Draft as of 10/5/23

Prop L Sales Tax Program
Project Information Form (PIF) Template

San Francisco County Transportation Authority

Project Name and Sponsor			
Project Name:	Muni Metro Modernization: Train Control Upgrade Project		
Implementing Agency:	SFMTA		
Prop L Expenditure Plan Information			
Prop L Program:	02- Muni Rail Core Capacity		
Prop L Sub-Program (if applicable):			
Second Prop L Program (if applicable):	06- Muni Transit Maintenance, Rehabilitation, and Replacement		
Project Information			
Brief Project Description for MyStreetSF (80 words max):	Plan, design, procure, and install the next-generation communications-based train control (CBTC) system for the rail network, including surface and subway alignments. Investing in a new CBTC system will bring the train control system into a state of good repair and will result in a more efficient, reliable, and safe way to manage light rail vehicle traffic. The CBTC system will improve transit service by reducing congestion-related delays, providing more consistent travel times, reducing headways, and increasing overall safety for Muni Metro.		
Project Location and Limits:	All LRV light rail lines (N, T, K, M, J, L, S) in the Muni Metro network. CBTC will cover all surface and subway rail alignments, except the F-line on the surface of Market Street and the trackway north of the Ferry Portal used by the E-line.		
Supervisorial District(s):	Citywide		
Is the project located on the 2022 Vision Zero High Injury Network ?	No	**Is the project located in an Equity Priority Community (EPC)?**	Yes
Which EPC(s) is the project located in?	Visitacion Valley, Bayview, Oceanview, Ingleside, Chinatown, SOMA, Tenderloin/Civic Center, Park Merced		
Detailed Scope (may attach Word document): Please describe in detail the project scope, any planned community engagement, benefits, considerations for climate adaptation and resilience (if relevant), and coordination with other projects in the area (e.g.	See attachment 1: Detailed Scope.		
Attachments: Please attach maps, drawings, photos of current conditions, etc. to support understanding of the project.	Attachment 1: Detailed Scope Attachment 2: Phase Map		
Type of Environmental Clearance Required:	Categorically Exempt		
Coordinating Agencies: Please list partner agencies and identify a staff contact at each agency.			

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Project Delivery Milestones	Status	Work	Start Date		End Date	
Phase	**% Complete**	**In-house - Contracted - Both**	**Quarter**	**Fiscal Year (starts July 1)**	**Quarter**	**Fiscal Year (starts July 1)**
Planning/Conceptual Engineering			Q2-Oct-Nov-Dec	2018/19	Q4-Apr-May-Jun	2025/26
Environmental Studies (PA&ED)					Q3-Jan-Feb-Mar	2024/25
Right of Way						
Design Engineering (PS&E)			Q4-Apr-May-Jun	2025/26	Q3-Jan-Feb-Mar	2030/31
Advertise Construction						
Start Construction (e.g. Award Contract)			Q2-Oct-Nov-Dec	2026/27		
Operations (i.e. paratransit)						
Open for Use					Q1-Jul-Aug-Sep	2032/33
Project Completion (means last eligible expenditure)					Q3-Jan-Feb-Mar	2033/34

Notes

Q3 of FY 2024/25 is the date of the expected NTP of the train control supplier contract. The approval action for NTP requires the completion of environmental clearance.

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Project Name:	Muni Metro Modernization: Train Control Upgrade Project

Project Cost Estimate		**Funding Source**		
Phase	**Cost**	**Prop L**	**Other**	**Source of Cost Estimate**
Planning/Conceptual Engineering	$ 72,644,509	$ -	$ 72,644,509	
Environmental Studies (PA&ED)	$ -	$ -	$ -	
Right of Way	$ -	$ -	$ -	
Design Engineering (PS&E)	$ 201,117,278	$ -	$ 201,117,278	
Construction	$ 332,892,025	$ 88,078,000	$ 244,814,025	
Operations (i.e. paratransit)	$ -	$ -	$ -	
Total Project Cost	$ 606,653,812	$ 88,078,000	$ 518,575,812	
Percent of Total		**15%**	**85%**	

Funding Plan - All Phases - All Sources

Cash Flow for Prop L Only (i.e. Fiscal Year of Reimbursement)

Fund Source	**Prop L Program**	**Phase**	**Fund Source Status**	**Fiscal Year of Allocation (Programming Year)**	**Total Funding**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027/28**	**2028/29**	**2029/30**
Operating		Planning/Conceptual Engineering	Allocated	Previous	$ 2,095,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General Fund Prop B Transit		Planning/Conceptual Engineering	Allocated	2018/19	$ 340,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenue Bond		Planning/Conceptual Engineering	Allocated	2020/21	$ 2,165,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenue Bond		Planning/Conceptual Engineering	Allocated	2021/22	$ 3,240,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TSF Developer Fees		Planning/Conceptual Engineering	Allocated	2021/22	$ 10,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenue Bond		Planning/Conceptual Engineering	Allocated	2022/23	$ 11,672,882	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Revenue Bond		Planning/Conceptual Engineering	Programmed	2023/24	$ 23,922,118	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Planning/Conceptual Engineering	Programmed	2023/24	$ 6,014,161	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Planning/Conceptual Engineering	Programmed	2024/25	$ 18,185,348	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Planning/Conceptual Engineering	Programmed	2025/26	$ 5,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA5337		Design Engineering (PS&E)	Programmed	2025/26	$ 65,244,528	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA5337		Design Engineering (PS&E)	Programmed	2026/27	$ 52,804,364	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General Fund Prop B Transit		Design Engineering (PS&E)	Programmed	2027/28	$ 7,656,716	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Caltrans SB1 SGR		Design Engineering (PS&E)	Programmed	2027/28	$ 10,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
AB664 Bridge Tolls		Design Engineering (PS&E)	Planned	2027/28	$ 2,413,512	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Operating		Design Engineering (PS&E)	Planned	2027/28	$ 8,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TSF Developer Fee		Design Engineering (PS&E)	Programmed	2027/28	$ 2,785,609	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General Fund Prop B Transit		Design Engineering (PS&E)	Planned	2028/29	$ 13,496,955	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Caltrans SB1 SGR		Design Engineering (PS&E)	Programmed	2028/29	$ 5,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Design Engineering (PS&E)	Programmed	2028/29	$ 14,958,233	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Caltrans SB1 SGR		Design Engineering (PS&E)	Programmed	2029/30	$ 3,751,472	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Design Engineering (PS&E)	Programmed	2029/30	$ 15,005,889	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prop L	06- Muni Transit Maintenance, Rehabilitation, and Replacement	Construction	Planned	2026/27	$ 41,078,000	$ -	$ -	$ -	$ -	$ 13,074,000	$ 16,502,000	$ 11,502,000
FTA 5337		Construction	Programmed	2026/27	$ 13,752,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TIRCP		Construction	Programmed	2026/27	$ 30,576,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Construction	Programmed	2027/28	$ 51,563,373	$ -	$ -	$ -	$ -	$ -	$ -	$ -

General Fund Prop B Transit		Construction	Programmed	2028/29	$ 3,773,416	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prop L	02- Muni Rail Core Capacity	Construction	Planned	2027/28	$ 35,000,000	$ -	$ -	$ -	$ -	$ 10,500,000	$ 11,550,000	$ 12,950,000
TIRCP		Construction	Planned	2028/29	$ 50,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Construction	Programmed	2029/30	$ 16,876,650	$ -	$ -	$ -	$ -	$ -	$ -	$ -
STIP		Construction	Planned	2027/28	$ 10,642,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Construction	Programmed	2028/29	$ 6,799,409	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TSF Developer's Fee		Construction	Planned	2029/30	$ 6,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
AB664 Bridge Tolls		Construction	Planned	2029/30	$ 365,840	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TIRCP		Construction	Planned	2029/30	$ 20,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prop L	06- Muni Transit Maintenance, Rehabilitation, and Replacement	Construction	Planned	2029/30	**$ 12,000,000**	$ -	$ -	$ -	$ -	$ -	$ -	$ -
FTA 5337		Construction	Programmed	2030/31	$ 23,155,558	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SB1 SGR		Construction	Programmed	2031/32	$ 2,783,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -
General Fund Prop B Transit		Construction	Planned	2032/33	$ 61,251	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SB1 SGR		Construction	Programmed	2032/33	$ 8,465,278	$ -	$ -	$ -	$ -	$ -	$ -	$ -
				Total By Fiscal Year	**$ 606,653,812**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 23,574,000**	**$ 28,052,000**	**$ 24,452,000**

Notes

The $12 million in Prop L EP 6 funds planned for FY 2029/30 will be considered for Transportation Authority Board adoption to program the funds during the next 5YPP cycle.

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Prop L Supplemental Information Please fill out each question listed below (rows 2-8) for all projects.	
Project Name	***Muni Metro Modernization: Train Control Upgrade Project***
Relative Level of Need or Urgency (time sensitive)	The time sensitivity of the Train Control Upgrade Project funding is high. The unique contracting structure of this project requires coordination between the SFMTA, the eventual train control supplier, and the contractors with which the SFMTA establishes follow-on installation contracts. While this approach gives SFMTA much greater flexibility during installation, this multiple contract approach places a greater level of construction coordination responsibility on the SFMTA. Delays to installation due to missed payment milestones between the SFMTA and the supplier or future installation contractors will cause delays to project delivery, and increased costs due to these delays will fall on the SFMTA. The train control supplier will be paid on milestones established in the contract that are tied to delivery, installation, and verification of the new system. However, this milestone approach is a contractual obligation for all parties and means that SFMTA must meet all payment milestones on the contract schedule when required, as delays due to funding will place the SFMTA at risk for increased cost.
Prior Community Engagement/Level and Diversity of Community Support (may attach Word document):	SFMTA is currently developing a Public Engagement and Outreach Plan that defines the goals and objectives of public outreach for the project and identifies external stakeholders who: - Reside, work or travel using Muni Metro and will be directly affected by or interested in the project; - Those who may be indirectly or temporarily impacted by the project, such as riders and merchants on key Muni lines with major transfer points to Muni Metro; - Other community members who may be influenced by or interested in the project such as disability advocates and safety advocates. The TCUP Public Outreach and Engagement Plan will also analyze how the project will impact residents, merchants, transit riders and other impacted communities including traditionally underserved and underrepresented communities, prioritizing those identified by the Muni Service Equity Plan. We will identify and consider the anticipated impacts to diverse local communities throughout all phases of the project. We will clearly define the decision space for public participation and share clear expectations about the public's role in the project as part of the SFMTA's commitment to meaningful public involvement in decision-making. This includes articulating the aspects of the project that can potentially be influenced by public input as well as the constraints that limit the efficacy of public feedback. Additional information about outreach is included in Attachment 1: Detail Scope and Engagment. Our priority throughout the public outreach planning process is to center traditionally underrepresented communities and ensure that informational and consultative strategies and tactics are equitable and inclusive and that feedback is incorporated into the project in transparent and demonstrable ways.

Benefits to Disadvantaged Populations and Equity Priority Communities	The SFMTA Train Control Upgrade Project (TCUP) aims to address Muni Metro efficiency, reliability and crowding. The SFMTA's Muni Metro LRV system directly serves seven of the nine neighborhoods identified in the agency's Muni Service Equity Plan, providing important connections to jobs and services throughout the city for people who rely on public transit. These communities are racially and ethnically diverse and include a high percentage of San Francisco's monolingual or limited English proficient residents and low-income residents. The SFMTA Train Control Upgrade Project (TCUP) aims to better serve these communities and all Muni riders, 70% of whom are from households that make less than $50,000/year. The phasing of the Train Control Upgrade Project was in part designed to bring the benefits of CBTC to disadvantaged communities sooner. The Pilot Phase, which will enable CBTC on Muni Metro track between the western portals and Muni Metro East, will improve service on the T Line, a critical transit link to Bayview and Visitacion Valley. The following planned surface phases of the project, the N and K/M, will subsequently provide the benefits of CBTC to the highest ridership Muni Metro line and the lines serving the Southern portions of the CIty, including Park Merced, Ingleside, and Oceanview.
Compatability with Land Use, Design Standards, and Planned Growth	Yes
San Francisco Transportation Plan Alignment (SFTP)	Safety and Livability
	As discussed in the response to the Safety prompt, the Train Control Upgrade Project will maintain the excellent safety record provided by the ATCS system in the Market Street Subway, while also bringing the saftey improvements associated with CBTC to the surface portions of the Muni Metro network.

The next section includes criteria that are specific to each Expenditure Plan program. The questions that are required to be filled out for each program will auto-populate once the Prop L program is selected on the Scope & Schedule tab.	
02- Muni Rail Core Capacity	
Safety	The existing ATCS has achieved an excellent record of safety in the Market Street Subway. The SFMTA expects a new CBTC system to match and exceed this record. Safety improvements from this project will primarily come from the expansion of train control to the surface portions of the system. For example, CBTC will provide ATP (automatic train protection) functionality on the surface, something that currently only exists in the subways. Specific technical details on how ATP works are dependent on the selected train control supplier, however ATP generally provides a suite of automatic safety features that prevents conflicts between trains, including the ability for the CBTC system to automatically activate an LRVs emergency brake. Expanding train control supervision to the surface will also enable automatic speed and signal enforcement for LRVs. ATP combined with automatic speed and signal enforcement will increase safety for riders and other road users.
Increases Capacity	Due to the restriction of most Muni Metro lines combining into a single double-tracked subway, SFMTA considers throughput in the Market Street Subway as the greatest indicator of capacity, measured in trains-per-hour (TPH). At the height of pre-Covid service Muni Metro managed to run 30-35 TPH when delays were minimal. However, even one non-communicating train or severe delay could drastically lower performance, indicating that the system was running on the limits of its capacity. During the early days of Covid, the Muni Metro shutdown and subsequent return to lighter service – operating with fewer TPH and a greater percentage of the more-reliable LRV4s – saw a 75% decrease in measured delay compared to pre-COVID service. With a new CBTC system, SFMTA expects to exceed the pre-COVID benchmark of 35 TPH and to do so with greater reliability. The RFP for the train control supplier requires that the new CBTC system reliability increase the capacity of the Market Street Subway by 20% compared to 2019 service levels.
Improves Reliability	There are two major sources of delay and decreased reliability on the Muni Metro network. The first is the transition LRVs make between the surface and subway portions of the system. The portals to the Subways are operated on a first-come, first-serve basis, and the technology that allows entry into the portals does not consider the scheduled headways of the LRVs. Additionally, due to the old technology of the existing ATCS, each train must come to a complete stop and "log-in" to the train control system every time it enters a portal. This is a potential failure point for the ATCS system, and if the train does not successfully "log-in" it is forced to travel at reduced speeds in the subway until it can be taken out of service. These technological conditions coupled with the complicated traffic environment outside the portals can easily lead to train queuing and congestion during peak service. With CBTC, trains will only "log-in" once per day at the start of service, which eliminates the need to stop at portals and the chances of a communications malfunction. The second source of delay is the lack of train management and signal integration on the surface. While the CBTC system will not automatically operate trains on the surface like it does in the subways, CBTC will allow train controllers to better manage train traffic on the surface, and the integration of CBTC with traffic signals will allow for better train throughput at intersections where the LRVs frequently experience delay. There are many other smaller technical improvements with modern CBTC, but the SFMTA expects these two benefits of CBTC to dramatically improve rail service reliability and decrease the variability of travel times on Muni Metro.

The next section only applies to projects that are proposed under multiple Expenditure Plan programs. The questions that are required to be filled out for each program will auto-populate once the Second Prop L program (row 7) is selected on the Scope & Schedule tab.	
06- Muni Transit Maintenance, Rehabilitation, and Replacement	
Safety	As described in the response to the EP 2 Safety question above, while the existing ATCS provides an excellent level of safety to Muni Metro riders, a new CBTC will confer several additional safety benefits for passengers, operators, and employees. The expansion of train control to the surface portions of the system through ATP (automatic train protection) will provide new safety features to surface-running Muni Metro service that prevent conflicts between trains, enable automatic emergency braking, and provide automatic adherence to surface signals and speed restrictions. Train operators will still retain control of their trains while driving on the surface, but these features will add an additional level of safety that will virtually eliminate surface conflicts between trains and expand safety protections between trains and other users of the road. For example, the new system will allow SFMTA transportation controllers to establish work zones that are automatically enforced by the CBTC system. SFMTA roadway workers already take extensive safety precautions when working in the rail right-of-way and have an impeccable safety record, but CBTC allows for added safety benefits like automatically enforced temporary speed restrictions and integration between the train control system and the early-warning beacon devices worn by all roadway workers.
Need (Asset Useful Life) (Facilities and Guideways Sub-program)	The existing Automatic Train Control System is approaching 30-years of use and is nearing the end of its useful life. Many train control related delays in the Subway can be attributed to the age of the physical components and software of this system. While SMFTA Maintenance of Way staff do an excellent job keeping the system safe and in the best state of repair achievable, the system needs to be replaced as soon as possible to prevent more train control related delays or the failure of proprietary components that are difficult to replace. A new CBTC system will confer additional service, safety, and capacity benefits over those provided by the ATCS; even so, a replacement as soon as possible is critical to maintain a state of good repair and the standards of transit service currently provided for Muni Metro riders.

Improves Efficiency of Transit Operations (Facilities and Guideways Sub-program)	This project addresses two major sources of delay and decreased reliability on the Muni Metro system, the issue of non-communicating trains slowing subway service as well as the lack of coordination between surface signals and train service. Addressing both these issues will both improve the reliability of Muni Metro and increase the overall efficiency of transit service provided to SFMTA customers. Non-communicating trains are an issue stemming from the existing ATCS and the process whereby all trains entering the subway from the surface must "log-in" each time they pass through a portal. In most train control systems, this only occurs once per day at the beginning of service, but the fact that only a portion of the Muni Metro system is controlled by train control means Muni LRVs must do so every time they enter the subway. While communication failures occur at a relatively low rate, the frequency of this process means non-communicating trains can occur several times per day during periods of peak service. When this happens, the non-communicating train enters a fail-safe mode and must proceed through the subway at a greatly reduced rate of speed until it can be removed from service, which bottlenecks the tightly spaced headways that Muni Metro requires and leads to residual delays for the rest of revenue service. CBTC eliminates this issue entirely by both removing the need for "log-ins" at the portals and improving communication reliability through modern technology and redundant connectivity between the LRVs and the train control system. In addition to the issue of non-communicating trains, the Muni Metro network generally suffers from poor reliability and efficiency due to the lack of coordination between the surface and subway portions of the system. CBTC will address this by adding the network management and signal integration benefits of train control to the surface portions of the line. The CBTC system will not automatically drive trains on the surface like in the subway portion of the system, but CBTC will allow train controllers to manage train traffic on the surface, and the integration of CBTC with traffic signals will allow for better train throughput at intersections where the LRVs frequently experience delay. There are many other improvements attributed to CBTC that SFMTA expects from this project, but these two alone will drastically improve the reliability and efficiency of Muni Metro service.

Train Control Upgrade Project

Prop L PIF Scope

July 2023

Attachment 1: Train Control Upgrade Project Detailed Scope

Background

The San Francisco Municipal Transportation Agency (SFMTA) currently uses an automatic train control system (ATCS) that first went into service in 1998. ATCS is a type of train control technology that controls trains in the 7-mile Market Street Subway and in the 1.6-mile long Central Subway. The ATCS controls the automatic movement of Light Rail Vehicles (LRV) and enforces a minimum safety separation between trains based on safe braking distances. ATCS also permits trains to move through the tunnel at a faster pace than allowable when vehicles are operated entirely under human control. Current Muni Metro transit service is not possible without this technology. When first introduced in 1998, the ATCS greatly improved the efficiency of the Muni Metro network. This system is now reaching the end of its useful life and must be completely overhauled or replaced.

Project Scope

The Train Control Upgrade Project (TCUP) is an SFMTA capital project which invests in this need by replacing the nearly 30-year-old ATCS in the subways with a new Communications Based Train Control System (CBTC). The project would also expand CBTC control outside of the subways to the surface portions of Muni Metro, where signals and switches are currently operated independently of the ATCS in a first come, first serve configuration. Under CBTC, the Muni Metro system would be managed centrally under a single, modernized system.

Unlike the existing ATCS, this newer CBTC technology uses WiFi or cellular connections to precisely track and continually communicate with every LRV in service. The existing ATCS cannot be used outside the subway. With the new technology, CBTC can manage train movements throughout the entire double-tracked Metro network. In the subway, CBTC would work like the existing ATCS and use automatic headway management to adjust the speed and dwell time of trains. On the surface, the CBTC system would communicate adjustments to LRV operators who would remain in control of the train. While Global Positioning Systems (GPS) is currently used to track LRVs on the surface, CBTC's telecommunications technology is more accurate and more directly accessible to the control center staff. The greater visibility CBTC provides to the SFMTA control center and operators would result in more effective train management and better LRV service for the entire Muni Metro system.

The SFMTA expects TCUP to confer the following benefits:

- Increase the capacity of the Muni Metro system
- Maintain the high standards of safety currently provided by the ATCS in the subway and extend modern safety protections to surface operations
- Enable shorter, more consistent travel times and wait times
- Provide a reliable train control system that supports Muni Metro at all times

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- Support configurable and flexible service changes and contingency operations
- Continually update the new system to include the latest service-proven components and software

The SFMTA will secure a single, negotiated contract with a CBTC supplier for design, procurement, testing, commissioning, and long-term support of a state-of-the-art CBTC. The CBTC contract will consist of two parts. The first part of the proposed contract will have a term of up to eight years and will cover CBTC design, procurement of software and equipment, oversight of equipment installation on light rail vehicles on trackways and in control rooms, system testing and certification. The second part of the proposed contract will have a term of up to 20 years (10-year base term and two five-year extensions) and will require the CBTC supplier to provide system support, a supply of spare and replacement parts, trouble shooting and diagnostics, software updates, and related technical services to assist the SFMTA in maintaining and operating the CBTC for its entire expected 20-year life. SFMTA will contract separately for the installation of train control equipment on the wayside and on the light rail vehicles. The CBTC supplier will provide installation instructions, witness the installation of its equipment, and assume quality assurance and construction management responsibilities with respect to the installers' work, with oversight provided by the SFMTA.

Phasing

As planned, the project would be installed in geographic phases. An initial "proving" phase would launch CBTC only on the surface trackway between Ferry Portal (at Embarcadero & Folsom Street) and the Muni Metro East maintenance facility (at 25th Street and Illinois Street), while also equipping the LRVs with CBTC equipment. This would allow for testing of the complete system and adjustments while minimizing delays and impacts to the system. The project would then move into the subways to replace the ATCS with the new CBTC, which is the most challenging and technically complex part of the system. Finally, the project would expand to the remaining trackway on the rest of the system.

A phased approach would minimize the risks associated with replacing the existing train control system while the system is in service and ensure that operations staff can become comfortable with the system as each phase is completed. Each phase would feature detail design and construction, allowing the design and construction of subsequent phases to overlap. The phases are planned as follows:

Phase 1 (Pilot): Trackway along Embarcadero/4th St & along 3rd Street to Muni Metro East (located at 25th Street and Illinois Street)

- Work under Phase 1 would occur along the public right of way following Muni Metro trackway between Ferry Portal (at Embarcadero & Folsom Street), Bryant Portal (at Bryant & 4th St) and the Muni Metro East maintenance facility (at 25th Street and Illinois Street)

Phase 2 (Subways): Replacement of ATCS in Market Street Subway and Central Subway

Train Control Upgrade Project

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- Work under Phase 2 would occur primarily in the existing Muni Metro Subways, including the extent of the Market Street Subway (Ferry Portal to West Portal) and the new alignment of the Central Subway (Central Subway Portal on 4th Street between Bryant and Harrison to the new Chinatown Station)

Phase 3: N Judah Expansion

- Work under Phase 3 would occur along the public right of way following Muni Metro trackway between the Duboce Portal and Ocean Beach. This would include work inside the Sunset Tunnel, which runs between the eastern portal at Duboce Street and Noe Street near Duboce Park and the western portal at Cole Street and Carl Street.

Phase 4: T Third Expansion

- Work under Phase 4 would occur along the public right of way following Muni Metro trackway along the remainder of the T Third line, between the Muni Metro East Maintenance Facility (25th Street and Illinois Street) and the terminus at Sunnydale Avenue and Bayshore Boulevard.

Phase 5: K Ingleside & M Oceanview Expansion

- Work under Phase 5 would occur along the public right of way following Muni Metro Trackway along the K & M light rail lines, between West Portal and Balboa Park Stations

Phase 6: J Church Expansion

- Work under Phase 6 would occur along the public right of way following Muni Metro Trackway along the J light rail line between the Duboce Portal (at Church Street and Duboce Avenue) and Balboa Park Station (the end of the J light rail line)

Phase 7: L Taraval Expansion

- Work under Phase 6 would occur along the public right of way following Muni Metro Trackway along the L Taraval line between West Portal Station and the terminal loop (end of the line) at Wawona Street by the SF Zoo

Work under each phase may include storage tracks (short sections or pockets of track connected to the main trackway used to remove trains from service), wyes (sections of track used to turn around trains), terminal loops (the loop at the end of the trackway), and any other trackway where Muni Metro trains may travel while in service and that are controlled by the train control system.

Train Control Upgrade Project

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Outreach/Stakeholder Engagement

This project was initiated as a result of the 2019 Muni Reliability Working Group, which made replacement of the train control system its top recommendation. The 2019 Muni Reliability Working Group was comprised of the SFMTA Board Chair, San Francisco Supervisors, the Mayor's Office, advocates, labor representatives, and outside transit experts.

The project team conducted extensive outreach to SFMTA staff from Transit Operations, Transportation Management Center, Fleet, Safety, Technology, Vehicle, Maintenance of Way, and Signal Maintenance groups, who provided input as to the scope of services, as well as desired and required CBTC functionality. Importantly, these stakeholders all identified reliability and maintainability as a priority for the new train control system. The procurement approach bundling performance-based support terms in the CBTC supplier contract was in part developed due to this stakeholder priority.

The project team has also given periodic briefings to the SFMTA and SFCTA Citizen's Advisory Committees, as well as MTC, SFCTA staff, and funding partners, and incorporated their feedback as appropriate. Development of a more detailed community engagement plan is underway. As more design details become known, the Agency will reach out to the communities and stakeholders who may potentially be impacted by construction, as well as to the transit riders who will benefit from the improved rail service.

In August 2022, the SFMTA Board established a Train Control Upgrade Project Committee to review and offer guidance to project staff concerning the project objectives, scope, contracting approach, schedule and costs. This committee has met twice since it was established, most recently on December 2, 2022. The first meeting focused on the strategic objectives and contracting approach, and the second meeting focused on a comparison of peer agency examples and the project risk assessment.

Attachment 2