SFMTA

Historic Streetcar Fleet Management Plan

2022 Update: Draft [10/17/2025]

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1. Introduction

The updates made in this plan reflect the organizational, planning, policy, and operational changes experienced since the 2019 Historic Streetcar Action Plan. The purpose of this document is to establish near-term and long-term fleet size requirements based on management direction related to service delivery expectations, infrastructure projects, and capital capacity. SFMTA commits to stewarding these tremendous historic assets and ensuring management of the historic fleet aligns with core agency values. SFMTA also acknowledges their role in offering economic value to San Francisco's recovery. By reflecting on the agency's current conditions and establishing a path towards improvement SFMTA remains nimble to respond to future growth opportunities.

Current Conditions. The COVID-19 pandemic and the economic crisis brought about by the pandemic had major impacts on every aspect of our business, including amplifying and exacerbating staffing and labor shortfalls across the agency. Despite small wins, our budgetary outlook remains unfavorable, and our structural deficit persists. SFMTA's ongoing financial uncertainty means the agency must prioritize decisions that lead to long-term financial stability. Near-term the SFMTA is – *back to basics* – targeting lean investment in the core of our transportation system and prioritizing reliability and state of good repair over expansion. As one of SFMTA's most expensive modes to operate and maintain, it is essential that plan for the historic fleet explores opportunities to realize efficiencies (like vehicle standardization) and to right-size investments in existing vehicles and infrastructure to maintain reliability for our current ridership base and be consistent with agency strategic values such as equity.

Fleet Management and Service Delivery Interdependency. Overarching principles, service standards and policies typically inform SFMTA's near-, mid-, and long-range service plan, which in turn informs the agency's vehicle demand/fleet composition and capital procurement, expansion, and overhaul programs. Given the variability and condition of the fleet along with uncertain planning environment (described below) and complexities of procurement/rehabilitation of historic vehicles, this Plan posits that the status of the fleet will drive future service decisions. The Plan maintains assumptions for current service delivery and demonstrates how the current pace of the fleet rehabilitation and standardization program and key policy decisions on expanded infrastructure over the course of the Plan time horizon will dictate how and when the agency could ramp up service.

Fleet Management Planning Framework Updates. SFMTA has greatly increased coordination between service planning, fleet maintenance, fleet engineering and transit capital planning groups across all transit modes, and as such, the Plan aligns fleet management with a consistent framework of policies and principles driving all aspects of historic fleet lifecycle management and planning This effort is demonstrated in an update to the naming conventions of this Plan (Historic Fleet Management Plan) and updates to the Plan's outline to be both consistent with the other modal plans and FTA fleet plan requirements. The new document structure also realigns the 2019 Plan's strategic actions. The 2019 Plan organized actions into strategic initiative areas in pursuit of capital and operating investments necessary to expand service, increase reliability and improve capital project delivery. This Plan highlights completed actions and, where possible, realigns new actions to updated plan goals and sections.

Accomplishments. Despite the volatile planning and operating environment of the last two years, SFMTA has made significant progress on near-term actions set forth in 2019. The table below highlights several accomplishments (for status of all 2019 actions see Appendix A and Appendix B).

Table 1. 2019 Historic Action Plan Accomplishments

Vehicle Restorations	Service Delivery and Customer Experience
• completed in-house restoration feasibility study. • scrapped/disposed identified vehicles to maximize space and provide spare parts. • initiated RFP to rehabilitate three vintage cars with intent to pilot standardization. • Completed SEPTA cars rehabilitation contract • initiated in-house restorations on special service vintage cars (162, 130, 233, 228). • completed wreck repair of car 1063	• installed ten ticketing machines at stops along the Embarcadero to reduce cash fares and streamline boarding. • implemented signal improvements through Central Subway to enhance transit priority along the King Street corridor. • working to pilot installation of multilingual signage at strategic locations on cable car lines which will extend to the F Line.

2. Historical Background

In 1995, Historic F Line service began along Market Street, five years later service was expanded to the Embarcadero. In 2015, complementary E Line service was introduced to the Embarcadero, connecting Fisherman's Wharf to Caltrain at 4th and King. SFMTA's historic streetcars carry approximately 25,000 passengers per day (pre-COVID-19) and play a key role in preserving San Francisco's rich transit history by delivering visitors, workers, and residents alike to world renowned destinations. The historic streetcars have become a main stay of SFMTA's diverse transit fleet; attracting people from around the world to ride this unique public transit service, thus taking their place alongside the cable cars as an important facet of the City's transportation landscape.

3. Purpose of this Plan

The SFMTA Historic Fleet Management Plan guides procurement, restoration, service, and infrastructure investments for the SFMTA historic streetcar service over the next ten to twenty years. This Plan aligns the unique needs of the historic fleet with those of the broader system and outlines capital investment options that recognize the fleet's role in providing San Francisco with excellent transportation options. This Plan's time horizon is 20 years; this iteration covers 2023 to 2043.

4. Overarching Principles

The SFMTA operates one of the largest transit systems in the Bay Area. The Agency's fleet is among the oldest and most diverse systems in the country, featuring sub-fleets which include modern light rail vehicles, hybrid-electric renewable diesel motorcoaches, electric trolley coaches, cable cars, historic streetcars, and a range of paratransit vehicles. The historic streetcar fleet is the most diverse of SFMTA's fleet and requires a unique set of principles to guide effective management of these rare assets. This Plan has adopted the principles below to guide the long-term approach to service planning, maintenance practices and overall stewardship of the historic streetcar fleet.

- **Quality Service:** Deliver safe, reliable service to meet the needs of Muni customers by increasing vehicle performance and reliability.
- **Historical Stewardship:** Balance vehicle reliability with historical integrity and showcase these unique assets as a rolling exhibit throughout regular service.
- **Standardization:** Strive for long-term standardization of equipment and parts, while maintaining a vehicle's historic significance to help create streamlined and predictable maintenance practices.

- **Maintenance Standards:** Maintain robust preventative maintenance standards and practices to promote excellent performance throughout the lifecycle of the vehicle, maximize benefits of vehicle overhauls and preserve staff expertise.
- **Spare Ratio:** Manage Fleet size to ensure optimal vehicle and facility utilization by reducing spare ratios where possible.

5. Vehicle Typology, Service Plan and Fleet Inventory

5.1. Vehicle Type

SFMTA classifies the historic streetcar fleet into three categories which are described below.

PCC: Designed by the Presidents' Conference Committee, PCCs are single- and double-ended streetcars built between 1946 and 1952. Typically painted in tribute to the 33 cities that operated them, PCCs make up the majority of historic fleet.

Vintage: A diverse set of one-of-a-kind single- and double-ended cars from around the world. Typically special-service vehicles, Vintage cars range in appearance (line the famous open-aired "boat cars") and operation (like those requiring two operators) among other unique characteristics.

Milan Trams: Single-ended streetcars designed by Peter Witt, in 1915. Built in Italy starting in 1928, Milans are named for their long-time use in the city. Their limited passenger capacity and design, mean Milan cars are typically designated as special-service with occasional revenue-service as required.

5.2. Historic Streetcar Service (Baseline)

Prior to COVID-19, the E Embarcadero and F Market & Wharves Lines accounted for 3% of overall Muni ridership and roughly 7.5 million annual unlinked trips. The F Line runs from The Castro to Fisherman's Wharf via Market Street and the Embarcadero. The F Line served most historic streetcar customers attracting ridership from residents, tourists, and commuters. The F Line tended to be most heavily used from Powell & Market Streets to Pier 39 and weekday ridership was typically highest during the PM hours. Prior to the COVID-19 pandemic, the F Line ran seven days per week from about 6 am to 1 am, approximately 19 hours per day, every 7 minutes during the day. The E Line route was introduced seven days per week in 2015 and operates from Fisherman's Wharf to the Fourth & King /Caltrain Station via The Embarcadero. E Line ridership is generally light, but typically heaviest between Fisherman's Warf and the Ferry Plaza, where service overlaps with the F Line. Pre-pandemic, the E Line operated every 20-30

minutes from 10 am to 6 pm and used 4 peak vehicles. Since the southern terminal is a tail track, the E Line can only be operated with double-ended vehicles which allow bi-directional operation. [1]

The E and F Lines were suspended at the beginning of the COVID-19 pandemic when Muni reduced service from 79 lines down to just 17 core lines. The F Line resumed service in May 2021 and as of January 2023, F Line runs seven days a week from about 7 am to 10 pm, at 12-minute headways from mid-morning to PM with a peak demand of 12 vehicles; the E Line service remains suspended. The current baseline service reflects SFMTA's current operating reality and represents continued transitional nature of post-Covid Operations. Section 5.3 below outlines current considerations related to growth.

Table 2. Current Mid-morning to PM Weekday & Weekend Service Plan (As of January 2023)

Route	Headway	PM Peak Vehicle Demand
F Line (Fisherman's Wharf to Castro)	12	12

5.3. Future Service

The previous iteration of this Plan anticipated a potential growth in ridership by 2030, and therefore proposed a significant aspirational service increase (of up to 20 vehicles). Given San Francisco's slow and uncertain recovery in the wake of the COVID-19 pandemic[2], both in ridership demand and funding for capital improvement projects, this Plan does not project a future service plan centered around growth and expansion in this plan's time horizon. Instead, SFMTA will focus on incremental service increases based on the condition of the fleet, vehicle availability and demonstrated pace of rehabilitation and overhaul campaigns. Future service growth will also be dependent upon demonstrated performance improvements associated with SFMTA's efforts to transition towards standardization and modernization of critical systems across the fleet. Subsequent sections of this Plan outline the current fleet condition, existing rehabilitation and overhaul campaigns, and the conditions (resources and timing) required to ramp up vehicle rehabilitation and production for expansion.

5.4. Fleet Inventory

SFMTA maintains a sufficient fleet composition to meet service demand while managing an ample spare ratio that allows for service flexibility, improved service reliability, and prolonged life/condition of vehicles. SFMTA strives for a future historic fleet composition that allows for streamlined maintenance enabled by standardization and modernization. SFMTA anticipates day-to-day revenue service to primarily be made up of PCCs, supplemented with several standardized, service-ready vintages (based on demand for double-ended vehicles). While Milan cars are relatively simple in design, their reliability and limited passenger capacity, as compared to PCCs, mean they are better suited for special-service near-term (with occasional revenue-service as required). SFMTA foresees Milans being a viable option as a test fleet for piloting standardization and modernization upgrades long-term. Table 3. below provides an overview of the current fleet – including unique car number, status in relation to use[3], its operational type (single-, double-), vehicle category and condition.

[2] SFMTA suspects economic growth forecasted in the 2019 Plan for 2030, has slowed to 2040 and beyond.

[3] Vehicles have been classified into the three use statuses: Revenue Service, Special Service and In Storage. Depending on the specific vehicle, Special Service represents vehicles that are limited to seasonal use. Each vehicle is also classified as Service-Ready or Rehab Required based on its known condition.

Table 3. Revenue Vehicle Inventory

Status	Car Number	Type	Category	Condition	Qty
Revenue Service Vehicle	1006-1011, 1015	Double-ended	PCC	**Service Ready**	**7**
	1040, 1050-1053, 1055-1063, 1070-1080	Single-ended	PCC	**Service Ready**	**25**
Potential Future Revenue Service Vehicle	351, 798, 913	Double-ended	Vintage	Major Rehab Required[4]	3
	151, 189, 586			Major Rehab Required	3
	1026-1028, 1033-1034, 1039, 1103, 1115, 1130, 1139, 1158, 1160, 1168, 1704, 2147	Single-ended	PCC	Major Rehab Required	15
			Total Service-Ready, Revenue Service		**32**
			Service-ready single-ended vehicles		**25**
			Peak Vehicle Service Demand (F Line)		12
			Spare Vehicle (F Line)[5]		13
			Spare Ratio (F Line)		108%

Table 4. Special Service Vehicle Inventory

Status	Car Number	Type	Category	Condition	Qty
Special Service Vehicle	1, 496, 578s,	Double-ended	Vintage	**Service Ready**	**3**
	162, 916,			Minor Rehab Required	2
	130, 578j, 952[6]			Major Rehab Required	3
	228, 737	Single-ended	Vintage	**Service Ready**	**2**
	233			Minor Rehab Required	1
	1807, 1815, 1818, 1856		Milan	**Service Ready**	**4**
	1811,1834,1859,188			Minor Rehab Required	4
	1814, 1893,1895			Major Rehab Required	3
Vintage Vehicle in Storage	3557, 106	Single-ended	Vintage	Major Rehab Required	2
		Total Service-Ready, Special Service			**9**

6. Operating Policies and Service Standards

SFMTA Operating and Service Standards guide how the Agency designs and improves transit service in an ever-changing environment. These guidelines ensure transparent, objective decision-making that is aligned with city and regional transportation goals for sustainability, equity, and economic growth; and are used to inform service change decisions.

[4] Current Rehab Contract

[5] Spares are calculated from vehicles with *Revenue Service Vehicle* status and *In Service* condition and based on current service level. Table only considers single-ended vehicles for spare ratio calculation. If SFMTA considers both single- and double-ended revenue service vehicles for F Line, pending continued suspension of E Line, spares would equal 20 with a ratio of 160%.

[6] On loan from New Orleans Regional Transit Authority (NORTA)

Table 5. Service Standards

<table>
<tr><th>Standard Type</th><th>Standard</th></tr>
<tr><td>1. Coverage</td><td>All residential neighborhoods in San Francisco should be within a quarter of a mile of a Muni bus stop or rail line stop.</td></tr>
<tr><td>2. Vehicle Assignment</td><td>Technical criteria for assigning vehicle types to specific Muni lines include peak load factors, route type, physical route characteristics such as street widths and grades, required headways, vehicle availability, and transit operator availability. In assigning vehicles, the SFMTA also seeks to prevent discrimination of minority and low-income communities.</td></tr>
<tr><td>3. On-Time Performance (OTP)</td><td>The on-time performance standard was mandated by Proposition E, which is now part of the City Charter. On-time performance on more frequent routes is measured based on headway adherence, while on-time performance on less frequent routes is measured based on schedule adherence.
<table>
<tr><th>Route Type</th><th>Definition</th><th>OTP Standard</th></tr>
<tr><td>Historic</td><td>% of time points served within one minute early to four minutes late of the schedule</td><td>85% on-time (schedule adherence)</td></tr>
</table></td></tr>
<tr><td>4. Service Span Hours</td><td>The service span standard sets the minimum number of hours that service is available.
<table>
<tr><th>Route Type</th><th>Service Span Standard</th></tr>
<tr><td>Historic</td><td>Based on demand</td></tr>
</table></td></tr>
<tr><td>5. Policy Headways</td><td>Minimum weekday headways (in minutes) are established by route type.
<table>
<tr><th>Time Period</th><th>Route Type</th><th>Day</th><th>Evening</th><th>Late Night</th></tr>
<tr><td>Weekday</td><td>Historic</td><td colspan="3">Based on demand</td></tr>
<tr><td>Weekend</td><td>Historic</td><td colspan="3">Based on demand</td></tr>
</table></td></tr>
<tr><td>6. Transit Shelter Installation</td><td>Transit shelters are installed at transit stops with 125 or more daily boardings, within site constraints, and consistent with Title VI requirements. Shelters may be installed at additional stops as needed.</td></tr>
<tr><td>7. Stop spacing</td><td>Guidelines for distances between stops were developed taking into account the different block lengths and grades on San Francisco streets. Placement of stops is based on a range of factors, including adjacent land uses, transfer opportunities, transit operations and site constraints. However, the stop spacing standards provide a basis for further analysis of optimum stop locations.
<table>
<tr><th>Vehicle Type</th><th>Stop Spacing Standard</th></tr>
<tr><td>Rail (surface)</td><td>Approximately 900 to 1,500 feet</td></tr>
</table></td></tr>
<tr><td>8. Passenger Loads</td><td><u>Planning capacity</u> – Capacity used to schedule service and is compared to the average number of passengers passing through the most crowded point of a route over a 30- or 60-minute interval (passenger count over interval divided by number of scheduled vehicles).
<u>Crowding capacity</u> – Capacity used to measure the percent of transit trips where crowding is experienced.
<u>Load factor</u> – The ratio of total passengers to seats. It is typically used to evaluate the quality of service on vehicles designed for mostly seated passengers.
<table>
<tr><th rowspan="2">Vehicle Type</th><th colspan="2">Planning Capacity</th><th colspan="2">Crowding Capacity</th></tr>
<tr><th>Total Passengers</th><th>Load Factor</th><th>Total Passengers</th><th>Load Factor</th></tr>
<tr><td>Streetcar[7]</td><td>69</td><td>2.1</td><td>82</td><td>2.5</td></tr>
</table></td></tr>
</table>

[7] The SFMTA's historic streetcars' capacities and layouts vary (some designed with transverse seats and narrow, while others are designed for mostly standing passengers). To provide capacities that are generally representative, figures provided are based on the average of the four most common vehicle configurations.

6.1. Maintenance Standards and Practices

Maintaining the historic streetcar fleet is extremely complex. From reverse engineering of parts for fabrications to no one car being alike, the fleet's continued stewardship requires a skilled and knowledgeable workforce. SFMTA's Vehicle Maintenance Rail Division is responsible for keeping the historic streetcar fleet in the best condition possible. The rail maintenance program includes standards for all rail fleets, preventative and reactive maintenance activities, and the vehicle overhaul program.

6.1.1 Preventative Maintenance

Preventative maintenance includes daily pre-operation inspections and mileage-based inspections. Before operators bring a vehicle into service, they perform a pre-operation inspection to check the general operating condition of the vehicle. These activities aim to minimize unexpected failures while reactive maintenance addresses issues when they arise. Problems that are identified during daily pre-operation inspections are reported to the rail vehicle maintenance unit. If an identified problem may affect safety, service, accessibility or cause further component damage, the vehicle is removed from service. For streetcar, mileage-based preventative maintenance inspections are scheduled to be conducted at intervals of 2,500 miles or (300 hours for vehicles without GPS). Inspections include checks based on industry standards and in-house SFMTA requirements.[8]

6.1.2 Reactive Maintenance

The SFMTA strives to maximize performance and minimize the need for reactive maintenance (including road calls) through the preventative maintenance program. However, reactive maintenance cannot be eliminated and is often a function of vehicle miles, fleet age and preventative maintenance intervals. The reactive vehicle maintenance policy is as follows:

- All problems are to be reported, no matter how minor.
- Campaigns are performed to eliminate known issues.
- The supervisor or their delegate will make an immediate determination whether the vehicle should be removed from service.
- Failures of accessibility equipment require prompt resolution. An alternate vehicle or immediate repair will be provided.
- The Operator records all defect problems on a 01 Defect Card.
- All repairs are documented in the maintenance database software.

7. Historic Overhaul and Restoration Program

The 2019 Plan estimated that SFMTA would need up to 51 service ready vehicles by 2030; with a strong preference for double-ended vehicles, due to the flexibility they provide for both E and F Line service. As presented in Table 3 above, 32 vehicles are considered service-ready. While short of the 2019 Plan's aspirational fleet size for 2030, SFMTA's current composition of service-ready vehicles is sufficient for delivering 2019 services levels, as well as support up to 50% increase in current service levels on the F line[9]. Given the capacity of the current fleet to accommodate service increase, SFMTA does not plan to take on full overhaul/restoration of additional vehicles in the next ten years beyond those

[8] All preventive maintenance inspections are detailed in SFMTA's L.PR.017 Rail Vehicle Preventative Maintenance & Inspection Scheduling standard operating procedure.

[9] Estimate for planning purposes only and dependent upon several factors including but not limited to performance and reliability, running repair capacity, operator availability etc. Assumptions includes a service level that adds up to 7 vehicles to peak PM demand, which maintains a spare ratio of approximately 30 percent.

planned/actively underway on vintage and special service cars (in-house: 233, 228, 162, 130; contract: 913, 351, 798). Instead, this Plan lays the foundation for SFMTA's Overhaul and Restoration Program for the 10-to-20-year period, building upon lessons learned thus far on active rehabilitation projects as well as the restoration alternatives study conducted in 2019. The below sections summarize active projects, outline recommended rehabilitation projects as demand dictates and resources allow. This section also provides an overview of the SFMTA's overall approach to its Historic Overhauls and Restoration Program moving forward.

7.1. Approach

Based on previous assessment of SFMTA capabilities and capacity to sustain an overhaul and restoration program, SFMTA maintains that a hybrid model continues to be appropriate for historic streetcar overhauls and restorations. Contracting out is the preferred model to deliver restorations at scale – minimizing costs, staff resourcing and physical space and equipment requirements for assembly, disassembly, parts fabrication and so on. Restorations completed via a third-party vendor will also allow SFMTA to pursue standardization of major subsystems in part of the fleet to improve reliability and maintainability (discussed in greater detail below). On-going rehabilitation of specialty cars may continue to be conducted by internal shops within Fleet Maintenance and project management support from Transit Program Delivery's Fleet Engineering and Project Management units. In-house rehabilitation is ideal for one-off cars given they often require significant reverse engineering and special work less suited for full contracting out as they are prone to significant mark-up in price[10]. Restoring special service vehicles in-house also reduces the potential impact on service when internal shops need to shift work to prioritize preventative and reactive repairs on the light rail fleet.

- *Scope.* Historic overhaul and restorations are intended to bring streetcars into like new condition. This includes but is not limited to rehabilitating trucks, upgrading propulsion, electrical and mechanical systems, performing bodywork, and ensuring all systems meet California Public Utilities Commission (CPUC) and the Americans with Disabilities Act (ADA) requirements. Consistent with the hybrid delivery model, the scope and typology of work completed during overhaul and restoration also takes a hybrid approach – balancing historical preservation with standardization/modernization. Standardizing major subsystems in part of the fleet will improve reliability, maintainability and vehicle availability and subsequently reducing the required spare ratio. Operational reliability and bringing operating cost to be more comparable to other Muni modes will be essential to ensuring long-term health and sustainability of the SFMTA Historic fleet of cars required for daily service. One-off and historically significant streetcars – cars that are not relied upon for daily service – will continue to be overhauled to their original state internally as staff capacity and capabilities allow.
- *Schedule Requirements.* SFMTA plans to continue to progress through active projects in order to inform realistic timelines (from start-up through to revenue service) for recommended future projects. As SFMTA gains greater understanding of expansion demand, assumed schedule duration requirements will be used to fine tune timing of capital resources. Depending on factors such as scale (number of vehicles), delivery method and complexity of work, project duration could be 36-60 months for multi-vehicle contracts with acceptance taking place over the course of the project.

[10] The in-house delivery model may include the contracting out of fabrication of various parts and scope elements depending on vehicle condition and shop capabilities.

7.2. Active Vehicle Rehabilitation Projects

The SFMTA has an active portfolio of restoration campaigns that will inform historic streetcar rehabilitation and vehicle standardization as resources allow and expansion in needed.[11] Below outlines the active projects' scopes, schedules, and costs.

Table 6. Active Rehabilitation Projects

Project	**Vintage Streetcar Rehabilitation Phase1**
Scope	Rehabilitate three historic streetcars to like-new condition. The rehabilitation will upgrade major electrical and mechanical systems, including the propulsion, controller, and door systems, which will improve vehicle reliability and ensure each vehicle is in regular revenue service. The rehabilitation and select system enhancements will provide a level of performance, safety, and reliability to keep vehicles in operation for an additional 25 years.
Schedule	Spring 2017 - Summer 2028
Cost Estimate	$17.25M
Anticipated Lessons	Ideal systems and scope elements for standardization at scale, time requirements, costs, contracting and delivery methodologies and best practices.
Project	**Blackpool Streetcar 233 Rehabilitation**
Scope	In-house rehabilitation of Blackpool Streetcar 233, internal SFMTA shop staff will conduct the rebuild of multiple components of the streetcar including, but not limited to, trucks, air compressor, and brake components. The rehabilitation will improve vehicle performance, safety and reliability to allow vehicle use in more frequent special service capacity.
Schedule	Spring 2022 - Fall 2023
Cost	$1.4M
Anticipated Lessons	Internal shop capacities and capabilities, resource requirements (staff/time/$) for various systems and conditions, project management best practices, engineering/design example for sister car
Project	**Vintage Car 162 Rehabilitation**
Scope	In-house rehabilitation of Vintage Car 162, internal SFMTA shop staff will conduct the rebuild of multiple components of the streetcar including, but not limited to, trucks, air compressor, and brake components. The rehabilitation will improve vehicle performance, safety and reliability to allow vehicle use in more frequent special service capacity.
Schedule	Spring 2019 - Summer 2023
Cost	$1.4M
Anticipated Lessons	Internal shop capacities and capabilities, resource requirements (staff/time/$) for various systems and conditions, project management best practices, engineering, and design blueprint for like cars

Total Active Project Capital Need: $20.1M

7.3. Future Vehicle Restoration Opportunities

While future restoration and overhauls are dependent on substantial expansion in service predicated on network/right-of-way improvements, SFMTA has identified candidate vehicles from the "rehab required" condition category. Specific vehicles would be identified based on use/status, operational flexibility (single-, double-) and condition (severity of damage and complexity of repairs).

[11] SFMTA has also recently completed rehabilitation campaigns include third party contract to rehabilitate 16 PCC's to like new condition and internal wreck repair of PCC Car 1063. Evaluation of both projects will be used along side active projects in informing the future overhaul and restoration program framework.

Candidates for Standardization

- **Singled-ended PCCs (15) (1026-1040):** Up to 15 single-end PCCs, in the rehab required condition category are of the same make/model. These vehicles could either be used to pilot standardization on the PCC vehicle category or as a sub-fleet to contract standardization at scale.
- **Milan cars (11):** Up to 11 Milans are available to help SFMTA determine their extended role in the revenue fleet as well as the degree to which increased standardization is required to improve their reliability.

Candidates for Internal Overhauls[12]

- **Vintage Cars (1, 130, 228):** Represent *sister* vehicles to rehabilitations currently underway, taking advantage of learnings and best practices while they are recent for shop staff.
- **Vintage Cars (916, 151, 578j 586):** Double-ended vintages cars that may be suitable for revenue service.
- **Vintage Cars (496, 578s, 189):** Double-ended vintages cars that are deemed Special Service in nature.

Candidates for Donation/Sale

- "**Red-Arrow" double-ended PCCs (2):** While previously identified as candidates for restoration due to SFMTA's limited availability of double-ended vehicles in the "rehab required" pool, the condition of the Red-Arrow cars make them prohibitively costly to pursue. Instead, SFMTA will explore sale opportunities. At time of writing Maryland Transportation Authority expressed interest in acquiring the "Red-Arrow" cars. Revenue from a potential sale of these vehicles can be used to fund priority projects in the restoration program.

[12] Candidates for internal overhauls continue to be one-of-a-kind original vintage cars which should remain historical in nature; refurbished using original design and fabrication standards. Vehicles identified represent staff understanding of condition and ease of repair, however given each vehicles unique status it is next to impossible to fully understand severity of condition, or the magnitude of work required until a vehicle is fully disassembled and assessed. As such, candidate identified here may evolve over time. It is also possible vintage cars be identified as suitable for standardization pending findings from Vintage Streetcar Rehabilitation Phase 1.

7.4 Project Recommendations

The below section provides recommendations for specific overhaul projects and conceptual timing over this plan's time horizon. Recommendations include rehabilitations of Special Service cars at a cadence that would allow internal shops to complete work as resources allow without impacting revenue service. Upon completion of Car 162 and Car 228, currently underway by internal shops, SFMTA projects Car 130 and 228 would be next in line, with special service vehicles being completed in pairs every two years, resulting in the special service fleet being serviced by 2042. For Revenue Service cars, after delivery of the three vehicles slated for rehab in the current RFP (2027-2028 projected acceptance), SFMTA anticipates piloting standardization on Milan cars and PCC's. Prototypes for standardized vehicle for each of the vehicle sub-categories would be anticipated accepted by 2034 and would inform a potential expansion in 2036+. Finally, SFMTA would stand-up mid-life refresh campaigns for recently restored vehicles to further solidify a lifecycle management practice for the historic cars (see Section 7.5). The following pages include conceptual scopes, schedules.

Table 7 Overhaul Project Recommendations

Project	**In house Streetcar Restorations Phase 2**
Scope	A combination of internal SFMTA shop staff and 3rd party contractors will conduct the rebuild of multiple components of special service streetcars 130 and 233. The Rehabilitations will include, but is not limited to, trucks, air compressor, and brake components. The rehabilitation will improve vehicle performance, safety and reliability to allow vehicle use in more frequent special service capacity.
Schedule	2024 – 2025
Cost	$8M
Project	**In house Streetcar Restorations Phase 3**
Scope	A combination of internal SFMTA shop staff and 3rd party contractors will conduct the rebuild of multiple components of special service streetcars. The Rehabilitations will include, but is not limited to, trucks, air compressor, and brake components. The rehabilitation will improve vehicle performance, safety and reliability to allow vehicle use in more frequent special service capacity.
Schedule	2030 – 2042
Cost	$38.4M
Project	**Streetcar Standardization Pilot Phase 2**
Scope	Rehabilitate three Milan streetcars, three PCCs, and three vintage cars to like-new condition based on lessons learned in the Vintage Streetcar Rehabilitation Phase 1. The rehabilitation will include upgrades major electrical and mechanical systems, including the propulsion, controller, and door systems, which will improve vehicle reliability and ensure each vehicle is in regular revenue service. The project will evaluate and provide a standardized scope of work for conducting future rehabilitation on the PCC and Milan vehicle categories by providing the prototype vehicles for rehabilitations at scale and apply vintage standardization to the next set of priority vintage cars. The rehabilitation and select system enhancements identified in the pilot will aim to provide a level of performance, safety, and reliability to keep vehicles in operation for an additional 25 years.
Schedule	Winter 2028 – Summer 2034
Cost	$29.2M

Total Overhaul Need (2025-2042): $ 76.8M[13]

[13] All estimates are in FY23 dollars.

Table 8. Summary of Potential Overhaul Program Timeline

Projects	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	FY39	FY40	FY41	FY42	FY43
Current																					
Original State Rehab (162/228)	**2**																				
Vintage Rehab Phase 1(3)					1	2															
Recommended																					
Original State Phase 2 (130/233)		1	1																		
Original State Phase 3								**1**	**1**			**1**	**1**			**1**	**1**			**1**	
Standardization Pilot (Vintage Rehabilitation Phase 2)(9)						3	3	3						X							
Possible Expansion																					
Expansion Rehab (TBD)											X	X	X								
Refresh Campaigns*																					
New Jersey PPCs (1070-1080)						2	2	2	2	2	2	2	2								
Ex-SEPTA PCCs														2	2	2	2	2	2	2	2
Revenue Car	32	32	32	32	33	38	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Special Service[14]	2	3	4-	-	-	-	-	5	6	-	-	7	8	-	-	9	10	-	-	11	-

Original Restoration Standardization Lifecycle Management

[14] Reflects number of special service vehicles with full rehabilitation not total fleet size timeline gets to all special service cars being serviced by 2042.

7.5 Lifecycle Management

As historic streetcars are rehabilitated, whether through standardization (revenue service cars) or preservation (special-service, vintage cars), these vehicles will require a lifecycle management strategy to keep the fleet in a continuous state of good repair and performing as expected. Two *mid-life* refresh campaigns have been identified for vehicles fully rehabilitated and accepted between 2010 and 2021. SFMTA will aim to define a streetcar lifecycle management strategy that will consider an optimal fleet age based on year of last restoration and vehicle performance, and establish standards for systems and components requiring overhaul, dependent upon a vehicles status and standardized/modernize or preserved/original.

Table 9. Lifecycle Management Refresh Campaigns

Project	**New Jersey Cars Refresh Campaign**
Scope	Conduct lifecycle refresh repairs on 16 New Jersey PCC historic street cars. Improvements would include minor body work such as roof rust mitigation and minor upgrades to door motors and propulsion control tips, traction motors, gearbox and truck overhauls.
Schedule	Winter 2028 – Winter 2033
Cost	$26.5M
Project	**SEPTA Cars Refresh Campaign**
Scope	Conduct lifecycle refresh repairs on 16 SEPTA PCC historic street cars. Improvements would include minor body work such as roof rust mitigation and minor upgrades to door motors and propulsion control tips, traction motors, gearbox and truck overhauls.
Schedule	2035 – 2040
Cost	$26.5M

Total Lifecycle Management Refresh Need (2028-2040): $53M

8. System Improvements and Service Expansion

To maximize investments in the historic fleet, several infrastructure upgrades are necessary to enhance the customer experience, as well as improve reliability and operational flexibility. Infrastructure investments also need to be complemented with service delivery improvements (such as designated line management at the TMC) to maximize on-time performance and minimizing gaps in service. However, like the vehicle program many right of way improvements will be dependent upon how San Francisco's planning context evolves, including financial viability and demand. SFMTA continues to maintain named projects in SFMTA's capital improvement program and aims to advance incremental improvements to optimize current customer experience. Additionally, SFMTA will advance studies to assess the viability of future service improvements. Results of these studies will ensure SFMTA has a suite of solutions that

could be deployed as demands require and funding is available. Below outline the system optimization and expansion opportunities that SFMTA maintains as priority along with their status (as of Spring 2023).

Improving signage and wayfinding. SFMTA is piloting updates of signage and wayfinding along cable car routes with completion anticipated in late 2023. SFMTA will apply lessons learned to design and install multilingual signage at strategic locations along the F line. Key information could include information on fares, prominent destinations, Muni Mobile ticketing and so on. Wayfinding and signage improvements has the potential to attract riders to the historic line; inform additional optimization strategies.

Church and Market Planning Study. As demand along the waterfront remains uncertain, SFMTA is looking in to advancing planning towards strategies where the historic streetcar service could bolster and supplement other service areas along the network. A Church and Market Planning Study would look at the technical feasibility and potential capital improvements required to offer alternative historic service alignment using Market Street and Church Street rail alignments.

Waterfront Stop Optimization Efforts. SFMTA continues to work towards improving accessibility, addressing sources of service delays and ensured historic service along San Francisco's waterfront is synergistic with the multifaceted mobility needs along the Embarcadero. Planning, outreach, and design for several locations including the Fisherman's Wharf terminal relocation and removal of the Harrison stop are among the locations for which SFMTA will advance near-term planning and design. SFMTA investigate delivering improvements the Embarcadero Enhancement Project led by SFMTA Streets division. SFMTA anticipates a clearer understanding of integration opportunities, feasibility, and potential delivery schedule in mid to late 2023.

Terminal West to Aquatic Park. SFMTA will complete near-term feasibility analysis to assess optimizing terminals at Fisherman's Wharf and extending tracks westward along Beach Street to a terminal west of Polk Street. Advancing this initiative is dependent upon Transit Planning staff capacity, SFMTA anticipates planning could commence in FY24 to answer key technical feasibility and critical planning questions.

F Line Loop Capital Alternatives. SFMTA identified a loop near McAllister and 6th Street for the F Line through the Better Market Street Project. Infrastructure associated with the loop would enable service planning and operational flexibility. Given the uncertainty around Better Market Street funding and delivery, a potential loop alternative continues to remain unfunded. As SFMTA continues to work towards identifying new revenues at the agency level, funding for better market street improvements will be assessed. Where possible SFMTA will advance near-term planning associated with loop alternative and maintain capital improvements as a long-range need.

9. Summary

In concert with Cable Cars, Muni's historic fleet of streetcars continue to attract recognition from around the world. San Francisco's streetcars not only move visitors and residents alike, but they also contribute to the unique fabric of our growing and vibrant city. As visitors return to this extraordinary city, historic streetcars will continue to have an important role to play. The Historic Streetcar Fleet Management Plan intends to guide the agency's approach vehicle restorations, service and infrastructure investments. While conditions continue to evolve, what is laid out in this Plan aims to maintain a steady, but flexible program of recommended project and provide a framework for how we approach this work. As mobility

needs continue to evolve along the Market Street and the waterfront, historic streetcars will contribute the livability, and economic vitality in our city.

10. Appendices

Appendix A. 2019 Historic Streetcar Action Plan Summary

Table 10. Action Status – 2019 Historic Streetcar Action Plan

2019 Strategy Areas	ID	Action(s)	Status	Status Details
1. Fleet Restoration	1.1	Initiate contracts to restore five vintage double-ended cars (no.151, 189, 351, 798, 913).	In Progress	SFMTA is currently in process of finalizing RFP for restoration of 3 vintage cars.
1. Fleet Restoration	1.2	Complete in-house restoration of four vintage cars (162, 130, 233, 228).	In Progress	in-house restoration of 162 and 228 currently underway.
1. Fleet Restoration	1.3	Scrap and dispose strategically identified vehicles to maximize utilization of facilities and provide a stream spare part.	Completed	
1. Fleet Restoration	1.4	Restore two double-ended streetcars.	Not Started	Decision made to not move forward with red-arrow cars. Disposal planning underway.
1. Fleet Restoration	1.5	Restore four Milan trams.	Not Started	Funding not currently identified.
1. Fleet Restoration	1.6	Restore nine PCCs to meet 2030 service plan.	Not Started	Funding not currently identified.
2. Infrastructure Investment	2.1	Complete environmental and preliminary engineering study to separate the E and F Line terminals in Fisherman's Wharf by extending tracks westward along Beach Street to a terminal west of Polk Street. Actively seek funding to complete design and construction.	On Hold	Funding not identified for construction, but planning and technical feasibility can likely be explored in FY24+.
2. Infrastructure Investment	2.2	Define Historic Streetcar service area in conjunction with system wide Overhead Catenary System (OCS) condition assessment.	Not Started	Action requires further discussion with key Maintenance of Way stakeholders.
2. Infrastructure Investment	2.3	Move accessible southbound stop at Pier 39 to better utilize existing turnback loop.	On Hold	Planning delayed, investigating delivery as part of Embarcadero Enhancement Project. Clearer understanding of feasibility and schedule in late 2022.
2. Infrastructure Investment	2.4	Evaluate the estimated ridership and costs associated with adding a new E Line stop along the Embarcadero south of Howard.	Not Started	Revisiting network service priorities
2. Infrastructure Investment	2.5	Implement Better Market Street improvements, including track replacement, improvements to the 11th Street wye, accessibility upgrades and the McAllister loop.	On Hold	Elements remain unfunded. As SFMTA continues to work towards identifying new revenues at the agency level
3. Service Delivery	3.1	Install ticketing machines at strategic stops along the Embarcadero to reduce cash fares and streamline boarding. Possible locations: Jones and Beach, Stockton, and Ferry Terminal.	Completed	
3. Service Delivery	3.2	Design and install multilingual signage with key information on fares, prominent destinations, Muni Mobile etc. at strategic locations.	In Progress	SFTMA is piloting on cable car and will apply lessons learned to the F Line, ~late 2023.
3. Service Delivery	3.3	Review the Historic Streetcar operator training curriculum with the goal of increasing the graduation rate.	Not Started	Limited resources redirected to core service network
3. Service Delivery	3.4	Restore original 5-car service level to E Line and evaluate expanded service hours from 6 am to 10 pm.	On Hold	E Line Service levels are dependent upon core service increases planned post-COVID.

3. Service Delivery	3.5	Implement signal improvements at 6th and King to enhance transit priority for the N-Judah and E-Line.	Completed	
3. Service Delivery	3.6	Initiate dedicated line supervision of the E and F lines to improve reliability and maximize performance.	Not Started	Limited resources redirected to core service network
4. Dedicated Resources	4.1	Conduct feasibility study of in-house historic fleet restoration.	Completed	
4. Dedicated Resources	4.2	Identify, and apply for, unique funding opportunities in order to initiate new/unfunded restorations	In Progress	

Appendix C. Fleet Inventory (as of October 2022)

Table 11. Historic Streetcar Fleet Inventory (October 2022)

Vehicle No.	Category	Single/ Double	Condition	Last Date in Service	Vehicle Description
1807	Milan	Single	Restore for Future Service	2016	Milan, Carminati & Toselli (1928)
1811	Milan	Single	On Hold	2014	Milan, Carminati & Toselli (1928)
1814	Milan	Single	Revenue Car	Revenue Car	Milan, Carminati & Toselli (1928)
1815	Milan	Single	Restore for Future Service	2019	Milan, Carminati & Toselli (1928)
1818	Milan	Single	Repairs required	2019	Milan, Carminati & Toselli (1928)
1834	Milan	Single	Restore for Future Service	N/A	Milan, Carminati & Toselli (1928)
1856	Milan	Single	Revenue Car	Revenue Car	Milan, Carminati & Toselli (1928)
1859	Milan	Single	On Hold	2019	Milan, Carminati & Toselli (1928)
1888	Milan	Single	Restore for Future Service	2007	Milan, Carminati & Toselli (1928)
1893	Milan	Single	Revenue Car	Revenue Car	Milan, Carminati & Toselli (1928)
1895	Milan	Single	On Hold	2018	Milan, Carminati & Toselli (1928)
1006	PCC	Double	Revenue Car	Revenue Car	PCC (San Francisco) (1948)
1007	PCC	Double	Revenue Car	2018	PCC (San Francisco) (1948)
1008	PCC	Double	Revenue Car	Revenue Car	PCC (San Francisco) (1948)
1009	PCC	Double	Revenue Car	Revenue Car	PCC (San Francisco) (1948)
1010	PCC	Double	Revenue Car	2018	PCC (San Francisco) (1948)
1011	PCC	Double	Revenue Car	Revenue Car	PCC (San Francisco) (1948)
1014	PCC	Double	On-Loan	1982	PCC (San Francisco) (1948)
1015	PCC	Double	Revenue Car	2018	PCC (San Francisco) (1948)
1026	PCC	Single	Restore for Future Service	1982	PCC (San Francisco) (1952)
1027	PCC	Single	Restore for Future Service	1982	PCC (San Francisco) (1952)
1028	PCC	Single	Restore for Future Service	1982	PCC (San Francisco) (1952)
1033	PCC	Single	Restore for Future Service	1982	PCC (San Francisco) (1952)
1034	PCC	Single	Restore for Future Service	1982	PCC (San Francisco) (1952)
1039	PCC	Single	Restore for Future Service	1982	PCC (San Francisco) (1952)
1040	PCC	Single	Revenue Car	Revenue Car	PCC (San Francisco) (1952)
1050	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1051	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1052	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1053	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1947)
1055	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1056	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1057	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1058	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1059	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1060	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1947)
1061	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1062	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1063	PCC	Single	Revenue Car	Revenue Car	PCC (ex. SEPTA) (1948)
1070	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)

1071	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1947)
1072	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1073	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1947)
1074	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1075	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1076	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1077	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1947)
1078	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1079	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1080	PCC	Single	Revenue Car	Revenue Car	PCC (ex NJT) (1946)
1103	PCC	Single	Restore for Future Service	1982	PCC (SF, ex. St. Louis) (1946)
1115	PCC	Single	Restore for Future Service	1982	PCC (SF, ex. St. Louis) (1946)
1158	PCC	Single	Restore for Future Service	1982	PCC (SF, ex. St. Louis) (1946)
1160	PCC	Single	Restore for Future Service	1982	PCC (SF, ex. St. Louis) (1946)
1168	PCC	Single	Restore for Future Service	1982	PCC (SF, ex. St. Louis) (1946)
1704	PCC	Single	Restore for Future Service	1983	PCC (SF, ex. St. Louis) (1946)
2147	PCC	Single	On Hold	N/A	PCC (ex. SEPTA) (1948)
1	Vintage	Double	Special Service	2019	Muni Type A (Built 1912)
130	Vintage	Double	Restore for Future Service	2017	Muni Type B (Built 1914)
151	Vintage	Double	Restore for Future Service	N/A	Osaka, Japan (Built 1927)
162	Vintage	Double	Restore for Future Service	2014	Muni Type B (Built 1914)
189	Vintage	Double	Restore for Future Service	1987	Porto, Portugal (Built 1929)
351	Vintage	Double	Restore for Future Service	N/A	Johnstown, PA (Built 1926)
496	Vintage	Double	Special Service/E Line Service		Melbourne, AU (Built 1928)
586	Vintage	Double	Restore for Future Service	N/A	Melbourne, AU (Built 1928)
798	Vintage	Double	Restore for Future Service	N/A	Market St. Railway Car (1924)
913	Vintage	Double	Restore for Future Service	N/A	New Orleans (Built 1923)
916	Vintage	Double	Special Service/Limited Regular Service	2019	Melbourne, AU (Built 1946)
952	Vintage	Double	New Orleans	2015	New Orleans (Built 1923)
578-J	Vintage	Double	Restore for Future Service	1990	Hiroshima Japan (1927)
578-S	Vintage	Double	Special Service/Limited Charter Service	2019	Market Street Railway (1896)
228	Vintage	Single	Special Service/Limited Regular Service	2019	Blackpool, England (Boat) (1934)
233	Vintage	Single	Restore for Future Service	2018	Blackpool, England (Boat) (1934)
737	Vintage	Single	Special Service/Limited Regular Service	2019	Brussels (Painted Zurich) (1952)
3557	Vintage	Single	Restore for Future Service	1992	Hamburg Tram (1954)