management Strategy

A complete performance model that includes asset life cycle management and capital planning for sustained success.

In 2018, the SFMTA reviewed asset management functions with the objective of realizing the full promise that successful asset management could bring to San Francisco's transportation system. The result of this review was the creation of a new Asset Management Unit and a 10-Year Asset Management Strategy, which is being introduced in this report.

To realize the promise of Asset Management, a more complex and complete strategy is required: an effective management strategy that supports informed decision-making within all divisions of the Agency. While much work has already been done, including the development of the Capital Asset Inventory (CAI), measurement of performance through annual State of Good Repair Reports, investment in an Enterprise Asset Management System (EAMS), and condition assessments of Agency assets, these tools alone cannot ensure effective management of Agency assets. Consequently, in accordance with Capital Plan and Program Policies, the new Asset Management Unit will develop specific actions to implement a 10-year Asset Management Strategy (see Figure 1). The 10-Year Asset Management Strategy is a blueprint and process that builds upon existing work that will result in lower costs, improved infrastructure management and greater efficiencies when fully implemented Agency-wide. The goal is more than a collection of data and reporting, but actively using this data in prioritization of investment choices and the development of capital projects.

Figure 1: 10-Year Asset Management Strategy

This circular diagram shows the six phases of the strategy: inventory, categorize, prioritize, assess, deliver, update and back to inventory. An example of the inventory phase is creating a capital asset inventory; an example of the categorize phase is creating an asset hierarchy. These two phases enable consistent and accurate capital planning and recording. An example of the prioritize phase is creating the 5 year CIP, which addresses needs on capital budgets based on the criticality of the transportation system. Examples of the assess phase include condition assessments and asset validation, which determine and/or confirm the real condition of assets. An example of the deliver phase is the project delivery, which ensures that systems of record are updated as assets are capitalized and maintained. An example of the update phase is EAMS/systems, which improve data accuracy and overall integrity.

Each of the elements of the cycle above is defined as follows:

- Inventory – The complete, detailed listing of the Agency’s asset portfolio, that incorporates age, useful life, value, maintenance activities, and other key elements to accurately track the status of each asset and the portfolio as a whole.
- Categorize – The manner in which the inventory is broken into distinct groups for the sake of sorting, management, and consistent reporting activities.
- Prioritize – Based on the state of elements in the inventory, the Agency will develop an order in which SFMTA’s requirements and needs will be met.
- Assess – All elements of the inventory are both continuously and periodically assessed for their condition to determine the state of repair of each individual asset and the inventory as a whole; these are completed on a 1-5 scale (with 5 being the highest).
- Deliver – Based on the condition assessment and prioritization of the inventory, the Agency will perform various activities to improve the state of its assets; this will be accomplished via Capital Projects implementation, preventive maintenance and/or as-needed repair.
- Update – Following the delivery of improvement activities, the details of each asset will be updated to reflect key elements, including age, new useful life, value, and other relevant information to accurately track and manage the asset.

The 10-Year Asset Management Strategy follows a yearly cycle. After 10 years, if implemented correctly, the yearly cycle will be self-sustaining. The Asset Management Unit is dedicated to the year-round strategy and will improve performance after each cycle. As the Strategy becomes more complete, the Agency will move up levels in Asset Management Maturity (see Figure 2). Currently, the SFMTA has reached Levels 1 and 2. With each year of implementation, the Strategy will move closer to Level 5, a complete performance model that includes asset life cycle management and capital planning

Figure 2: A Complete Performance Model

Includes asset life cycle management and capital planning

This line graph depicts the five levels of the performance model. The levels are measured as Asset Management Elements on the X axis and Asset Management Maturity Level on the Y axis.

Level 1: Policy and strategy. Level of service objectives. Business plan. “I know where I want to be.”

Level 2: Asset Inventory. Condition Inspection. “I know what I have.”

Level 3: Condition Assessment. Performance Assessment. Risk Analysis. “I know where I am against my objectives.”

Level 4: Capital Planning. O & M Budgeting. "I use asset lifecycle information in my budgeting processes."

Level 5: Performance modeling. Lifecycle management. Planning and Models. "I know how to optimally manage across the lifecycle."

2018 Transit Asset Management Plan

TAM Plans must include at a minimum an asset inventory, condition assessments of inventoried assets and a prioritized list of investments to improve the State of Good Repair of capital assets.

In July 2016, the Federal Transit Administration (FTA) published a Final Rule for Transit Asset Management. The Transit Asset Management Rule (49 CFR part 625) is a set of federal regulations that sets out minimum asset management practices for transit providers. The FTA's Rule for Transit Asset Management requires every transit provider that receives federal financial assistance under 49 U.S.C. Chapter 53 to develop a Transit Asset Management (TAM) Plan. According to the FTA, the TAM Plan is a tool that will aid transit providers in assessing the current condition of their capital assets, determining what the condition and performance of its assets should be, identifying the acceptable risks in continuing the use of an asset that is not in a State of Good Repair, and deciding how best to balance and prioritize funding to improve an asset's condition.

In October 2018, the SFMTA completed its inaugural TAM Plan, detailing the Agency's policy, approach, and implementation process to improve its asset management practices over the next four years. The 2018 SFMTA TAM Plan employed an action-oriented framework that aimed to improve the maturity of asset management at the SFMTA. The TAM Plan documents the SFMTA's asset management policy and presents the SFMTA's overall asset management improvement program. Additionally, the TAM Plan includes the ongoing governance and system of accountability for managing implementation of an asset management program.

The TAM Plan's development process was designed to:

Communicate the SFMTA's commitment to asset management.

Facilitate the establishment of a culture that values and prioritizes asset management.

Embed asset management responsibilities and accountabilities into strategic planning activities.

Build on existing asset management strengths and best practices.

Provide leadership and direction in establishing asset management into capital, operation, and maintenance activities.

Capital Planning Process

Provides foundational structure for the SFMTA's capital investments involving replacement, renewal, improvement, expansion and acquisition of capital assets.

Several documents describe the Agency's need for capital investments, most notably the 20-Year Capital Plan and the 5-Year Capital Improvement Program (CIP). These planning documents support the Agency's overarching strategic goals:

1. Create a safer transportation experience for everyone.
2. Make transit and other sustainable modes of transportation the most attractive and preferred means of travel.
3. Improve the quality of life and environment in San Francisco and the region.
4. Create a workplace that delivers outstanding service.

Formally updated every two years, the SFMTA Board adopted the most recent 20-Year Capital Plan in August 2017. The purpose of the Capital Plan is to identify and characterize all the Agency's potential capital investments needed to achieve the City's transportation goals. It is a financially unconstrained document, meaning that it includes capital needs for which funding has not yet been identified or committed. It also provides the foundation for developing the fiscally constrained 5-Year CIP and the 2-Year Budget. A capital project must be included in the 20-Year Capital Plan to be eligible for inclusion in the 5-Year CIP. The current Capital Plan identifies over \$21.9 billion in potential SFMTA capital investments over the next 20 years.

Like the 20-Year Capital Plan, the 5-Year CIP is formally updated every two years. The SFMTA currently is implementing the FY 2019-2023 CIP that was adopted by the SFMTA Board in December 2018. The Agency's 5-Year CIP is a fiscally constrained program of capital projects that is organized into 12 Capital Programs: Communications/IT, Facility, Fleet, Parking, Security, Traffic Signals, Streets, Taxi, Transit Fixed Guideway, Central Subway, Transit Optimization/Expansion, and Other. The FY 2019-2023 CIP includes 266 projects for a total investment of \$3 billion, including infrastructure investments, capital procurements, area plans, and one-time initiatives such as educational programs. Of this \$3 billion, approximately \$1.6 billion will be dedicated to State of Good Repair investments over the next five years.

In 2010, the SFMTA committed to investing an average of \$250 million annually in replacing and rehabilitating the Agency's transportation assets. This commitment was made to the FTA in 2010 as part of the full-funding grant agreement for the Central Subway project. With the \$1.6 billion allocated to State of Good Repair in the FY 2019-2023 CIP, combined with prior years' funding, the Agency is on-track to exceed its \$250 million commitment in the coming years.

Part 2: State of Good Repair

State of Good Repair Defined

State of Good Repair is the condition in which a capital asset is able to operate at a full level of performance.

The SFMTA categorizes an asset as being in a State of Good Repair if the asset is able to function at a full level of performance. This definition excludes projects or capital investments in which the primary purpose is to enhance or expand the transportation system. However, new assets that are introduced to the transportation system through enhancement or expansion projects are added to the Capital Asset Inventory upon completion. This ensures that they will be included in future assessments of the transportation system's long-term rehabilitation and replacement needs.

The SFMTA currently evaluates whether an asset or Asset Class is in a State of Good Repair using the TERM Lite tool developed by the Federal Transit Administration. The TERM Lite model produces a "condition score" for all assets in the Capital Asset Inventory. Currently, this score is based solely on asset age, which shows an asset's condition score deteriorating as it reaches the end of its scheduled useful life. It does not reflect specific operating conditions, level of use, or other factors that impact the performance and operating life of an individual asset. A key component of the 10-Year Asset Management Strategy is to incorporate additional factors into condition scoring, such as an inspected operating condition. Accordingly, the Agency will start to incorporate use-based condition data to better model the condition of its assets. To obtain this data, the Agency conducted condition assessments on various specific assets, as follows:

- recently completed ultrasonic rail testing on the rail network,
- completed condition assessments of all of its buildings and grounds,
- and will begin a condition assessment on its traffic signals.

This refined condition scoring will support more precise State of Good Repair assessments and more data-driven investment decision and project development.

The key elements of State of Good Repair include:

Function: The transportation asset can fully perform its designed function.

Safety: The transportation asset does not pose any safety risk to employees or the public.

Value: The transportation asset performed within its useful life at its planned cost.

State of Good Repair Policies

The SFMTA has specific policies related to the State of Good Repair of the transportation system. These policies are integrated into the Agency's Capital Plan and Program Policies.

The SFMTA has had long-standing policies regarding Asset Management and has been making strides in advancing a life cycle asset management program for many years. In 2019, the SFMTA created an Asset Management Unit to advance a long-term 10-Year Asset Management Strategy. The goal is to realize the full value of managing the Agency's assets in regard to centralized asset inventory development, resource management, and target setting.

The Agency's development and documentation of new State of Good Repair Policies is a key element in laying the foundation for a successful Asset Management Program. These policies were integrated into the SFMTA's Capital Plan and Program Policies in 2018, tying asset management into the Agency's capital planning process, the development of the 5-Year Capital Improvement Program and 2-Year Capital Budget.

State of Good Repair Policies:

- State of Good Repair is when an asset's condition results in the operation of that asset at a full level of performance.
- The Asset Management Program shall set the framework for asset condition standards and reporting methods that classify the level of performance of Asset Classes within the Agency's Asset Hierarchy.
- Each Asset Class will have defined metrics for evaluating State of Good Repair based on condition, safety, reliability or other defined data metric.
- State of Good Repair metrics will be reviewed and approved by the Asset Management Steering Committee.
- Divisions, through their respective Subject Matter Experts, will regularly evaluate the State of Good Repair by identifying investment levels required in the appropriate Asset Classes in the Capital Improvement Program.
- The Asset Management Unit of the Finance and Information Technology Division shall prepare an annual State of Good Repair Report detailing capital investment impacts on SFMTA Asset Classes.

Capital Asset Inventory

With over 6,000 individual assets, the CAI categorizes assets into distinct CIP Programs and Asset Classes, as well as “Transit Service Critical” or “Other State of Good Repair” assets.

The SFMTA kicked off its Capital Asset Management Program in 2009 with the development of its first comprehensive Capital Asset Inventory (CAI). The program was intended to support Agency, regional, and nation-wide capital planning efforts. The resulting 2009 inventory reflected an extensive effort that engaged many SFMTA divisions in collecting asset information, including age, replacement cost, and scheduled useful life.

Following the completion of the 2009 CAI, the SFMTA identified several opportunities to improve the quality of its transportation inventory data, such as refining replacement cost estimates and adding previously undocumented assets to the inventory. The SFMTA worked with the Metropolitan Transportation Commission (MTC) and C2HM Hill to make these updates in 2011, which fed into the MTC’s Regional Transit Capital Inventory (RTCI).

Beginning in 2014, the Agency has updated the CAI on an annual basis. These annual updates include updating changes to capital assets, refining replacement costs, and ensuring asset records reflect completed capital projects within the fiscal year. Today, the CAI includes over 6,000 individual assets, categorized to differentiate between various CIP Programs, as well as “Transit Service Critical” or “Other State of Good Repair” assets. These categorizations provide further insight to the SFMTA when prioritizing State of Good Repair investments.

The Agency has begun the process of implementing organizational changes to make the CAI actionable and integrate data from it into daily management processes. The first step in the Asset Management Strategy life cycle is to update the CAI with more accurate information, enabling more consistent and accurate capital planning and reporting.

Categorizing Investment Needs

At a high level, the SFMTA categorizes all assets into distinct Asset Classes, which were developed in 2009 as part of the first comprehensive capital asset inventory. These Asset Classes were updated in 2018 as part of the SFMTA’s initiative to create a standardized asset hierarchy that better conforms to classification standards used by the City and County of San Francisco. Investments in these assets occurs via capital projects, which are sorted by Capital Program for capital planning purposes. To provide full transparency, this Report will use both Asset Classes and Capital Programs to report upon State of Good Repair needs and investments. To facilitate trend comparison, the 2018 Report will continue to use the original 2009 Asset Classes. Future State of Good Repair reports will begin reporting based on the newly adopted hierarchy.

The SFMTA categorizes State of Good Repair needs as either “Transit Service Critical” or “Other State of Good Repair”. Transit Service Critical investments are made in Asset Classes and Capital Programs that are essential to ensuring the safe and reliable functioning of the transit system, such as maintaining or replacing overhead wires, rail track, or transit vehicles. Other State of Good Repair signifies areas of investment that help to make the transportation network more comfortable, efficient, and enjoyable for riders, along with maintenance of non-transit assets related to pedestrian, bicycle, enforcement, and administration. Figure 3 outlines the newly created asset hierarchy and labels Asset Classes and Capital Programs as either Transit Service Critical or Other State of Good Repair.

Figure 3: State of Good Repair Classification Matrix

This chart depicts 11 Asset Classes sorted into two categories: Transit Service Critical and Other SGR.

Transit Service Critical includes:

1. *Light Rail Vehicles*
2. *Motor Coach Vehicles*
3. *Overhead Catenary System*
4. *Track*
5. *Train Control & Communications*
6. *Trolley Coach Vehicles*
7. *Other Systems/Vehicles (TSC)*

Other SGR includes:

8. *Facilities*
9. *Parking & Traffic*
10. *Stations*
11. *Other Systems/Vehicles (Other)*

2018 Capital Asset Inventory Update

The FY 2018 State of Good Repair Report reflects a substantial data improvement implemented by the Agency, specifically the actualizing of fleet data. Prior to this update, the fleet data in the CAI was based on the Agency’s Fleet Plan that projects anticipated vehicle procurement. While this data correctly captured the number and type of vehicles procured, the replacement values and dates of acquisition of the fleet were not consistent with actual purchases. After correcting the data, the fleet became older (date of acquisition was earlier

than previously reported), which added to the reported value of assets in backlog, according to the age-based TERM Lite score. Additionally, the replacement value of the fleet decreased, which lowered the total investment needed to keep the fleet in a State of Good Repair. By actualizing the fleet data, the Agency now has more reliable information to make future investment decisions.

While actualizing the fleet data was a major step forward for the Agency, there remains work to be done to further increase the usefulness of the inventory. Future steps include obtaining accurate cost and date-built information for other assets, specifically elevators, escalators, wayside lifts, and traffic signal poles, to allow these assets to be run through TERM Lite and included in a State of Good Repair analysis. Additionally, migrating the capital asset inventory into the Agency's Enterprise Asset Management System (EAMS), the primary database developed to keep track of the Agency's assets, would make inventory data more accessible and useful. Finally, performing and incorporating condition assessments of all assets would make inventory analysis more accurate and credible, particularly in informing the asset condition scores in a State of Good Repair analysis.

TERM Lite Scoring

Assists in evaluating the SFMTA's current State of Good Repair asset backlog, future investment needs, and different funding and prioritization scenarios.

The FTA's Transit Economic Requirements Model Lite (TERM Lite) is a computer application designed to estimate an agency's transit capital investment needs over an extended time horizon. The model estimates the total amount of annual capital expenditures required up to a 30-year period to maintain or improve the physical condition and performance of an agency's transit infrastructure. Specifically, the TERM Lite tool determines levels of investment required to maintain or improve asset condition, assesses the impact of investment scenarios on asset conditions, and simulates future needs with age-based asset decay formulas. The tool produces Asset Condition Scores, projects Future Investment Needs, and provides a reported Asset Backlog.

Condition scores are based on the scheduled useful life of each asset; they do not reflect specific operating conditions, level of use, or other factors that impact the performance and operating life of individual assets. The TERM Lite condition scores use a scale of 1 (poor) to 5 (excellent), with assets approaching zero as they reach the end of their scheduled useful life. In their 2010 National State of Good Repair Assessment, the FTA defines State of Good Repair as maintaining a transportation system in which assets receive a score of 2.5 or better based on these classification rankings.

The SFMTA's reported Asset Backlog is calculated based on scheduled useful life and replacement value of an asset. When an asset is first capitalized and entered into the CAI, it is given an estimated useful life approximating the number of years the asset will be operable in a State of Good Repair. Useful life estimates are based on several factors including manufacturer recommendations, FTA guidelines, and general industry experience. When an asset comes to the end of its estimated useful life, TERM Lite reports the asset is in a status called backlog. An asset reported in backlog is measured by its full replacement value. As with the condition score, the reported Asset Backlog does not account for specific conditions of operation, level of use, or other factors that would adjust the anticipated useful life of an asset.

The 2018 State of Good Repair analysis is based on a TERM Lite run of 20 years of analysis. This time horizon was selected instead of a 30-year horizon to better align analysis to the time horizon of the Agency's 20-Year Capital Plan. It also ensures that the results are as accurate and useful as possible. As the time horizon moves farther out from the present, it becomes exponentially harder to accurately forecast State of Good Repair needs, replacement schedules, and asset condition scores.

The 2018 State of Good Repair analysis is also based on assumptions of unconstrained spending and 3% escalation, unless otherwise noted. Unconstrained spending allows a more complete picture of the total investment needs necessary to maintain the Agency's capital

assets in a State of Good Repair. Escalation is considered in the model to make the results useful when trying to budget out for future projects and investment costs. An escalation rate of 3% was chosen based on historical context.

Going forward, the Agency will move beyond solely useful life and age-based condition scoring. The Agency will incorporate additional factors into condition scoring such as work conducted by maintenance staff on an asset over time.

Part 3: 2018 State of Good Repair Analysis

Asset Replacement Value

The term “replacement value” refers to the amount that an entity would have to pay to replace an asset at the present time, according to its current worth.

The 2018 State of Good Repair analysis calculates a total replacement value of \$14.04 billion for the Agency’s assets. Figure 4 shows total reported replacement value for all recorded assets rose from \$13.5 billion in FY 2015-16 to \$14.6 billion in FY 2016-17 and fell to \$14.04 billion in FY 2017-18.

The rise from FY 2015-16 to FY 2016-17 is due to significant investments in facility and fleet assets. These investments include the Islais Creek Motor Coach facility, which has a recorded date built of FY 2016-17, operator restrooms, and replacement of revenue fleet vehicles.

The fall in reported replacement value from FY 2016-17 to FY 2017-18 is attributable to updating of the fleet inventory. The SFMTA actualized data for both revenue and non-revenue fleet, specifically including the actual procurement dates and costs of the fleets, resulting in decreases to the reported replacement value of these assets.

Figure 4: Total Replacement Value by Asset Class

This bar graph shows the replacement value of each asset class for 2016, 2017 and 2018. The replacement value for facilities has stayed the same since 2017; overhead traction power system has stayed the same; facilities has increased; parking and traffic has increased; track as stayed the same; light rail vehicles has decreased; train control and communications has increased; other systems and vehicles has decreased; motor coach vehicles has decreased; and trolley coach vehicles has decreased.

Figure 5 details the total replacement value of all SFMTA’s assets by Asset Class, with Stations having the highest replacement value at \$3.5 billion. By knowing the current value of its assets, the Agency is in a better position to advocate for funding from federal, state and local funding agencies. By regularly updating and documenting the replacement value of its assets, the Agency can provide detailed confirmation to funding agencies of its need for capital investments and support the leveraging of funds for critical State of Good Repair needs.

Figure 5: Total Replacement Value of Assets by Asset Class

This pie chart reports the replacement value as \$3514 million for stations; \$2781 million for overhead; \$1938 million for facilities; \$1582 million for parking and traffic; \$1126 million for track; \$891 million for train control and communications; \$816 million for light rail vehicles; \$566 million for motor coach vehicles; \$517 for other systems and vehicles; and \$308 million for trolley coach facilities.

Reported Asset Backlog

The reported asset backlog is the replacement value of assets older than their estimated useful life. In 2018, the Agency's reported asset backlog is \$3.13 billion.

When an asset is entered in the CAI, it is given an estimated useful life calculated by TERM Lite that approximates the number of years the asset will be operable in a State of Good Repair. This estimated useful life is based on manufacturer recommendations, FTA guidelines, and industry experience. When an asset comes to the end of its estimated useful life, TERM Lite reports the asset is in a status called backlog. An asset reported in backlog is measured by its full replacement value. As the number of assets reported in backlog grows, the total amount of investment needed to replace those assets grows as well.

Based on the 2018 FTA's TERM Lite output, the SFMTA's reported asset backlog has a total replacement value of \$3.13 billion. Figure 6 shows that the Agency's reported asset backlog rose from \$2.41 billion in FY 2015-16 to \$2.62 billion in FY 2016-17 to \$3.13 billion in FY 2017-18. The 2018 reported asset backlog is comprised of \$1.943 billion in Transit Service Critical assets and \$1.183 billion in Other State of Good Repair assets. The reported asset backlog growth shows an increasing need for the Agency to invest in a State of Good Repair across all its assets, particularly Other State of Good Repair assets that have grown incrementally faster than Transit Service Critical assets. Figure 7 details the reported asset backlog by Asset Class, showing that the Agency's Parking & Traffic assets have the highest reported backlog at \$950 million.

Figure 6: Reported Asset Backlog

This bar chart depicts the combined transit service critical and other state of good repair backlog to be \$2.41 billion in 2016, \$2.62 billion in 2017 and \$3.13 billion in 2018.

Figure 7: Reported Asset Backlog by Asset Class

This pie chart reports the backlog as \$950 million for parking and traffic; \$473 million for stations; \$466 million for facilities; \$420 million for overhead; \$268 million for other systems and vehicles; \$261 million for track; \$114 million for train control and communications; \$110 million for trolley coach vehicles; \$64 million for motor coach vehicles; and less than \$1 million for light rail vehicles.

While the reported backlog value is a useful goalpost to measure the Agency's progress in maintaining a State of Good Repair, it should not be considered the actual value of assets in backlog that need replacement. Adjustments to the Agency's reported backlog are necessary as follows:

- TERM Lite's calculated estimated useful life does not incorporate the asset's specific operating environment that affects an asset's performance and useful life. For example, San Francisco's dense urban environment has a more adverse impact on transit vehicles and their related capital infrastructure than most transit systems in the United States.
- TERM Lite's calculated estimated useful life does not consider the level of use, maintenance, rehabilitation or other factors that would affect the anticipated useful life of an asset. For example, certain assets may have exceeded their useful life but remain in perfectly acceptable operating condition because of maintenance. While the Agency's Stations have a reported backlog value of \$473 million, the Stations will not be replaced but rehabilitated as needed.
- Refining of data, specifically actualizing of dates, is an on-going process that will affect the estimated useful life of an asset. The recent actualization of the fleet data played a role in increasing backlog. The new actualized inventory has older years built in than what was previously in the capital asset inventory, translating to a higher backlog.

To adjust for these discrepancies, the Agency will continue to verify asset dates and place a strong emphasis on condition assessments moving forward. Currently, the SFMTA does not make changes to the estimated useful life once it is entered in the CAI, regardless of its operating condition. This is the most conservative approach the Agency can take when calculating its State of Good Repair investment needs. By ensuring asset dates are correct in the CAI and incorporating condition assessments to better inform the TERM Lite model, the Agency will have a more accurate reported asset backlog and better understanding of what and when assets need to be replaced.

Asset Condition Scores

Asset Condition Scores are based on the age of an asset and use a scale of 1 to 5. The weighted average condition score for all SFMTA assets in FY 2018 is 3.19.

In addition to calculating current and future investment needs for SFMTA assets, the 2018 TERM Lite modeling also produces a “condition score” for each asset in the capital asset inventory. These condition scores are based only on the scheduled useful life of each asset; they do not reflect specific operating conditions, level of use, or other factors that impact the performance and operating life of individual assets. In FY 2019-20, the Asset Management Unit will develop condition assessments of the Agency’s assets to obtain a better understanding of each asset’s actual useful life.

The TERM Lite condition scores use a scale of 1 (poor) to 5 (excellent) with scores for assets declining as they age. For the FTA to recognize a transportation system as being in a State of Good Repair, assets must receive a score of 2.5 or higher based on these classification rankings.

2018 Asset Condition Score

As shown in Figure 8, the average condition score for all of SFMTA’s assets is 3.19 in 2018. The SFMTA incorporates a weighted average based on total replacement cost. This creates a more accurate representation of the State of Good Repair of Agency assets. For example, it is more detrimental if a high-value asset has a low condition score than a low-value asset.

Figure 8 also segments asset condition score by Transit Service Critical and Other State of Good Repair assets. Transit Service Critical assets have a substantially higher average condition score than Other State of Good Repair assets. This result stems from the Agency’s conscious focus over the past five years on maintaining and improving Transit Service Critical assets (see Figure 9). Because these assets are critical to the Agency’s ability to fulfill essential transportation functions, the Agency has allocated higher State of Good Repair funding to Transit Service Critical assets over the past five years. With Transit Service Critical assets reaching optimal conditions, the Agency anticipates shifting its focus over the coming years to increase the condition of its Other State of Good Repair assets.

Figure 8: Age-Based Condition Score Overview

This bar chart reports the score for all assets as 3.19, the score for transit service critical is 3.38, and the score for other state of good repair is 2.93.

Figure 9: Comparison of Condition Scores, 2014 vs. 2018

This bar graph reports that for all assets the average condition score decreased from 3.24 in 2014 to 3.19 in 2018; the score increased for transit service critical assets from an average of 3.32 in 2014 to 3.38 in 2018; and the average score for other state of good repair assets decreased from 3.13 in 2014 to 2.93 in 2018.

Figures 10 and 11 provide detailed breakdowns of average condition scores by Capital Program and Asset Class, respectively. The data affirms that the Agency's State of Good Repair efforts have had positive results on the condition scores of Transit Service Critical assets such as the revenue fleet; but that other State of Good Repair assets, including non-revenue vehicles (Other Systems and Vehicles) and parking assets (Parking & Traffic), have not been a point of recent emphasis for the Agency.

Figure 10: Age-Based Condition Score by Capital Program

This bar graph reports the average fleet score as 3.68; parking as 2.23; facility as 3.13; traffic and signals as 2.51; transit fixed guideway as 3.29; IT and communications as 3.33; and other systems and vehicles as 2.51.

Figure 11: Age-Based Condition Score by TERM Asset Class

This bar graph reports the average facilities score as 3.26; light rail vehicles as 3.78; motor coach vehicles as 3.62; other systems and vehicles as 2.56; overhead as 3.53; parking and traffic as 2.38; stations as 3.05; track as 3.11; train control and communications as 3.43; and trolley coach vehicles as 3.60.

Asset Condition Score Trends

Figure 12 provides a breakdown of average condition scores by Asset Class over time. An analysis follows explaining the trend in condition scores for each Asset Class. Although the TERM Lite data is only based on the useful life of the assets and does not incorporate the actual operating condition of the assets, it provides a general indicator of the state of the Asset Class.

Figure 12: Asset Class Condition Scores from 2014 – 2018

The chart reports the total condition score average across Facilities, Light Rail Vehicles, motor coach vehicles, other systems and vehicles, overhead traction power system, parking and

traffic, stations, track, train control and communications, and trolley coach vehicles scores as 3.24 for 2014; 3.33 for 2015; 3.32 for 2016; 3.3 for 2017; and 3.19 for 2018.

Facilities

The condition score for facilities is holding steady over the last 5 years, averaging 3.28. The SFMTA's facility campus includes a varied group of buildings, grounds and bus yards. These facilities support the SFMTA's ability to provide reliable transit service, maintain street infrastructure, and store, protect and maintain its diverse transit fleet. During the last several years, the SFMTA conducted a thorough assessment of 15 of its major facilities. The result was \$60.4 million in repairs and a program of \$140.2 million to keep these facilities in a State of Good Repair.

Light Rail Vehicles

The condition score for LRVs rose from 3.1 in FY 2014 to 3.7-3.8 in FY 2015 - FY 2018. The jump in condition score from FY 2013-14 to FY 2014-15 is explained by actualizing data. When the Agency purchases new vehicles, they are delivered individually over the course of years. Rather than using the same purchase date for every vehicle in the contract, the data was updated to reflect when each individual vehicle was received by the Agency. Once this correction was made, the condition scores of the fleet improved significantly. The SFMTA is in the process of replacing and expanding its existing fleet of 151 Breda LRVs, in service since 1996, with over 200 new LRVs from Siemens.

Motor Coach Vehicles

The condition score rose 3.2 in FY 2014 to 3.5-3.7 in FY 2015 - FY 2018 as the SFMTA replaces all its diesel motor coaches, in service since early 2000, that have reached the end of their useful lives. The SFMTA's contract with New Flyer Inc. for procurement of hybrid motor coaches was entered in December 2014. The SFMTA is spending over \$475 million to purchase 200 40' and 224 60' hybrid motor coaches.

Other Systems & Vehicles

The condition scores for this Asset Class, that includes non-revenue vehicles, substations and cable cars, show a decrease over the years, from 3.2 in FY 2014 to 2.6 in FY 2018. The decrease in condition scores may be a result of refining the inventory included in the Asset Class; as well as providing actual dates of procurement of the assets. The Asset Management

Team will continue to refine and evaluate the data to ensure its accuracy, but assuming that it reflects the condition of these assets, the Agency should prioritize investments in this Asset Class moving forward.

Overhead Traction Power System

This asset includes all the components of the overhead catenary system and traction power infrastructure to support electrically-powered trolley coaches, light rail vehicles, and historic streetcars. The condition scores for this asset have held steady for the last 5 years, ranging from 3.5 to 3.7. The SFMTA will continue to make investments to maintain this critical asset in a State of Good Repair.

Parking & Traffic

With the SFMTA primarily investing in Transit Critical Services such as its transit vehicles over the last few years, the SFMTA's investment in Parking & Traffic lagged behind. The lack of investment is reflected in a condition score that was 2.8 in FY 2014 and decreased to 2.4 in FY 2018. This Asset Class ranges from installing traffic signals and designing streets that help traffic flow to managing on-street parking and city garages. By not investing in this asset, the impact can be felt in more congested streets and deteriorating city garages. The Agency should prioritize investments in this area moving forward.

Stations

The condition scores for the SFMTA's subway and surface stations shows a slight decrease over the years from 3.2 in FY 2014 to 3.0 in FY 2018. The SFMTA will continue to make investments to maintain its transit stations in a State of Good Repair.

Track

The condition scores for the SFMTA's track system shows a slight decrease over the years from 3.3 in FY 2014 to 3.1 in FY 2018. The SFMTA will continue to make investments to maintain its track system in a State of Good Repair to ensure reliable transit service.

Train Control & Communications

The infrastructure necessary to run the light rail vehicles, including the Automatic Train Control System (ATCS), the fiber optic network, blue light emergency phones in the subway, and radio

communication system, shows a condition score that has increased from 2.9 in 2014 to 3.4-3.7 over the last few years. The SFMTA's investment in this asset includes the recent major upgrade of the radio communication system, some elements of which date back to the 1970s, to a new Intelligent Transportation System radio communication system. The SFMTA will continue to invest funding to maintain its ATCS system as the Agency moves to a new WiFi/cellular connected communications-based train control (CBTC) system. The new CBTC system will reduce subway delays, enable lower headways, and deliver faster, more reliable service.

Trolley Coach Vehicles

The condition score for trolley coaches is trending upward from 2.5 in 2014 to 3.6 as the SFMTA replaces its Trolley Coach Fleet. The SFMTA's 40' and 60' Electric Transit Inc. trolley coaches, in service since 2001 and 1993 respectively, have exceeded their useful lives and were overdue for replacement. With an investment of over \$400 million, the SFMTA is purchasing up to 240 40' and 93 60' trolley coaches from New Flyer Inc. A portion of the replacement trolley coaches will be used for the bus rapid transit service being planned on the Van Ness Avenue corridor.

State of Good Repair Investments

Since 2010, the SFMTA has made a commitment to spend an average \$250 million per year on State of Good Repair investments.

Because the SFMTA operates in a fiscally constrained environment, the Agency must balance State of Good Repair needs with operations, enhancement, and expansion priorities. In 2010, the SFMTA committed to spend an average of \$250 million annually on State of Good Repair over the next 20 years. This was a condition of the full funding grant agreement with the Federal Transit Administration for the Central Subway project. This goal is intended to ensure that the SFMTA balances its resources effectively between maintaining a State of Good Repair and enhancing and expanding the transportation system.

Of the \$250 million per year, the SFMTA has made it a policy priority to direct these resources primarily towards “Transit Service Critical” Asset Classes and projects. This spending has resulted in positive results across the asset condition scores of those assets.

In calculating yearly State of Good Repair expenditures, the SFMTA analyzes expenditures at both a project-level and Capital Program-level. Some Capital Programs are entirely comprised of State of Good Repair investments so that 100% of that Capital Program is counted towards the SFMTA’s \$250 million annual commitment. Other Capital Programs are only partly comprised of State of Good Repair projects and programmatic expenditures so that the SFMTA must consider such programs on a project-by-project basis to determine the amount of State of Good Repair expenditures. At a granular level, some individual projects may contain both State of Good Repair and non-State of Good Repair components. For example, curb to curb street projects such as Better Market Street (Figure 13) combine expansion and enhancement elements, as well as the rehabilitation of existing assets including track, traffic signals, overhead lines and paint.

Figure 13: Better Market Street Project

A map depicting the project area at the intersection of Market Street, Charles J Brannan Place, McAllister Street, and Jones Street.

Expenditure Average: From FY 2010 through FY 2018, the Agency averaged \$194 million per year on State of Good Repair spending, with the rate of investment in State of Good Repair trending upwards. In 2021, the Agency anticipates that its 20-year average will reach \$250 million in State of Good Repair spending. Significant investments in the replacement of the Muni Fleet, in addition to the passages of the 2014 Transportation and Road Improvement General Obligation Bond and Proposition B Transportation Population Based General Fund Set-

Aside, resulted in a substantial increase of funds for State of Good Repair transportation projects.

Actual Expenditures: The SFMTA has increased its State of Good Repair expenditures each year since FY 2015. In FY 2017, the total expenditures for State of Good Repair was \$338 million; in FY 2018, they were \$402 million, an increase of 19%. This positive trend is planned to continue after FY 2018, with the average increasing and being maintained at approximately \$350 million through FY 2023. By continuing to build momentum with State of Good Repair annual investments, the SFMTA can begin to decrease the Agency's reported asset backlog and ensure assets remain in a State of Good Repair.

Figure 14: State of Good Repair Investments

(FY 2014 - FY 2018 Actuals; FY 2019 - FY 2023 Planned)

This chart projects SGR investment needs to be \$411 million for fiscal year 2019; \$356 million for fiscal year 2020; \$386 million for fiscal year 2021; \$337 million for fiscal year 2022; and \$268 million for fiscal year 2023.

2018 State of Good Repair Spending: \$402 million

Long-Term Investment Needs

The SFMTA must continue investing in State of Good Repair at or above the current rate over the next 20 years, or aging assets will cause the reported backlog to grow.

Based on the 2018 State of Good Repair analysis, it is not enough for the Agency to simply meet its \$250 million per year planned State of Good Repair investment goal. Figures 15 and 16 show State of Good Repair annual investment levels and their impact on the reported asset backlog, including an annual 3% escalation. Without accounting for escalation, the SFMTA will need to invest \$11.56 billion over the next 20 years to keep its assets in a State of Good Repair. To do this and maintain the reported asset backlog at the same level, the Agency needs to invest an average of \$422 million per year for 20 years in State of Good Repair assets. In order to eliminate the entire reported asset backlog, the Agency would need to invest an average of \$578 million per year for 20 years on State of Good Repair needs.

Figure 15: State of Good Repair Required Investment Levels (0% Escalation)

An upside down pyramid graphic with five levels reporting \$578 million per year for full scheduled asset replacement and eliminating the backlog; \$500 million per year for reducing the backlog by 50%; \$422 million per year for no growth in backlog; \$281 million per year for transit service critical needs met; \$250 million per year for SGR investment commitment..

When accounting for a 3% per year escalation rate, the 20-year investment needs rise to \$15.12 billion. To fully eliminate the reported asset backlog and meet all State of Good Repair investment needs, the Agency would need to invest \$756 million per year for 20 years.

Figure 16: State of Good Repair Required Investment Levels (3% Escalation)

An upside down pyramid graphic with five levels reporting \$756 million per year for full scheduled asset replacement and eliminating the backlog; \$678 million per year for reducing the backlog by 50%; \$600 million per year for no growth in backlog; \$401 million per year for transit service critical needs met; \$250 million per year for SGR investment commitment.

This analysis shows that the SFMTA still has significant work to do to fully meet recommended State of Good Repair investment levels over the next 20 years. However, because of the Agency's proactive State of Good Repair spending over the past few years, the SFMTA is in a

much better position moving forward than if it had not consistently met and exceeded its \$250 million investment goal.

Figure 17 shows the \$15.12 billion in investment needs by year through FY 2038. The TERM Lite model assumes investments will be made in FY 2018-19 and therefore excludes the \$3.13 billion in FY 2018 reported asset backlog. While the model shows a relative steady rise and fall in investment need over the years, it shows a dramatic spike in investment need in 2034. The spike is the result of the TERM Lite Model assuming that many of the Agency's assets have a replacement life of 15 years and that the last replacement of assets occurred in 2019 when the backlog was replaced; and thus, many of the Agency's assets are designated for replacement again in 2034.

Figure 17: Upcoming Investment Need

The bar graph depicts upcoming investment need for TSC and Other SGR from 2019 to 2038. The projections are roughly \$250 million for 2019, 2020, and 2021; \$400 million for 2022; \$500 million for 2023; \$250 million for 2024; \$500 million for 2025; \$400 million for 2026; \$700 million for 2027; \$1000 million for 2028; \$900 million for 2029; \$750 million for 2030; \$500 million for 2031; \$300 million for 2032; \$500 million for 2033; \$2000 million for 2034; \$1000 million for 2035; \$250 million for 2035; \$250 million for 2036; \$400 million for 2037; \$500 million for 2038.

Eliminating the Asset Backlog:

- \$578 million annually
- \$756 million annually (3% inflation)

Part 4: Conclusion and Next Steps

Conclusion and Next Steps

Working toward continuous improvement of the transportation system will take a strategic approach: matching data to decision-making to raise revenues to slow, and ultimately stop the backlog from growing.

Conclusion

The SFMTA continues to mature its practice of asset management with the goal of being a leader in both transit specifically and the transportation industry as a whole. In 2018, the SFMTA did a review of numerous other transportation agencies and departments. Much of the findings of this review resulted in the 10-Year Asset Management Strategy.

Overall, the 2018 State of Good Repair Report reflects the SFMTA's continuous efforts to update and refine its Capital Asset Inventory, its measurements of condition of the transportation system, and process to prioritize and deliver capital improvements that will have the greatest operational impact and value to San Francisco's transportation system.

In 2018, San Francisco's transportation system is generally in a State of Good Repair, with a TERM Lite score of 3.19. Investments in transit service critical assets have resulted in the score of these assets rising since reporting began in 2014. Non-transit service critical assets, however, continue to decline in condition score and increase the overall backlog. The SFMTA will begin to refocus its efforts on supportive infrastructure such as facilities and technology including: modernization of transit yards and investment in new systems such as the Advanced Train Control System and Customer Information System.

Long-term, revenues are insufficient to prevent the State of Good Repair backlog from growing. In the FY 2018 Report, the total amount needed annually to replace assets on schedule and eliminate the backlog is \$578 million per year; and when adding an escalation factor of 3% over the 20-year window, this amount grows to \$756 million per year. The amount needed just to keep the backlog from growing is \$422 million per year and \$600 million per year, respectively.

Next Steps

The SFMTA will continue to build and mature its Asset Management Program by establishing and implementing tasks, strategies and processes to enable efficient asset life cycle management. Future activities include:

Data Refinement

The Asset Management Unit will work with operational divisions to add “operational condition” data to individual assets and revise anticipated useful life based on functional conditions in the field. By adding operational condition data to its capital assets, the Agency will obtain a more accurate assessment of an asset’s condition, enabling better life-cycle management and prioritization of investments. Also, the Agency will fully integrate its new Agency-wide asset hierarchy over the coming year to make data management more efficient and effective. The Agency’s progress in making its data more accurate and improving the inventory’s data structure will be documented in its annual State of Good Repair reports and Transit Asset Management Plan reports issued every four years.

Condition Assessment of Traffic Signals

The Agency anticipates completing a comprehensive condition assessment of its 1,240 individual traffic signals in FY 2020. The assessment will include a prioritized review of deficiencies, estimates of repair options, and projected scheduled maintenance needs. The Traffic Signals Condition Assessment will result in a new inventory with more accurate condition scores and operational condition data.

Capital Planning Process

The Agency will be developing the FY 2021–2022 Budget and the FY 2021-2025 Capital Improvement Program. For the first time, the Agency will integrate asset management data into the development of each of these processes. Data from the Capital Asset Inventory will be used to help Agency divisions prioritize their State of Good Repair investments and identify the amount of projected spending on State of Good Repair needs.

Minimum \$250 Million Investment

The Agency will continue to invest \$250 million per year in State of Good Repair needs pursuant to its commitment to the FTA. However, based on the FY 2018 State of Good Repair analysis, it is not enough for the Agency to simply invest this amount per year. To reduce the FY 2018 estimated reported backlog of \$3.13 billion, the Agency will seek to continue its positive trend of exceeding this \$250 million investment goal.

New Revenues

The SFMTA relies on a variety of sources to fund its operating and capital budgets, including fares, grants, fines and fees, City general funds, state sales taxes and voter-approved general obligation and revenue bonds. This diversity of sources gives the SFMTA a stable base of operating revenues and capital funds. However, with an increasing investment backlog, the Agency will need to advocate for new revenues and resources to improve the State of Good Repair of San Francisco’s transportation system and ensure project delivery of capital projects.

Enterprise Asset Management System (EAMS)

The Agency will develop an action plan to migrate the Capital Asset Inventory data into EAMS. Uploading the Capital Asset Inventory into EAMS will give the inventory greater visibility and functionality, as well as aid in both reporting and decision-making in regard to capital expenditures.

2018 Transit Asset Management (TAM) Plan Follow-up

The development of the SFMTA's inaugural 2018 TAM Plan was a critical step to having a strong asset management program. The SFMTA is finalizing the development of specific action plans committed to in the 2018 TAM Plan that improves asset management at the SFMTA.

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