2024 SFMTA Facilities Framework

Final Report - 20 November 2024 - *Prepared by Laura Blake Architect*

SFMTA

Contents

Cover: Presidio Yard, Photograph by IDEO

Report

Overview

Building Progress Program

The San Francisco Transportation Agency (SFMTA) *Building Progress Program* is a $2 billion plus multi-year effort to repair, renovate, and modernize the SFMTA's aging facilities that support Muni transit service, paratransit service, street infrastructure, and other critical functions that keep the City moving.

The SFMTA *Building Progress Program* has five elements:

- Plan for the future of the SFMTA buildings and yards.
- Engage the SFMTA staff, communities surrounding the SFMTA facilities, and additional stakeholders.
- Fund and manage the Building Progress Program cash flow.
- Repair and modernize facilities based on facility planning study recommendations.
- Deliver the recommended programs and projects through capital design and construction.

The *Building Progress Program* projects are included in the agency's *20-Year Capital Plan* and *5-Year Capital Improvement Program* (CIP). The CIP is a fiscally constrained program in which projects are funded by phase and adjusted as needs change.

Through a series of planning efforts the SFMTA has identified and refined recommended support facility improvements. The 2013 *SFMTA Real Estate and Facilities Vision for the 21st Century* provided recommendations for operational efficiencies, sustainable initiatives, funding sources, and advancing the Agency's goals for transit-oriented development and joint development. The *2017 SFMTA Facilities Framework* helped identify deficiencies and prioritize facility improvements. The *2024 SFMTA Facilities Framework* is an update to the agency's plan for improving its transit fleet facilities.

2017 SFMTA Facilities Framework

The *2017 SFMTA Facilities Framework Addendum* described two planning scenarios to modernize and expand the SFMTA fleet facilities. The agency selected the scenario that entails rebuilding its oldest bus yards with more capacity and began work on the Potrero Yard and Presidio Yard modernization projects.

In 2018 the California Air Resources Board (CARB) issued the *Innovative Clean Transit Regulations* that set the goal of transit agencies having all zero-emission bus fleets by 2040. The regulations require increasing zero emission bus purchases over time (25% of new bus purchases in 2023, 50% in 2026, and 100% in 2029). The regulations include bonus credits for electric trolley buses (ETBs) and early purchases of battery electric buses (BEBs) and allow transit agencies to seek exemptions due to setbacks in infrastructure construction, bus mileage and grade issues, and agency financial hardship.

The SFMTA submitted its initial *Zero Emission Bus Roll-out Plan* to CARB in 2021 and updated it in 2022. The plan describes the agency's intent to transition its hybrid buses to battery electric buses that are charged in its yards using inverted pantographs. It also describes its approach to converting its bus yards to battery electric bus yards and replacing its hybrid buses with battery electric buses.

The COVID-19 pandemic and ensuing shift to remote work impacted transit demand. As of September 2024, the SFMTA's system-wide ridership is approximately 78% of pre-pandemic levels.

In 2023 the SFMTA revised its *Zero Emission Vehicle (ZEV) Policy* to extend the timeline for having an all zero-emission fleet to align with the CARB's regulation timeline, which is currently 2040.

Given these changes the SFMTA requested that Laura Blake Architect assist the agency prepare the *2024 SFMTA Facilities Framework*.

2024 SFMTA Facilities Framework

The *2024 SFMTA Facilities Framework* is an update to the agency's plan for modernizing, converting, and in the long-term expanding its transit fleet facilities.

The SFMTA's older bus facilities, two of which—Potrero and Presidio—are over 100 years old, are not well suited to modern bus maintenance and need to be modernized to provide functional, safe, and resilient facilities. In addition, the agency's hybrid bus facilities need to be converted to BEB facilities to support the regulatory required transition to an all zero-emission bus fleet. To address these issues the SFMTA needs to rebuild or convert each of its bus yards.

This report provides an overview of the planned bus yard rebuild and conversion projects, their schedules, associated bus moves, yard capacities, and some implementation issues. Appendix 1 provides additional information on bus yard facility planning. Appendix 2 provides information on the SFMTA's updated *New Bus Delivery Plan*, bus parking demand projections, and bus yard parking analysis. Appendix 3 describes Scenario 2 that entails a different implementation sequence of the bus yard projects.

This report also provides updates on the SFMTA's paratransit, light rail vehicle, and enforcement facility planning.

This *2024 SFMTA Facilities Framework* will be used to help update the *Building Progress Program*, the *Zero Emission Bus Roll-out Plan,* the *20-Year Capital Plan* and the *5-Year Capital Improvement Plan.*

The *Facilities Framework* is a living document that the SFMTA should periodically update. The bus yard conversion and rebuild projects are large, complex, and expensive projects that include evolving technology and requirements. In addition, the schedule of sequential bus yard projects to support the transition to an all zero-emission bus fleet is ambitious.

The SFMTA is working to secure local, regional, state, and federal funding for its bus yard projects. In addition, where possible, it is incorporating joint development in its rebuild projects to maximize land use and generate revenue. Given the high cost and long-term nature of projects, the *Building Progress Program* is not fully funded and funding shortfalls are an ongoing risk.

All the SFMTA revenue sources are growing more slowly than before the pandemic and slower than the rate of expenditure growth due to inflation and cost of living increase. Federal, state, and regional relief is expected to be fully expended in FY25-26, which contributes to a large operating deficit starting in FY26-27.

If a bus yard project is delayed—due to funding shortfall, and/or other factors—the SFMTA will need to evaluate modifying subsequent project schedules and associated bus procurements and deliveries.

Transit Yard Planning and Projects

Bus Yard Planning

The *2024 SFMTA Facilities Framework* integrates and builds on the SFMTA's plan to rebuild its oldest bus yards as described in the *2017 SFMTA Facilities Framework Addendum* and its plan to convert its hybrid bus yards to BEB bus yards as described in the *SFMTA Zero-Emission Bus Roll-out Plan*. This report assumes the facility planning criteria described in the *2017 SFMTA Facilities Framework*, the BEB charging technology and infrastructure described in the *SFMTA Zero-Emission Bus Roll-out Plan*, and the SFMTA's updated bus parking demand projections and *New Bus Delivery Plan* which are included in Appendix 2.

This report also incorporates updates to mitigate capital costs by mitigating interim improvements, project phasing, and BEB relocations, and by retaining an electric trolley bus fleet.

Mitigate Interim Improvements and Project Phasing

The SFMTA determined that, due to reduced ridership demand since the COVID-19 pandemic, service could be met with fewer buses. In 2023 the agency canceled the MME and Marin interim trolley bus facility projects and will store some trolley buses while the Potrero and Presidio yards are rebuilt. In addition since fleet growth will be slower than previously projected, the yard conversion projects can be completed in one or two phases rather than four or five phases which will shorten project delivery times and reduce project costs.

Mitigate BEB Relocations

The SFMTA plans to charge its BEBs in its bus yards with inverted pantographs. As shown in the illustrations on the following page, pantographs are installed in fixed locations over bus parking lanes. To mitigate costs the *2024 SFMTA Facilities Framework* assumes that, once installed, the number and layout of pantographs in a yard will not change and that, with a few exceptions, the mix of 32-foot, 40-foot, and 60-foot buses assigned to a yard will not change.

Retain Electric Trolley Bus Fleet

Rather than convert the entire bus fleet to a BEB fleet, the SFMTA plans to retain most of its current electric trolley bus fleet and use the rebuilt Potrero as a trolley bus yard.

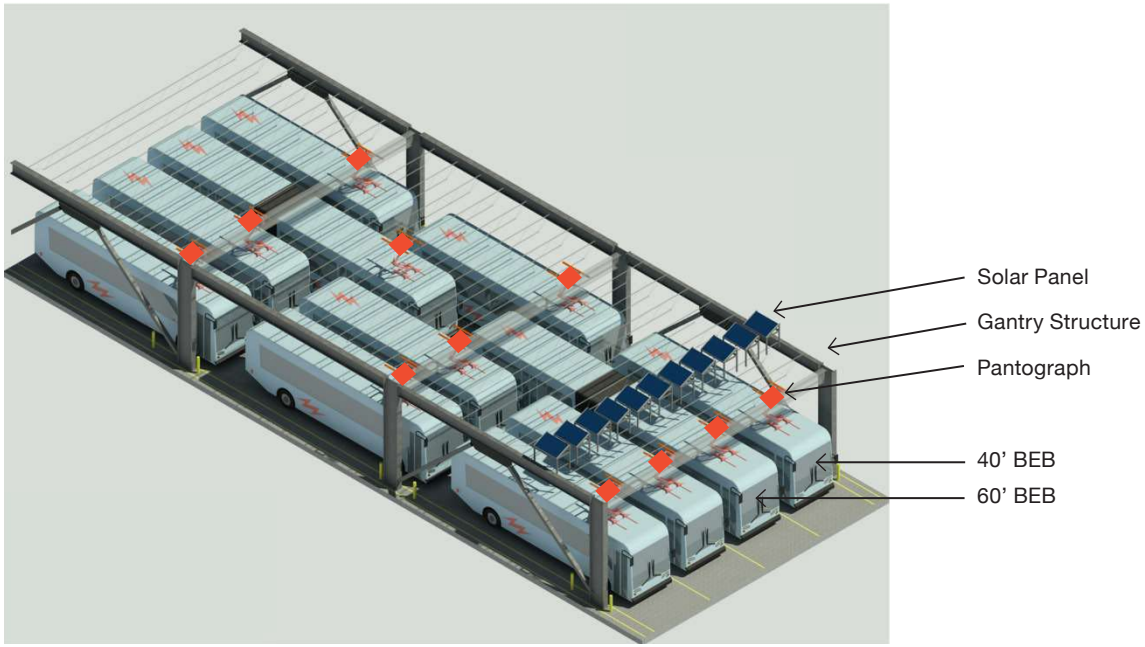
Bus Yard Projects

The *2024 SFMTA Facilities Framework* includes two BEB pilot projects (Woods and Islais Creek), two facility upgrade projects for interim bus parking and storage (MME and Marin), and six bus yard conversion and rebuild projects (Kirkland, Islais Creek, Potrero, Presidio, Flynn, and Woods). The following is a brief description of each yard and planned project. See Appendix 1 for additional information.

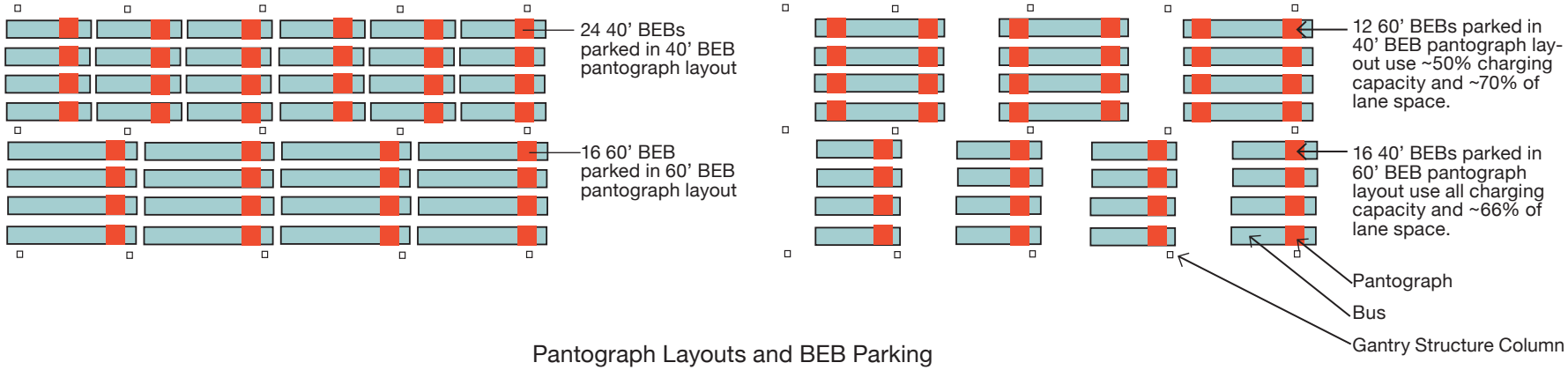
Marin

The SFMTA leases 1399 Marin Street from the San Francisco Port (SF Port). The SFMTA currently uses Marin as a bus acceptance facility. Since Marin is located across the street from the Islais Creek bus yard, its yard can be used as a satellite hybrid bus parking lot. Marin will serve as both a bus acceptance facility (for new bus delivery, testing, and acceptance prior to assignment to a yard for service), and

Bus Yard Battery Electric Bus Charging



Example of BEB gantry structure with pantograph (chargers) over parking lanes. WSP, 7/06/22, *SFMTA Zero-Emission Bus Roll-out Plan*, Figure 4-2 Inverted Pantographs and Modular Support Structure. Image modified to show pantographs in orange.



Pantograph Layouts and BEB Parking

an interim hybrid bus parking lot for 40-foot and 60-foot buses while other bus yards are converted or rebuilt. Bus administration and dispatch functions for fleets assigned to Marin will be located at Islais Creek. The SFMTA plans minimal site improvements but no building improvements at Marin. The scope of work includes pothole repair, and fencing, lighting, and security improvements.

Kirkland
The Kirkland Yard, built circa 1950, is the SFMTA's smallest bus yard. It is a 40-foot hybrid bus yard. The Kirkland yard will be converted to a BEB yard. The scope of work includes increasing the existing 11-foot-wide bus parking lanes to industry standard 12-foot-wide lanes and adding storm water collection and management and BEB charging infrastructure and equipment. The existing maintenance and fuel facilities will remain, but the existing operations facilities and bus wash will be replaced in new locations to maximize BEB charging position capacity.

Islais Creek
The Islais Creek Yard, completed in 2017, is the SFMTA's newest bus yard. The City owns and the SFMTA has jurisdiction of the yard property east of Interstate 280 and leases the yard property under and west of the elevated freeway from the California Department of Transportation (Caltrans). In addition, the San Francisco Port and San Francisco Public Utilities Commission have memorandums of understanding with the SFMTA for portions of the property. The yard, which can accommodate 40-foot hybrid buses, is currently used as a 60-foot hybrid bus yard. The yard will be used for a 60-foot BEB pilot project and be converted to a BEB yard. The scope of work includes new charging infrastructure and equipment on the SFMTA property.

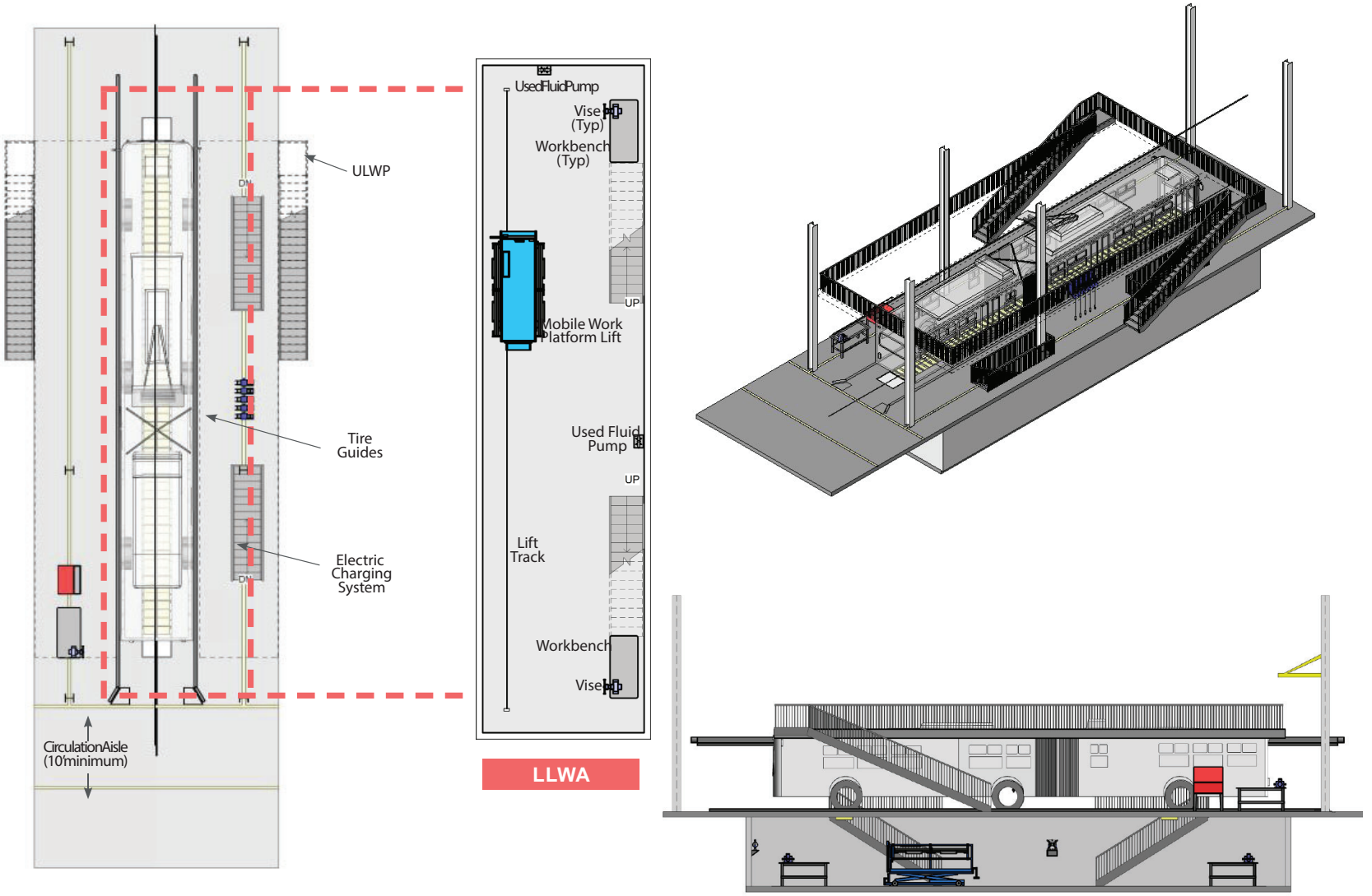
Muni Metro East Expansion Area
The City owns and the SFMTA has jurisdiction of an undeveloped 4-acre parcel on the east side of the 13-acre Muni Metro East (MME) light rail yard. The SFMTA will upgrade the parcel and use it for temporary 60-foot trolley bus storage and temporary 40-foot trolley bus parking. The scope of work includes a crushed concrete yard, lighting, fencing, and staff trailer or shed.

Potrero
The Potrero Yard, built in 1914, is the SFMTA's second oldest bus yard. It is an electric trolley bus yard. In 2022, the SFMTA awarded a pre-development agreement to the Potrero Neighborhood Collective (PNC) to rebuild the yard with more capacity and joint development. The rebuilt yard will be used as a trolley bus yard. The project, which includes joint development and the potential to include the SFMTA's paratransit battery electric vehicle (BEV) facility in addition to the planned bus yard, obtained CEQA and special use district approvals in early 2024.

Presidio
The Presidio Yard, built in 1912, is the SFMTA's oldest bus yard. It is an electric trolley bus yard. Presidio will be rebuilt as a battery electric bus yard with more capacity. The project will include joint development and possibly the SFMTA's paratransit BEV facility in addition to the planned bus yard.

Flynn
The Flynn building was built in 1941 as a US Steel warehouse. The City acquired it and converted it into a bus facility in 1989. It is a 60-foot hybrid bus facility and currently the SFMTA's only indoor bus facility. The building would need significant fire life safety, seismic, and other upgrades if it is converted to a battery

Modern Bus Maintenance



Example of modern bus preventative maintenance bay with lower level work are (LLWA) and upper level work platform (ULWP). HDR, March 2021 *Potrero Bus Yard Modernization Project Design Criteria Document*, page 123.

electric bus facility. Rebuilding instead of converting the facility is recommended due to the building's age, construction, and condition. Rebuilding Flynn as a multi-level facility will provide a modern, safe, and resilient facility with more capacity. It also will allow the SFMTA to relocate the Kirkland heavy repair and the bus body/paint shop functions, which are currently located at Woods, to Flynn prior to converting or rebuilding Woods as a BEB yard. The project could include joint development and possibly the SFMTA's paratransit BEV facility in addition to the planned bus yard.

If the SFMTA could acquire the small adjoining parcel at the corner of Harrison and 16th Streets, it could redevelop the entire block.

Woods

The Woods Yard, completed in 1978, is located on two parcels separated by a street. It is a 40-foot hybrid bus yard. Woods provides operations and maintenance for its fleet, heavy maintenance for the Kirkland fleet, and body repair and paint for the entire bus fleet. It also has a 40-foot BEB pilot that will be expanded. Woods could be converted to a battery electric bus yard, or one or both parcels could be rebuilt as a multi-level battery electric bus yard. If rebuilt the project could include joint development and possibly the SFMTA's paratransit BEV facility in addition to the planned bus yard.

Paratransit Yard Planning

The SFMTA's paratransit (SF Access Van Service) fleet, includes large cutaway buses over 14,500 pounds, small cutaway buses over 8,500 pounds, and some lighter vehicles. The large and small cutaway buses need to be replaced with zero-emissions vehicles by 2040 to meet CARB's *Innovative Clean Transit Regulations* and *Advanced Clear Fleets Regulation* respectively. The SFMTA recently completed a *Paratransit Electric Vehicle Feasibility Study* which describes several options to transition its paratransit fleet to a fully battery electric vehicle fleet.

Currently the SFMTA's paratransit fleet, maintenance, and operations are located in leased facilities in Brisbane, California. The facility leases and the added staff and fuel expenses incurred by driving to and from these facilities at the beginning and end of service are significant additional costs. Renovating the leased facilities to accommodate a battery electric fleet may not be an option. The SFMTA is considering including a paratransit facility with battery electric vehicle charging infrastructure and equipment in one of its bus yard rebuild projects or at a new location. The paratransit facility could be included in the rebuilt Potrero, Presidio, Flynn, or Woods facilities.

Light Rail Yard Planning

There is an undeveloped four-acre parcel on the east side of MME yard (MME expansion area) which the SFMTA will upgrade and use for temporary bus storage and parking, and then may develop for light rail vehicle fleet growth.

Enforcement Headquarters Planning

The SFMTA leases space for its Parking Enforcement Headquarters. The SFMTA plans to renovate 1200 15th Street and use it as its Parking Enforcement Headquarters.

Bus Yard Projects Summary

Marin Location: 1399 Marin Street Site: 3.2 acres Building: 27,000 sf Ownership: SFMTA leases from SF Port Current Use: bus acceptance Facility Plan: Lightly upgrade for interim hybrid bus parking as well as bus acceptance	**Potrero** Location: 2500 Mariposa Street Site: 4.4 acres Building: 109,000 sf, built 1914, renovated 1990 Ownership: City owns; SFMTA has jurisdiction Current Use: 40 and 60-foot trolley bus yard Facility Plan: Rebuild as a 40 and 60-foot trolley bus yard with more capacity, joint development, and possibly paratransit BEV yard.
Kirkland Location: 2301 Stockton Street and 151 Beach Street Site: 2.6 acres Buildings: built c. 1950 Ownership: City owns; SFMTA has jurisdiction Current Use: 40-foot hybrid bus yard Facility Plan: Convert to 40-foot BEB yard and complete select upgrades.	**Presidio** Location: 949 Presidio Avenue Site: 5.4 acres Buildings: 158,000 sf, built 1912 Ownership: City owns; SFMTA has jurisdiction Current Use: 40-foot trolley bus yard Facility Plan: Rebuild as a 40 and 60-foot BEB yard with more capacity, joint development, and possibly paratransit BEV yard
Islais Creek Location: 1301 Cesar Chavez Site: 8.3 acres plus 0.3 open space along water Building: 18,200 sf built in 2012 and 65,000 sf built in 2017 Ownership: City owns; SFMTA has jurisdiction over property east of Interstate 280 and leases property under and west of interstate from Caltrans Current Use: 60-foot hybrid bus yard Facility Plan: Modify for 60-foot BEB pilot and convert to BEB yard	**Flynn** Location: 1940 Harrison Street and 1941 Harrison Street Site: 6.2 acres and 4800 sf Building: 266,000 sf built in 1941. City acquired and renovated in 1989 Ownership: City owns; SFMTA has jurisdiction Current Use: 60’ hybrid bus yard Facility Plan: Rebuild as a 40 and 60-foot BEB yard with more capacity, joint development, and possibly paratransit BEV yard.
Muni Metro East Expansion Area Location: 601 25th Street Site: 4-acre parcel adjacent to 13-acre MME yard Ownership: City owns; SFMTA has jurisdiction Building: Undeveloped parcel Current Use: Some material storage Facility Plan: Upgrade for interim bus storage, then could expand light rail yard	**Woods** Location: 1095 Indiana Street and 1001 22nd Street Site: 8.2 acres Building: 158,000 sf opened 1974-1978 Ownership: City owns; SFMTA has jurisdiction Current Use: 40-foot hybrid bus yard and specialized maintenance facility Facility Plan: Modify for 40-foot BEB pilot and either convert to BEB yard or rebuild as a 40 and 60-foot BEB yard with more capacity, joint development, and possibly paratransit BEV yard.

Bus Yard Projects Schedule

The *Facility Framework* includes two scenarios that have the same bus yard capital projects, but different implementation sequences. Scenario 1 assumes that the Kirkland BEB yard conversion project occurs before the Islais Creek Yard project. Scenario 2 assumes that the Islais Creek BEB yard conversion project occurs before the Kirkland BEB yard conversion project. Scenario 1 is described on the following pages. Scenario 2 is described in Appendix 3.

The *Scenario 1 Bus Yard Projects Schedule* on the next page, is a master planning schedule for the SFMTA's bus yard capital projects. Bus yard projects and their primary work streams are listed in the left column and their anticipated schedules are shown in the rows. Concept, community outreach, and environmental review are shown in purple; PG&E application review and electrification in blue; design and procurement in tan, on-site construction in light red; and temporary moves for construction in green.

The schedule assumes that projects will typically take seven to ten years from inception to completion based on the following work stream durations. The SFMTA will need to periodically review specific project needs and risks and update the schedule as needed.

For BEB yard conversion projects the schedule assumes:

- Five years for PG&E application review and electrification concurrent with two years of concept, community outreach, and entitlements and two years of design and procurement.
- Two or three years of on-site construction.

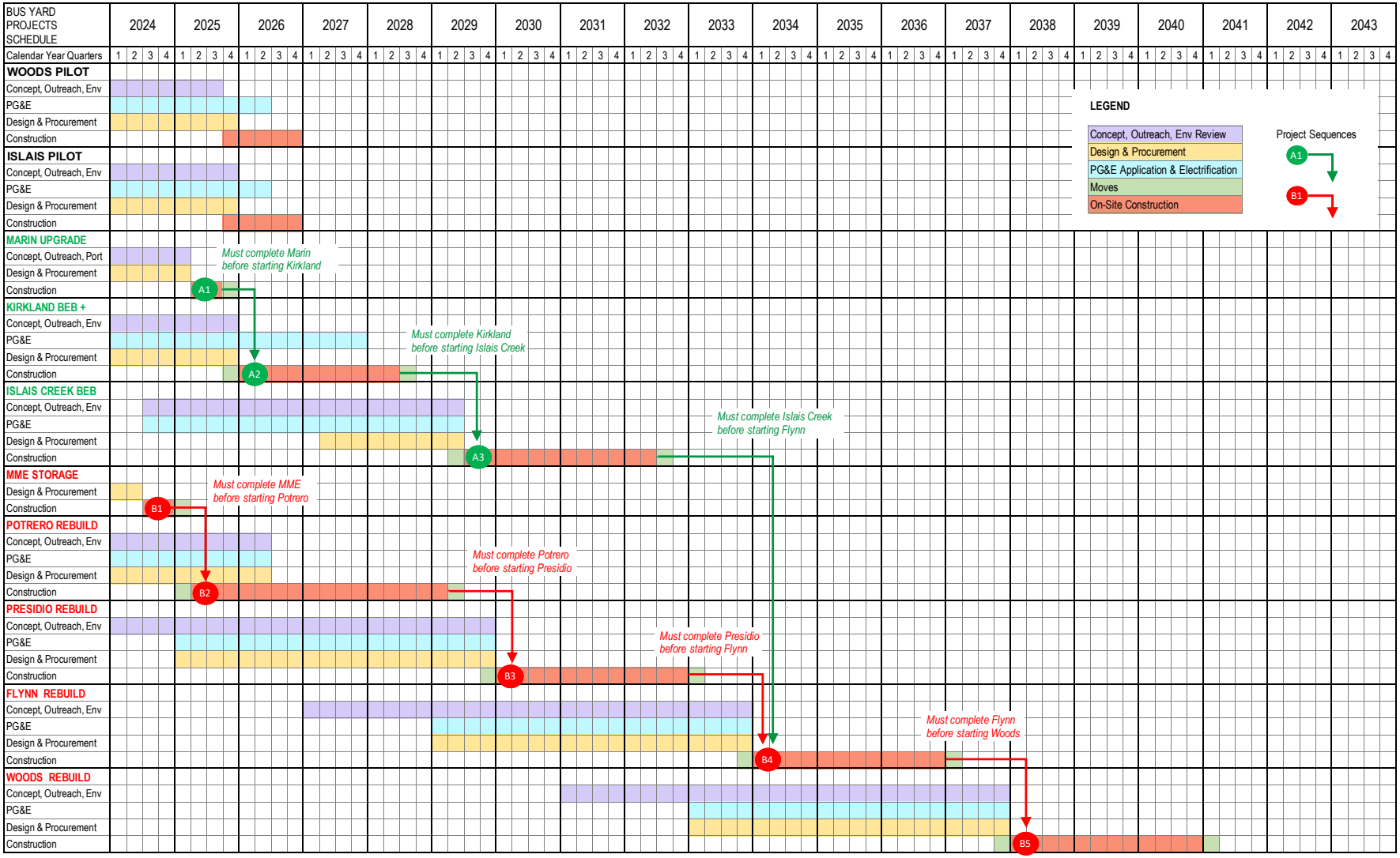
For rebuild projects the schedule assumes:

- Two years of concept development, community outreach, and initial entitlement work.
- Five years for PG&E application review and electrification concurrent with five years of design and procurement.
- Three or four years of on-site construction.

To maintain adequate bus parking, operations, and maintenance, bus yard projects need to occur sequentially. One sequential series, numbered A1-A3 in green in the schedule, includes Marin, Kirkland, and Islais Creek. The other series, numbered B1-B5 in red, includes MME storage, Potrero, Presidio, Flynn, and Woods. Both the Islais Creek and Presidio projects must be complete before starting the Flynn project.

The schedule is ambitious to support the regulatory required transition to an all zero-emission bus fleet. To provide some contingency the schedule typically includes a year between the on-site construction of sequential projects. However, funding shortfalls, prolonged environmental and/or other regulatory reviews, PG&E capacity and/or timing, construction issues, and/or other issues could delay a project. If a project is delayed the SFMTA will need to evaluate modifying subsequent planned bus procurements and deliveries. If the delay is greater than the scheduled time between the on-site construction of projects the SFMTA will need to modify subsequent project schedules and bus procurements and deliveries.

Scenario 1 Bus Yard Projects Schedule



Bus Moves

Except for Islais Creek, which can take advantage of its close proximity to Marin for temporary bus parking, each division including its buses, and maintenance and operations functions will need to temporarily move while the yard is under construction. A move plan will need to be developed for each project.

The text below and the *Scenario 1 Bus Moves Diagram* on the following page describe bus moves based on the sequence of projects shown in the *Scenario 1 Bus Yard Projects Schedule* on the previous page.

Except for Potrero which will remain a trolley bus yard, after the SFMTA converts or rebuilds each bus yard, there will be a large increase in available BEB charging positions and the agency will initially have more charging positions than BEBs due to the ongoing gradual process in which the SFMTA procures new buses.

The SFMTA will need to store hybrid buses at newly converted bus yards, which will still have fuel stations, until it retires the hybrid buses and replaces them with BEBs.

In addition, as the SFMTA completes more rebuild projects it will have fewer yards that have fuel stations where hybrid buses can be stored and thus it will need to store hybrid buses at previously converted yards:

- While Flynn is being rebuilt, the SFMTA will have a surplus of 60-foot BEB charging positions, but a shortfall of 60-foot hybrid bus parking. Therefore, the SFMTA will need to use 60-foot BEB charging positions at Islais Creek to park 60-foot hybrid buses.
- While Woods is being rebuilt, the SFMTA will have a surplus of 40-foot BEB charging positions, but a shortfall of 40-foot hybrid bus parking. Therefore, the SFMTA will need to use 40-foot BEB charging positions at Kirkland to park 40-foot hybrid buses.

Since the number of buses assigned to a yard changes over time, when preparing for a yard's construction, the SFMTA will need to review bus moves and, if needed, supplement them with additional crush parking (in maintenance bays, drive aisles or other locations without charging) or temporary reassignments to other yards.

Woods and Islais Creek BEB Pilot Projects

The Woods and Islais Creek BEB Pilot projects will require temporary relocation of some buses within each yard.

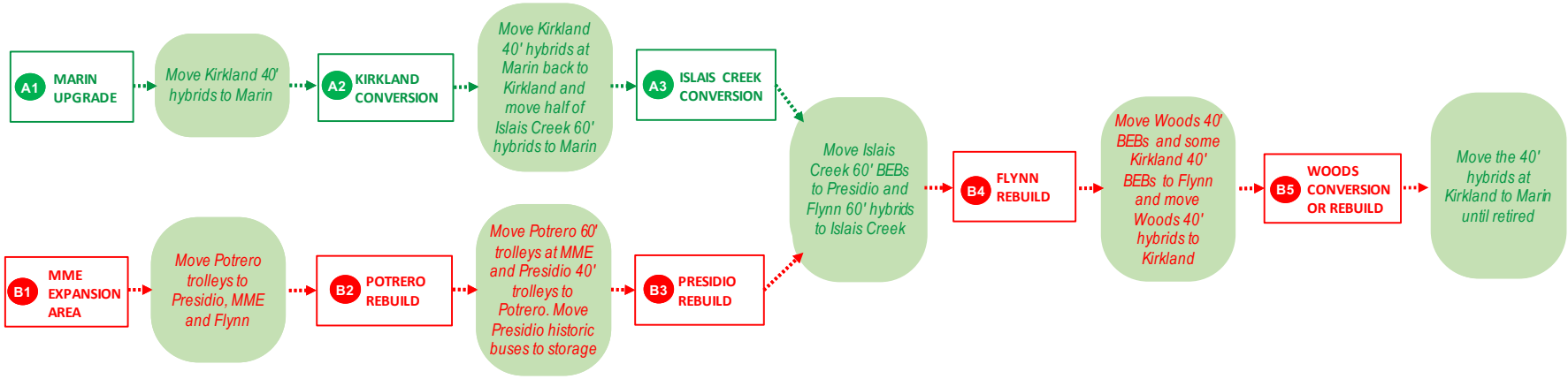
Marin/Kirkland/Islais Creek Project Series

- A1. Upgrade Marin. Then move Kirkland's 40-foot hybrids to Marin.
- A2. Convert Kirkland to a BEB yard and complete related upgrades. Then move Kirkland's 40-foot hybrids at Marin back to Kirkland and replace with BEBs as hybrids are retired. Move about half of Islais Creek's 60-foot hybrid buses to Marin.
- A 3. Convert the eastern half of Islais Creek to a BEB yard, move buses within the yard, and then convert the western half of the yard to a BEB yard.
- After Islais Creek and Presidio are complete rebuild Flynn. See items B3 and B4 below.

MME/Potrero/Presidio/Flynn/Woods Project Series

- B1. Upgrade the MME expansion area for temporary trolley bus storage and parking. Then move as many of Potrero's 40-foot trolley buses to Presidio as will fit and the rest of Potrero's 40-foot trolley buses to MME for parking and rotation into service. Move all except two 60-foot trolley buses to MME for storage. Move two 60-foot trolley buses with in-motion charging to Flynn.
- B2. Rebuild Potrero. Then move the 60-foot trolley buses stored at MME and Presidio's 40-foot trolley buses to Potrero. Some 40-foot trolley buses are expected to remain in storage. Move the historic buses at Presidio to storage.
- B3. Rebuild Presidio. Then move Islais Creek's 60-foot BEBs to Presidio and move Flynn's 60-foot hybrids to Islais Creek and replace with BEBs as hybrids are retired.
- B4. Rebuild Flynn. Move Woods 40-foot BEBs and some of Kirkland's 40-foot BEBs to Flynn and move the remaining 40-foot hybrid fleet at Woods to Kirkland.
- B5. Convert or rebuild Woods. Then move the 40-foot hybrids at Kirkland to Marin until they are retired.

Scenario 1 Bus Moves Diagram



Bus Yard Capacities

Bus Yard Capacities

The *Bus Yard Capacities Table* on the following page shows the current bus capacity in each yard and planned capacity after all the bus yard rebuild or conversion projects are complete.

The yards are listed in the left column and the numbers of 32-foot, 40-foot, and 60-foot buses are listed in each row. Current use is the number of buses of each length parked in each yard in 2024. Yard project lane charging positions is the number of charging positions in a yard's parking lanes after a rebuild or BEB conversion project is complete. Yard project crush parking is the number of parking locations in maintenance bays, drive aisles, or other locations without charging. The yard project total is the total number of lane charging positions and crush parking spaces.

BEBs crush parked in drive aisles or other locations without charging will need to be rotated into bus lanes to be charged before returning to service.

Upon completion of the first five bus yard projects—Potrero, Kirkland, Islais Creek, Presidio, and Flynn—the SFMTA bus capacity is expected to exceed the 2024 bus use. The sixth project—Woods—is expected to increase bus capacity by approximately 20% if it is converted and 30% if it is rebuilt. If the SFMTA added an additional bus level to Presidio or Flynn, then an increase in the SFMTA bus capacity could occur sooner.

Interim Bus Yard Uses

While each bus yard is rebuilt or converted the SFMTA will need to move buses to other yards. During some yard projects hybrid buses will need to be parked at previously converted yards and 40-foot BEBs will need to be parked in 60-foot BEB charging positions. Note that parking 40-foot BEBs in 60-BEB charging positions will optimize use of available charging capacity, but will not increase the number of buses that can be charged at one time. See Appendix 2 for additional Scenario 1 bus parking information and Appendix 3 for additional Scenario 3 bus parking information.

Bus Yard Capacities Table

BUS YARD CAPACITIES	2024 Use including some crush parking				Yard Project Lane Charging Positions				Yard Project Crush Parking ***			Yard Project Total Lane Charging Positions + Crush Parking			
	30'	40'	60'	**Total**	30'	40'	60'	**Total**	30'	40'	60'	30'	40'	60'	**Total**
POTRERO - Rebuild		53	93	**146**		153	93	**246**				0	153	93	**246**
KIRKLAND - BEB Conversion *		88		**88**		80		**80**		10		0	90	0	**90**
ISLAIS CREEK - BEB Conversion**			105	**105**			75	**75**			16	0	0	91	**91**
PRESIDIO - Rebuild		132		**132**	33	110	72	**215**			8	33	110	80	**223**
FLYNN - Rebuild			119	**119**		136	114	**250**		2	8	0	138	122	**260**
WOODS - See options below	30	234		**264**											
Hybrid Parking Total	30	322	224	**576**											
Trolley Charging Total	0	185	93	**278**	0	153	93	**246**				0	153	93	**246**
BEB Charging Total					33	326	261	**620**	0	12	32	33	338	293	**664**
Total Bus Parking & Charging	**30**	**507**	**317**	**854**	**33**	**479**	**354**	**866**	**0**	**12**	**32**	**33**	**491**	**386**	**910**

Add WOODS Conversion															
WOODS - Conversion						120		**120**		4		0	124	0	**124**
Hybrid Parking Total															
Trolley Charging Total					0	153	93	**246**				0	153	93	**246**
BEB Charging Total					33	446	261	**740**	0	16	32	33	462	293	**788**
Total Bus Parking & Charging	**30**	**507**	**317**	**854**	**33**	**599**	**354**	**986**	**0**	**16**	**32**	**33**	**615**	**386**	**1034**

Add WOODS Rebuild															
WOODS - Rebuild****						117	106	**223**			8	0	117	114	**231**
Hybrid Parking Total															
Trolley Charging Total					0	153	93	**246**				0	153	93	**246**
BEB Charging Total					33	443	367	**843**	0	12	40	33	455	407	**895**
Total Bus Parking & Charging	**30**	**507**	**317**	**854**	**33**	**596**	**460**	**1089**	**0**	**12**	**40**	**33**	**608**	**500**	**1141**

* Kirkland long term crush capacity after Woods project complete shown. Near term "super crush" parking is 24 and total is 104 40-foot BEBs
** Islais Creek capacity after Woods project complete and yard used for fleet and bus acceptance
*** Crush Parking is parking in maintenance bays, drive aisles, and other locations without charging
**** Woods West Parcel Rebuild Option total shown

Bus Yard Projects Implementation

In order to convert its hybrid bus fleet to a zero-emission fleet while rebuilding its oldest bus yards, the SFMTA needs to work on the planning, funding, design, and construction of multiple projects at the same time. The following are some issues that the SFMTA needs to resolve for the first projects and some issues that it needs to track and address as the *Building Progress Program* continues. The *SFMTA Facilities Framework* is a living document that the agency should periodically update to address these and other issues that emerge.

Kirkland
The Kirkland BEB yard conversion project scope of work includes several yard changes to maximize bus charging capacity and meet code requirements. Since Kirkland is an initial project in Scenario 1 the SFMTA should develop the schematic design of this project as soon as possible.

Islais Creek
A BEB pilot project and a phased BEB conversion project are planned at Islais Creek. The yard is partially located on leased property and the SFMTA has Memorandums of Understanding with other City agencies for portions of the yard. Since Islais Creek is an initial project in Scenario 2 and to avoid unnecessary rework, the SFMTA should develop the BEB pilot project and phased BEB yard conversion project schematic designs together as soon as possible.

Presidio
For planning flexibility, the SFMTA should evaluate the feasibility and costs of adding a fourth bus floor instead of a fourth floor Paratransit facility at the rebuilt Presidio.

Potential Bus Parking Shortfall
While Kirkland and Potrero are both closed for construction and the Woods and Islais Creek BEB pilots are both under construction there will be a shortfall of 40-foot hybrid bus parking. The SFMTA will need to evaluate if parking demand and yard capacity can be balanced or if supplemental parking is needed. See the Parking Analysis in Appendix 2 for additional information.

Project Development
The SFMTA should use the facility planning criteria described in the *2017 SFMTA Facilities Framework*, the BEB charging technology and infrastructure described in the *SFMTA Zero-Emission Bus Roll-out Plan*, along with emerging technology, regulatory requirements, and lessoned learned to develop projects. The agency should also continue to engage its Transit Division to understand specific project needs and the community to understand specific project considerations and incorporate these into projects.

Operational Changes
Except for Islais Creek, which can take advantage of its close proximity to Marin for temporary bus parking, each division including its buses, and maintenance and operations functions will need to temporarily move while the yard is under construction. A move plan will need to be developed for each project. In addition, Islais Creek and Kirkland yards will have retiring hybrid buses that will be gradually replaced with new

procured battery electric buses. Both the division moves and gradual fleet transitions will require careful planning and operational flexibility to align each yard's staffing levels with its assigned bus fleet.

Temporary Trolley Bus Storage and Parking
The SFMTA will temporarily store 60-foot trolley buses while Potrero is being rebuilt and temporarily park and rotate into service 40-foot trolley buses that do not fit in active trolley bus yards. While Potrero is being rebuilt two 60-foot trolley buses with in-motion charging will be assigned to Flynn and the rest of the 60-foot trolley buses will be stored at the MME expansion area. In addition, the 40-foot trolley buses that do not fit at Presidio will be parked at the MME expansion area and periodically rotated into service. After Potrero is rebuilt, the 40-foot trolley buses that do not fit at Potrero will be parked at the MME expansion area and periodically rotated into service until replaced with BEBs at BEB yards.

Fleet Changes
Changes in service demand, limitations in BEB bus capabilities, availability of 60-foot hybrid buses, and/or electric trolley bus availability and infrastructure needs could require the SFMTA to modify its *New Bus Delivery Plan* and associated bus yard project requirements.

As the SFMTA develops bus yard projects, the SFMTA transit planning and fleet engineering teams will need to work with the SFMTA facility team to incorporate any *Bus Delivery Plan* updates into individual yard projects and the overall *Facility Framework*. If the planned fleet mix at a yard needs to change, the SFMTA should consider the impact to staffing, maintenance, and operations and assess if adjustments are needed to project requirements, entitlement submissions, and/or PG&E applications.

Implementation Risks
The bus yard conversion and rebuild projects are large and complex projects that include evolving technology and requirements. New fire and building code requirements for parking and charging electric vehicles could restrict facility capacities and/or uses and increase costs. Environmental review mitigations could add complexity and cost to projects. Compliance with San Francisco's storm water management and sea level rise requirements will increase resiliency but could add complexity and cost to projects. The SFMTA will need to develop strategies to address project issues as they arise.

The SFMTA is working with the San Francisco Public Utilities Commission (SFPUC) and PG&E to secure the electrical supply needed to transition its hybrid bus fleet to a battery electric bus fleet. However, PG&E capacity and the timing of new service installation are ongoing risks.

The SFMTA is working to secure local, regional, state, and federal funding for its bus yard projects. In addition, where possible, it is incorporating joint development in its rebuild projects to maximize land use and generate revenue. Given the high cost and long-term nature of projects, the *Building Progress Program* is not fully funded and funding shortfalls are an ongoing risk.

The Scenario 1 schedule of sequential bus yard projects to support the CARB required transition to an all zero-emission bus fleet is ambitious. To provide some schedule contingency the *Scenario 1 Bus Yard Project Schedule* typically includes a year between the on-site construction of sequential projects. However, funding shortfalls, prolonged environmental and/or other regulatory reviews, PG&E capacity and/or new service

installation timing, construction challenges, and/or other issues could delay a project. If there is a delay the SFMTA may need to modify subsequent new bus procurements and deliveries. If there is a delay greater than the time between the construction of sequential projects the SFMTA will need to modify subsequent project schedules and new bus procurements and deliveries.

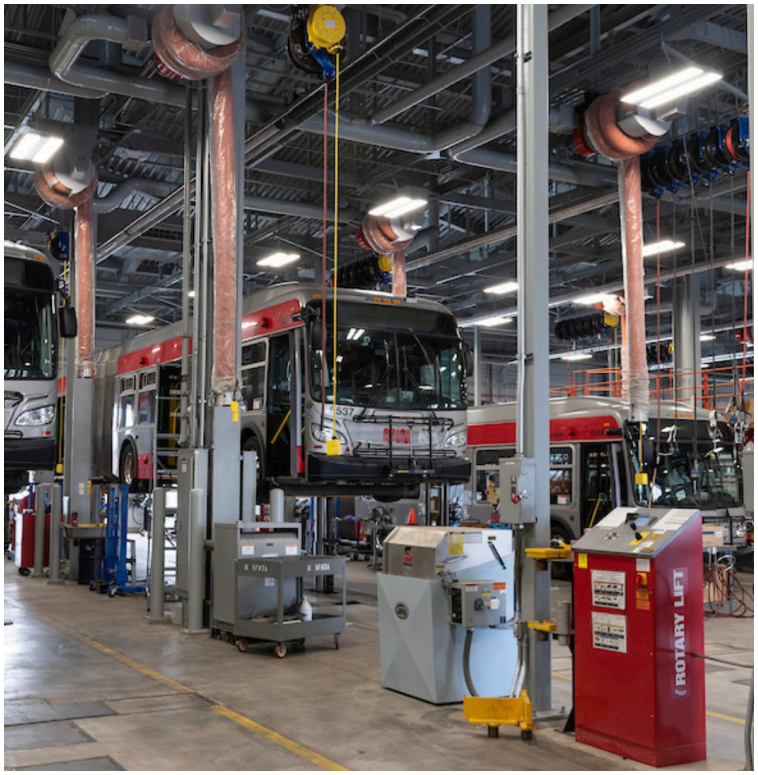
Implementation Considerations

The Kirkland BEB yard conversion project and Islais Creek BEB yard conversion project provide similar numbers of BEB charging positions, but the Kirkland project includes yard changes to maximize BEB capacity and meet code requirements and thus is expected to cost more than the Islais Creek project.

Given the current challenge of funding four near-term projects (two pilot projects, Potrero, and Kirkland) at the same time in Scenario 1, the SFMTA should evaluate *Facility Framework* implementation options that optimize use of available funding and/or allow more time to secure funding.

One option is to delay the Kirkland project and subsequent projects in Scenario 1. Another option is to pivot to Scenario 2 in which the Islais Creek project occurs before the Kirkland project and it and subsequent projects are delayed. Both options would require modifying the SFMTA's new bus procurement and delivery plan. See Appendix 3 for additional information on these scenarios and recommended next steps to evaluate them.

Potrero Yard, built 1914. Photograph by HDR



Islais Creek Yard, built 2017. Photograph by SFMTA

Presidio, Photograph by IDEO

Appendix 1: Bus Yard Facility Planning

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Bus Yard Projects Map

Flynn

Location: 1940 Harrison Street and 1941 Harrison Street

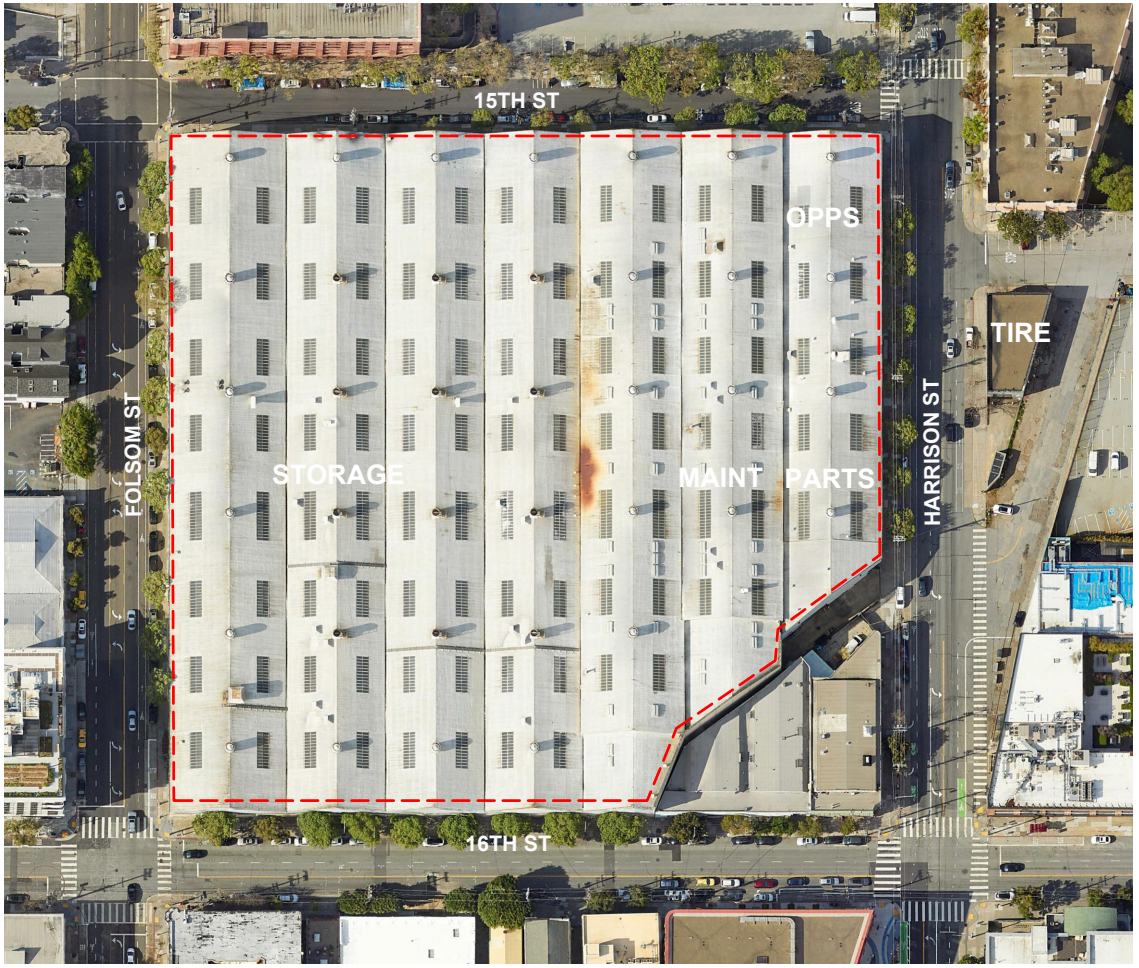
Site: 6.2 acre and 4800 sf

Building: 266,000 sf originally built in 1941. SFMTA acquired and renovated in 1989.

Current Use: 60’ hybrid bus yard

Facility Plan: The Flynn building was built in 1941 as a US Steel warehouse. The City acquired it and converted it into a bus facility in 1989. It is a 60-foot hybrid bus facility and currently the SFMTA’s only indoor bus facility. The building would need significant fire life safety, seismic, and other upgrades if it is converted to a battery electric bus facility. Rebuilding instead of converting the facility is recommended due to the building’s age, construction, and condition. Rebuilding Flynn as a multi-level facility will provide a modern, safe, and resilient facility with more capacity. It also will allow the SFMTA to relocate the Kirkland heavy repair and the bus body/paint shop functions, which are currently located at Woods, to Flynn prior to converting or rebuilding Woods as a BEB yard. The project could include joint development and possibly the SFMTA’s paratransit BEV facility in addition to the planned bus yard.

If the SFMTA could acquire the small adjoining parcel at the corner of Harrison and 16th Streets, it could redevelop the entire block.



The test fit diagrams on the next page include a three level bus facility and joint development. The bus facility first floor houses bus maintenance, the second floor maintenance, operations, bus parking/charging, and bus washing, and third floor operations, bus parking/charging, and bus washing. A mezzanine over a portion of the first floor could house BEB charging cabinets. A fourth level could be added for the SFMTA’s paratransit facility or an additional bus level. The current tire shop at 1941 Harrison could be converted or rebuilt as a bus paint shop.

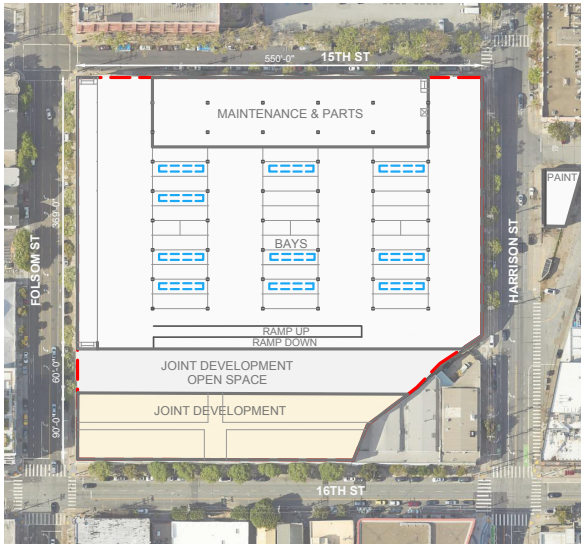
Flynn Planned Use

17 lanes x 8 = **136 40’ BEB charging**

2 40’ crush parking

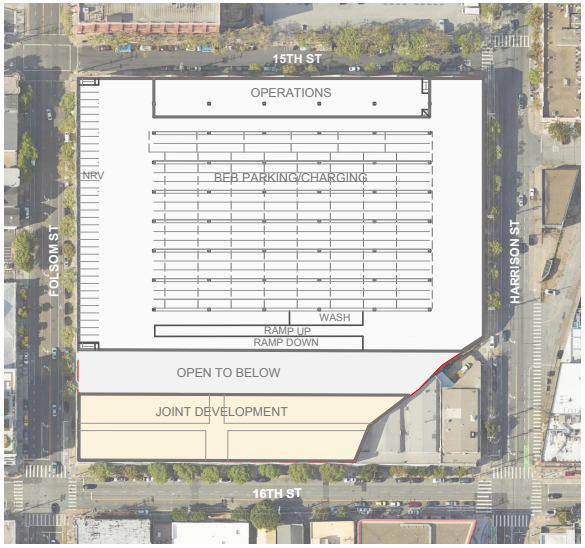
19 lanes x 6 = **114 60’ BEB charging**

8 60’ crush parking



First Floor
30 Maintenance Bays
Storage Capacity:
10 crush parking in bays
Paint Booth in former tire shop across street

Second Floor
Storage Capacity:
18 x 8 = 144 40’ BEB charging **or**
18 x 6 = 108 60’ BEB charging



Third Floor
Storage Capacity:
18 x 8 = 144 40’ BEB charging **or**
18 x 6 = 108 60’ BEB charging

Islais Creek

Location: 1301 Cesar Chavez

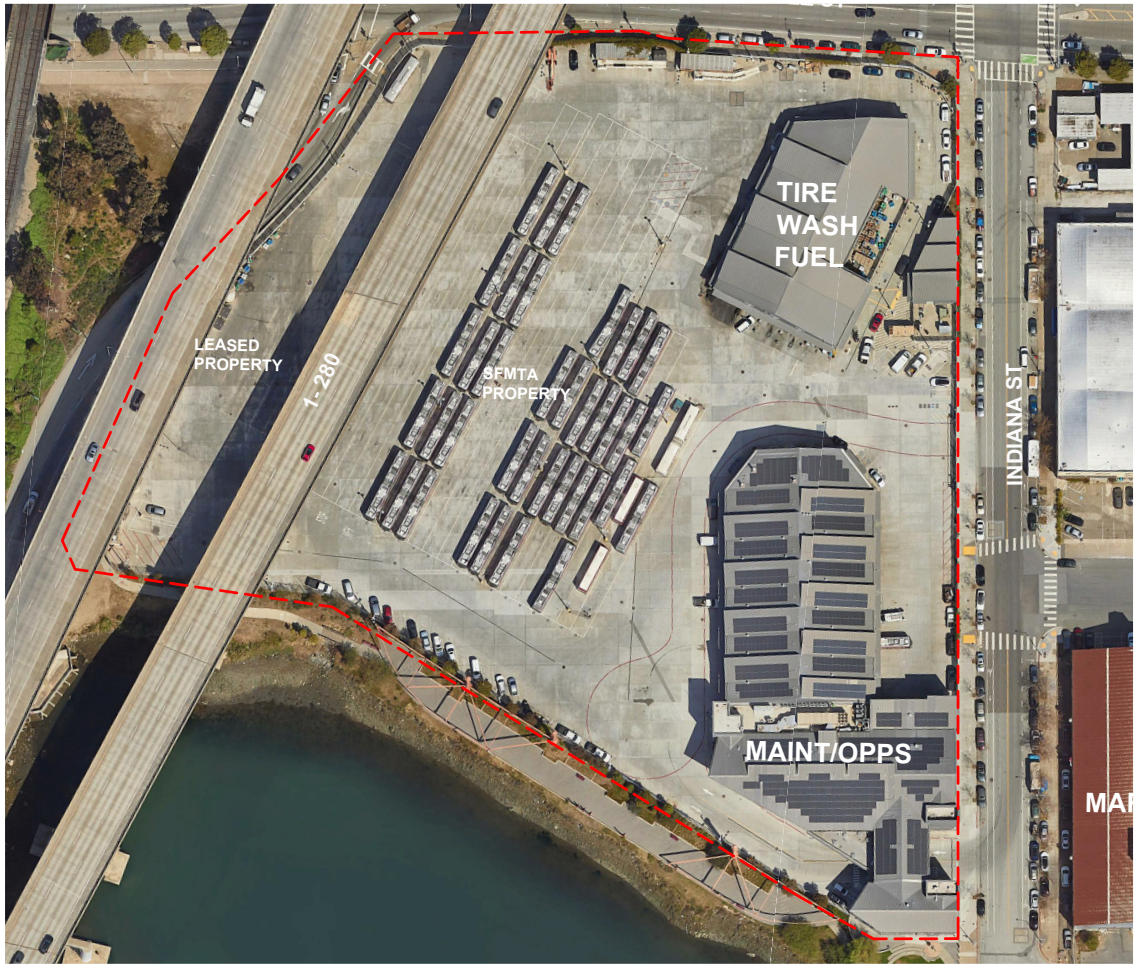
Site: 8.3 acres plus 0.3 open space along water

Building: 18,200 sf built in 2012 and 65,000 sf built in 2017

Current Use: Mostly 60' hybrid bus yard

Facility Plan: The Islais Creek Yard, completed in 2017, is the SFMTA's newest bus yard. The City owns and the SFMTA has jurisdiction of the yard property east of Interstate 280 and leases the yard property under and west of the elevated freeway from the California Department of Transportation (Caltrans). In addition, the San Francisco Port and San Francisco Public Utilities Commission have memorandums of understanding with the SFMTA for portions of the property. The yard, which can accommodate 40-foot hybrid buses, is currently used as a 60-foot hybrid bus yard. The yard will be used for a 60-foot BEB pilot project and be converted to a BEB yard. The scope of work includes new charging infrastructure and equipment on the SFMTA property.

The test fit diagrams on the next page include the 60-foot BEB pilot and the phased BEB yard conversion. The test fits assume that a gantry structure with BEB charging cabinets and pantographs will be built over bus parking lanes on the SFMTA property but not on the Caltrans property. The diagrams also assume that the light poles under the elevated freeway will be relocated and that BEBs will be crush parked on the Caltrans property and rotated into the bus lanes on the SFMTA property to be charged before returning to service. To avoid unnecessary rework, the SFMTA should develop the BEB pilot project and phased BEB yard conversion project schematic designs together and review these with Caltrans and the SFPUC.



Islais Creek Planned Use

CURRENT

PILOT
(lanes 1-3, shown in gray, closed during construction)

Current Capacity

1 lane x 2 = 2 60’ hybrid parking
7 lanes x 3 = 21 60’ hybrid parking
6 lanes x 4 = 24 60’ hybrid parking
5 lanes x 5 = 25 60’ hybrid parking
7 lanes x 6 = 42 60’ hybrid parking

114 60’ hybrid parking
6 60’ crush parking

During Pilot Construction
(lanes 1-3 closed)

1 lane x 2 = 2 60’ hybrid parking
4 lanes x 3 = 12 60’ hybrid parking
6 lanes x 4 = 24 60’ hybrid parking
5 lanes x 5 = 25 60’ hybrid parking
7 lanes x 6 = 42 60’ hybrid parking

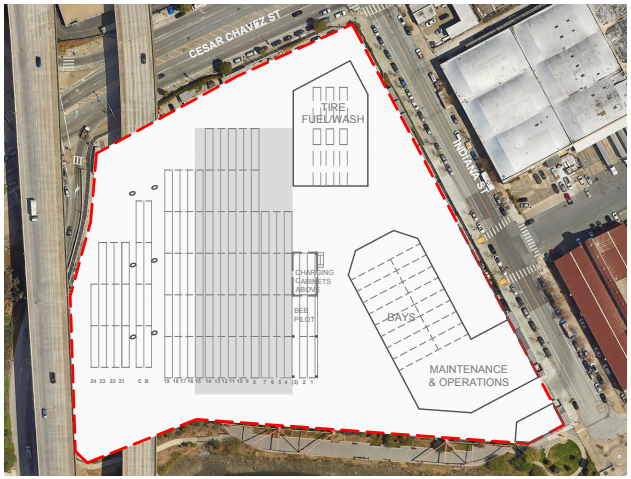
105 60’ hybrid parking
6 60’ crush parking

After Pilot Construction

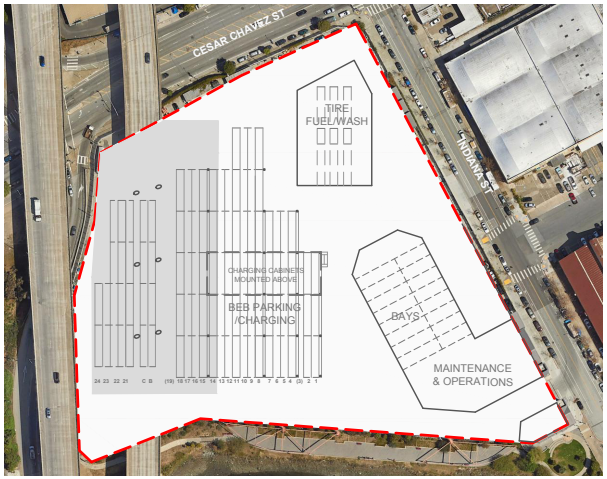
2 lanes x 3= 6 60’ BEB charging

1 lane x 2 = 2 60’ hybrid parking
4 lanes x 3 = 12 60’ hybrid parking
6 lanes x 4 = 24 60’ hybrid parking
5 lanes x 5 = 25 60’ hybrid parking
7 lanes x 6 = 42 60’ hybrid parking

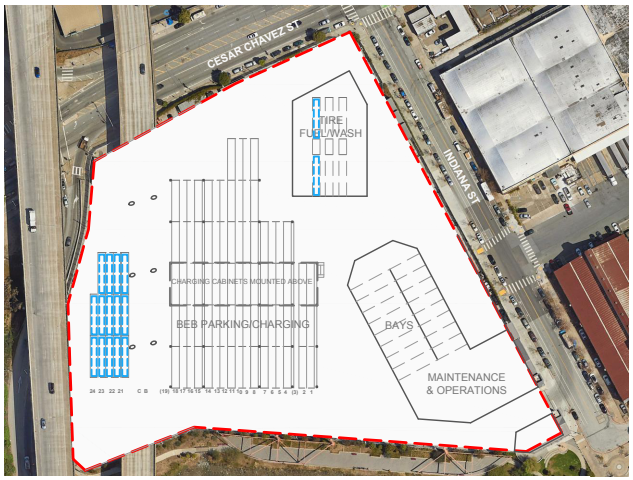
105 60’ hybrid parking
6 60’ crush parking



BEB CONVERSION PHASE 1
(lanes 3-15, shown in gray, closed during construction)



BEB CONVERSION PHASE 2
(lanes 14-24, shown in gray, closed during construction)



FINAL

Final Storage Capacity assumes lanes 3 and 19 used for BEB gantry columns:

2 lanes x 4 = 8 40’ BEB charging	or	2 lanes x 3 = 6 60’ BEB charging
4 lanes x 6 = 24 40’ BEB charging	or	4 lanes x 4 = 16 60’ BEB charging
4 lanes x 8 = 32 40’ BEB charging	or	4 lanes x 6 = 24 60’ BEB charging
7 lanes x 7 = 49 40’ BEB charging	or	7 lanes x 5 = 35 60’ BEB charging
113 40’ BEB charging	or	81 60’ charging
21 40’ crush	or	16 60’ crush

Islais Creek Planned Use

During Phase 1 Construction
(lanes 3-15 closed)

2 lanes x 3= 6 60’ BEB charging

1 lanes x 2 = 2 60’ hybrid parking
4 lanes x 3 = 12 60’ hybrid parking
2 lanes x 4 = 8 60’ hybrid parking
4 lanes x 5 = 20 60’ hybrid parking
42 60’ hybrid parking

During Phase 2 Construction
(lanes 14-24 closed)

2 lanes x 3 = 6 60’ BEB charging
4 lanes x 4 = 16 60’ BEB charging
4 lanes x 6 = 24 60’ BEB charging
2 lanes x 5 = 10 60’ BEB charging
56 60’ BEB charging

Final

2 lanes x 3 = 6 60’ Acceptance

4 lanes x 4 = 16 60’ BEB charging
4 lanes x 6 = 24 60’ BEB charging
7 lanes x 5 = 35 60’ BEB charging
75 60’ BEB charging
16 60’ crush parking

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Kirkland

Location: 2301 Stockton Street & 151 Beach Street

Site: 2.6 acres

Buildings: c1950

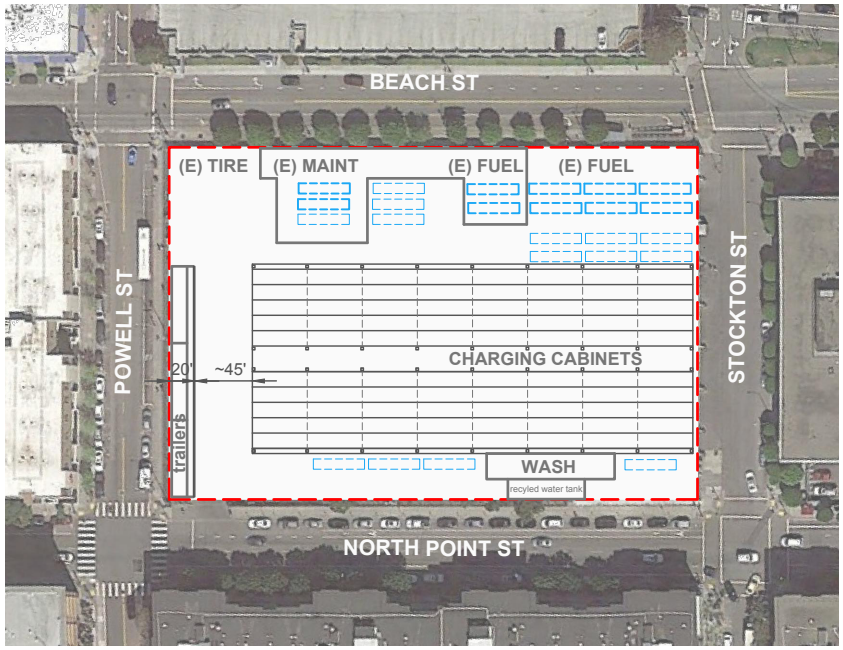
Current Use: 40’ hybrid bus yard

Facility Plan: The Kirkland Yard, built circa 1950, is the SFMTA’s smallest bus yard. It is a 40-foot hybrid bus yard. The Kirkland yard will be converted to a BEB yard. The scope of work includes increasing the existing 11-foot-wide bus parking lanes to industry standard 12-foot-wide lanes and adding storm water collection and management and BEB charging infrastructure and equipment. The existing maintenance and fuel facilities will remain, but the existing operations facilities and bus wash will be replaced in new locations to maximize BEB charging position capacity.

The test fit diagram on the next page is based on the SFMTA’s current planning for Kirkland BEB yard conversion. The location of the operator trailers reduces the drive aisle width to about 45 feet, which is less than 65 feet industry standard for turning. The SFMTA should consider relocating the trailers.

The site’s small size is a challenge to redeveloping it as a multi-level bus facility because bus circulation ramps and drive aisles required for a multi-level bus facility would use a significant amount of each level. However, a single-level bus facility with joint development above may be possible. The SFMTA may explore joint development opportunities at the site in the future.

Kirkland Planned Use



After BEB Conversion

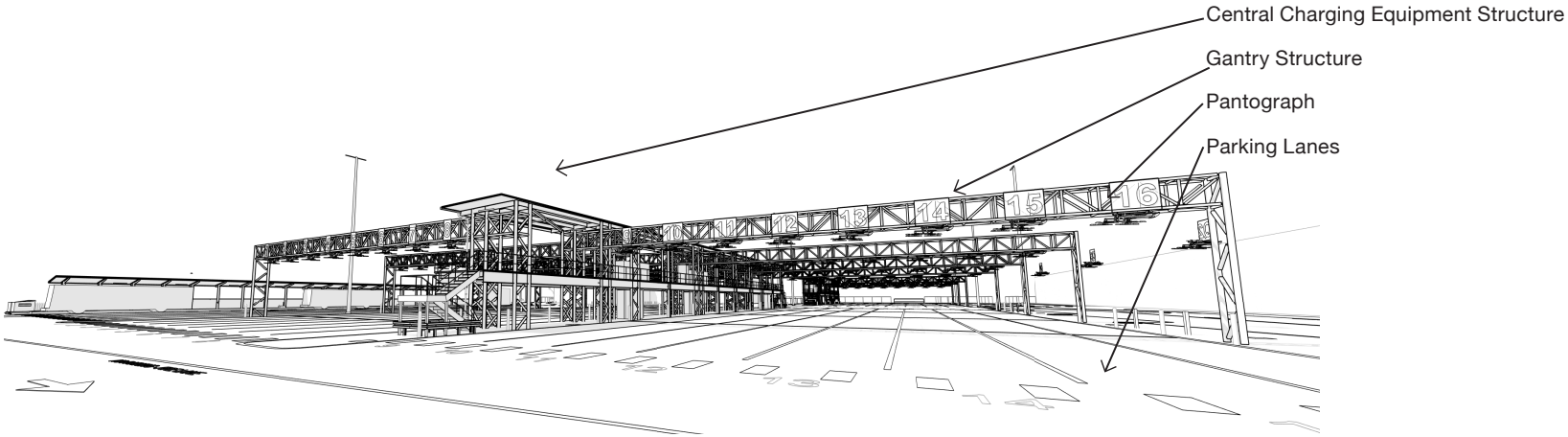
10 lanes x 8 **= 80 40’ BEB charging**

24 40’ super crush

After Woods Project Complete

10 lanes x 8 **= 80 40’ BEB charging**

10 40’ crush parking



Example of BEB charging structure with central charing equipment structure and gantry structures with BEB pantograph chargers over the parking lanes. Stantec, Rolluda Architects & Walsh, 11/04/22 *King County Metro Interim Base Electrification Project Architectural Drawing Set*, Cover Sheet.

Marin

Location: 1399 Marin Street

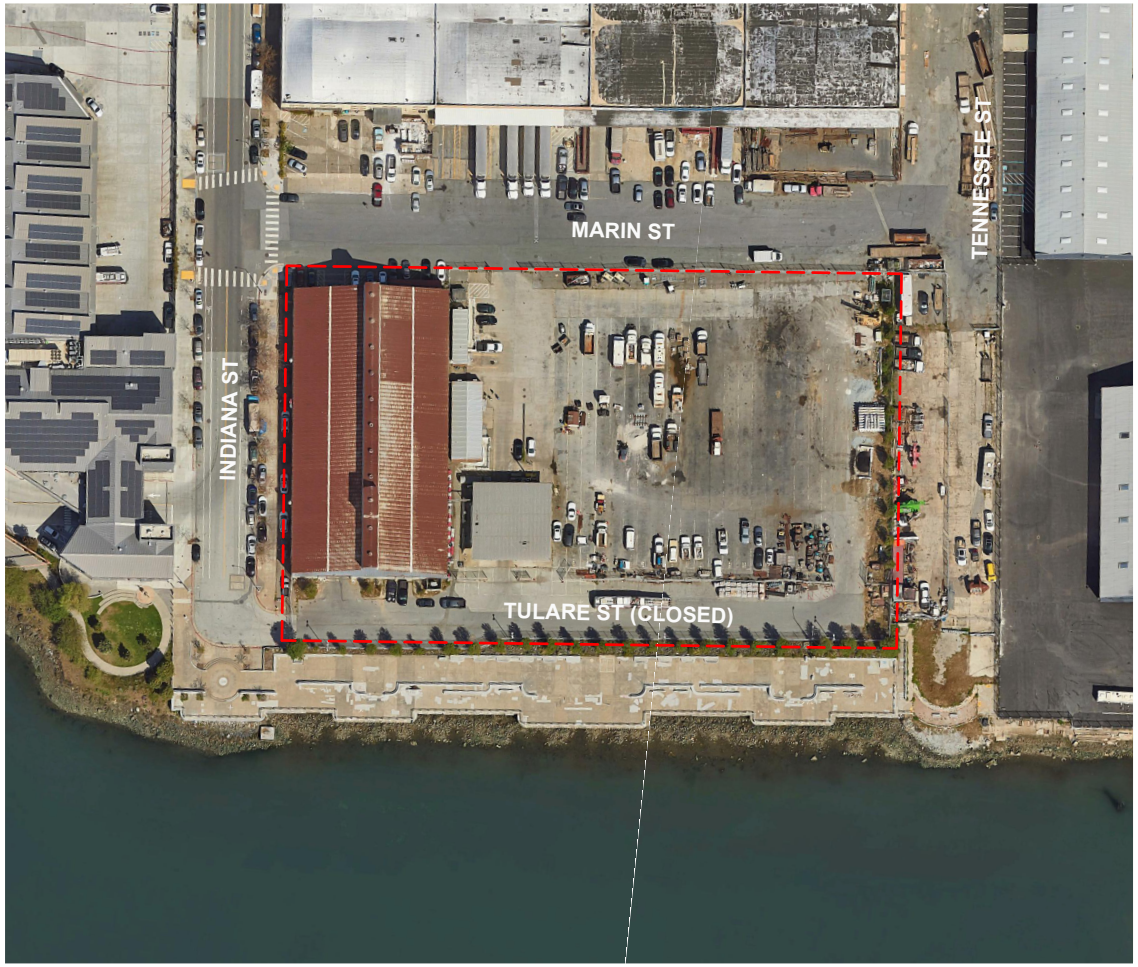
Site: 3.2 acres

Building: 27,000 sf

Current Use: Bus acceptance

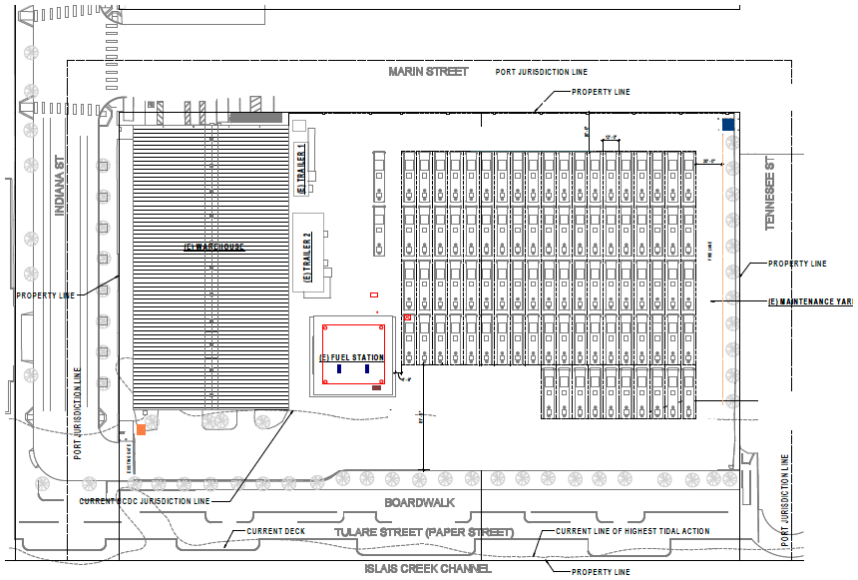
Facility Plan: The SFMTA leases 1399 Marin Street from the San Francisco Port (SF Port). The SFMTA currently uses Marin as a bus acceptance facility. Since Marin is located across the street from the Islais Creek bus yard, its yard can be used as a satellite hybrid bus parking lot. Marin will serve as both a bus acceptance facility (for new bus delivery, testing, and acceptance prior to assignment to a yard for service), and an interim hybrid bus parking lot for 40-foot and 60-foot buses while other bus yards are converted or rebuilt. Bus administration and dispatch functions for fleets assigned to Marin will be located at Islais Creek. The SFMTA plans minimal site improvements but no building improvements at Marin. The scope of work includes pothole repair, and fencing, lighting, and security improvements.

The concept plan on the next page shows the SFMTA's layout for hybrid bus parking at Marin. The last partial row of buses reduces the drive aisle width to about 37 feet, which is less than 65 feet industry standard for turning. The SFMTA should evaluate



if this or parking buses in the drive aisle is the most operationally efficient parking layout.

Marin Planned Use



SFPW, 5 February 2024, 1399 Marin Temporary Maintenance Facility Plan. Plan modified to show 88 40-foot buses

During Kirkland BEB Conversion

9 lanes x 4 = 36 40’ hybrid parking
10 lanes x 5 = 50 40’ hybrid parking
Fuel Lane 2 40’ hybrid parking
88 40’ hybrid parking

6 acceptance buses in building

During Islais, Flynn & Woods Projects

19 lanes x 3 = 57 60’ hybrid parking
Tulare St 6 60’ hybrid parking
Fuel Lane 1 60’ hybrid parking
64 60’ hybrid parking

6 acceptance buses in building

After Woods Project until last hybrid buses retired

7 lanes x 4 = 28 40’ hybrid parking
12 lanes x 3 = 36 60’ hybrid parking

Muni Metro East Expansion Area

Location: 601 25th Street

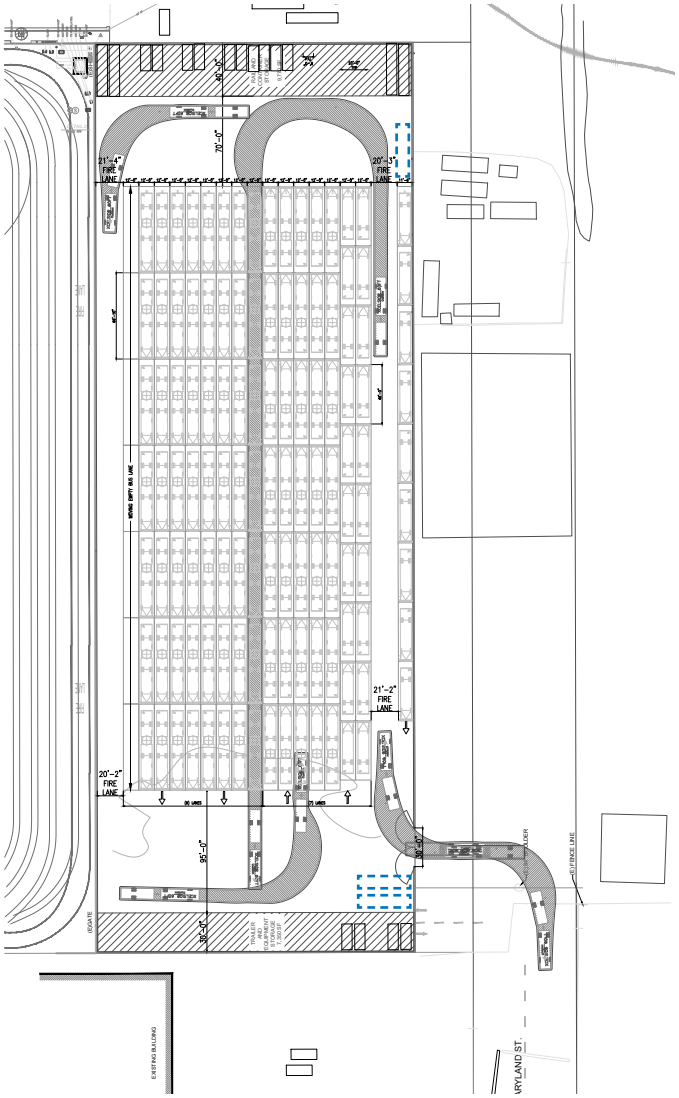
Site: 4 acres

Current Use: Undeveloped

Facility Plan: The City owns and the SFMTA has jurisdiction of an undeveloped 4-acre parcel on the east side of the 13-acre Muni Metro East (MME) light rail yard. The SFMTA will upgrade the parcel and use it for temporary 60-foot trolley bus storage and temporary 40-foot trolley bus parking. The scope of work includes a crushed concrete yard, lighting, fencing, and staff trailer or shed.

The test fit diagram on the next page shows trolley bus storage at the MME expansion area.

MME Planned Use



Stantec, 18 September 2024, MME Site Bus Layout modified to include crush parking

During Potrero Rebuild

2.9 lanes x 10 = **29 40’ trolley storage**

13 lanes x 7 = **91 60’ trolley storage**

3 40’ trolley crush

During Presidio Rebuild

3.2 lanes x 10 = **32 40’ trolley storage**

Presidio

Location: 949 Presidio Avenue

Site: 5.4 acres

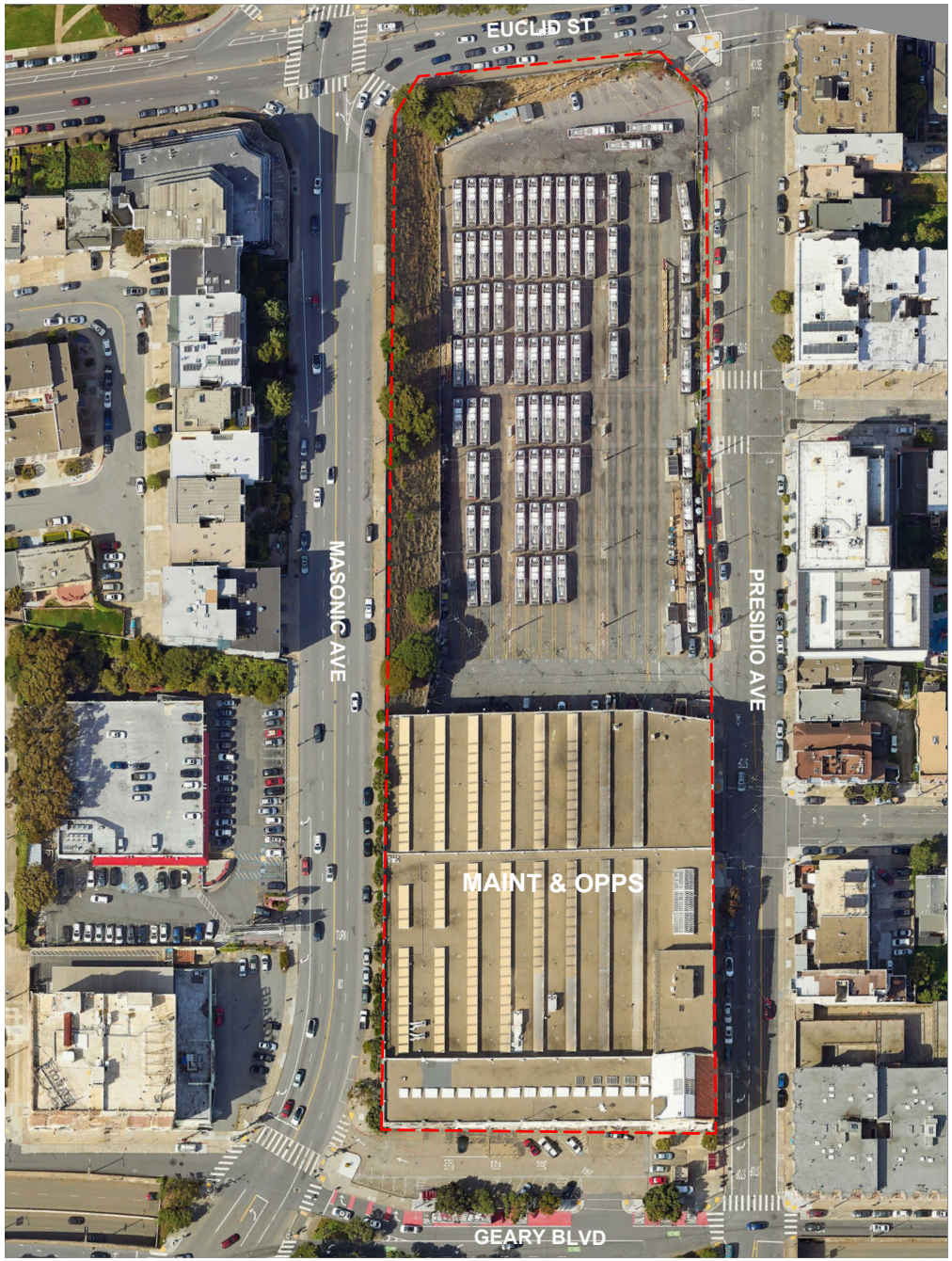
Buildings: 158,000 sf, built 1912

Current Use: 40’ trolley bus yard

Facility Plan: The Presidio Yard, built in 1912, is the SFMTA’s oldest bus yard. It is an electric trolley bus yard. Presidio will be rebuilt as a battery electric bus yard with more capacity. The project will include joint development and possibly the SFMTA’s paratransit BEV facility in addition to the planned bus yard.

The concept plans on the next page include a three level bus facility and joint development. The bus facility basement houses bus maintenance, stationary engineers, and non-revenue vehicles; the first floor bus maintenance; and the second and third floors operations, bus parking/charging, and bus washing. The design includes joint development along Geary Boulevard and the potential for a fourth bus floor which could house the SFMTA’s paratransit BEV facility as shown, or possibly an additional bus level.

The SFMTA plans to continue to store its historic buses at Presidio. Most historic buses should be stored in the basement to keep drive aisles clear for turning.

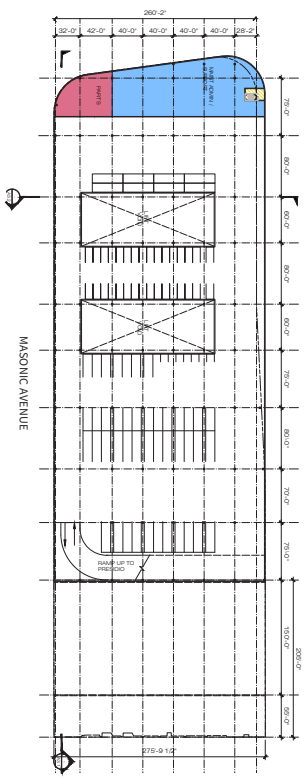


Presidio Planned Use

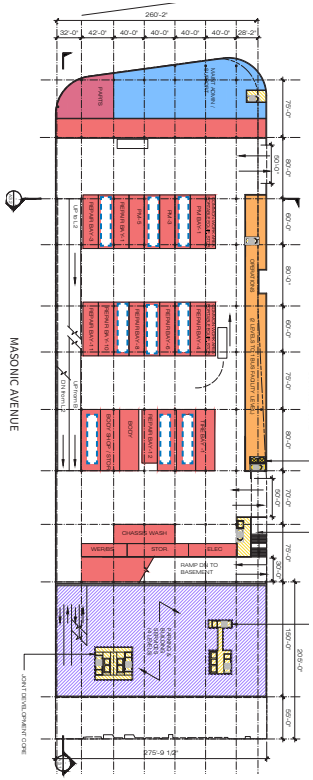
3 lanes x 11 **= 33 32’ BEB charging**
10 lanes x 11 = **110 40’ BEB charging**

9 lanes x 8 = **72 60’ BEB charging**
8 60’ crush parking

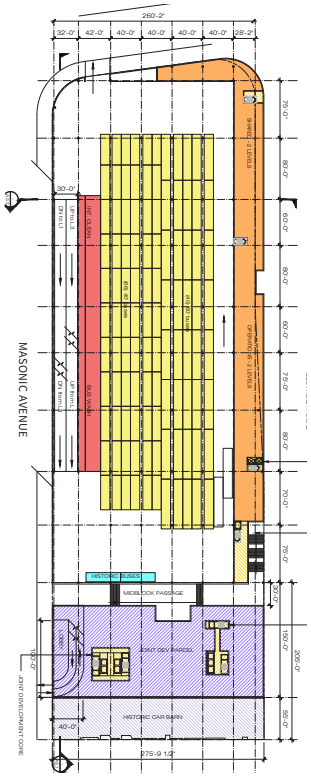
22 historic buses



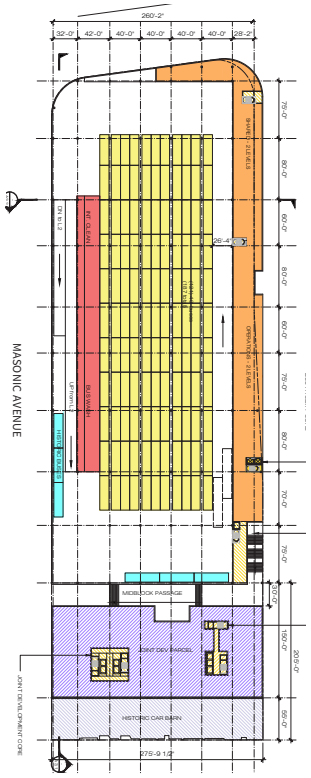
Basement
Most historic buses
SFMTA/PW NRVs



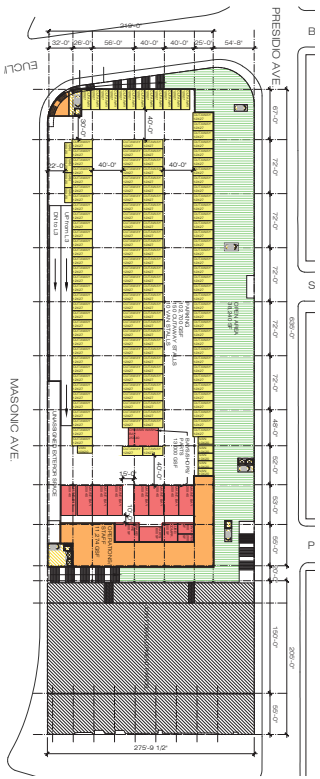
First Floor
20 Maintenance Bays
8 60’ crush parking



Second Floor
Storage Capacity:
11 lanes x 11=121 40’ **or**
11 lanes x 8 = 88 60’



Third Floor
Storage Capacity:
11 lanes x 11=121 40’ **or**
11 lanes x 8 = 88 60’



Possible Fourth Floor
Paratransit Facility shown, could be an additional bus yard floor

Hatch, May 2023, *San Francisco Transportation Agency Presidio Bus Yard Planning Study* Plans. Plans modified to show crush parking.

Potrero

Location: 2500 Mariposa Street

Site: 4.4 acres

Building: 109,000 sf, built 1914, renovated 1990

Current Use: 40’ and 60’ trolley bus facility

Facility Plan: The Potrero Yard, built in 1914, is the SFMTA’s second oldest bus yard. It is an electric trolley bus yard. In 2022, the SFMTA awarded a pre-development agreement to the Potrero Neighborhood Collective (PNC) to rebuild the yard with more capacity and joint development. The rebuilt yard will be used as a trolley bus yard. The project, which includes joint development and the potential to include the SFMTA’s paratransit battery electric vehicle (BEV) facility in addition to the planned bus yard, obtained CEQA and special use district approvals in early 2024.

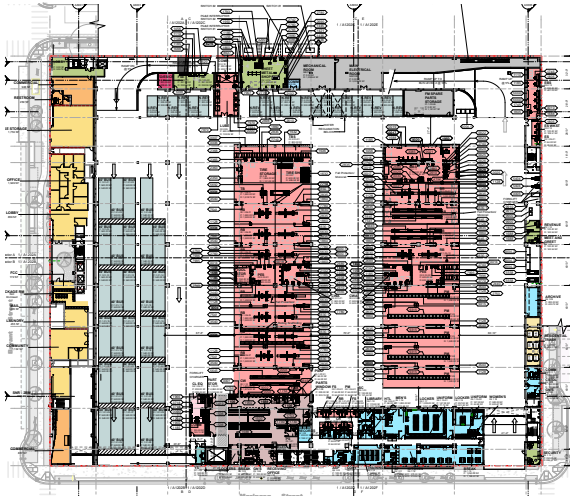
The schematic plans on the next page include a three level bus facility and joint development. The bus facility basement houses the SFMTA’s fare box operation and joint development functions; the first floor bus maintenance; the interim floor operations, training, and equipment; the second and third floors bus parking/charging and bus washing. The layout could allow the yard to be converted to a BEB yard in a future project if needed. The design includes joint development along Bryant Street and the potential for joint development or the SFMTA’s paratransit facility on top of the bus facility. See the project web site (https://www.sfmta.com/projects/potrero-yard-modernization-project) for additional information.

Potrero Planned Use

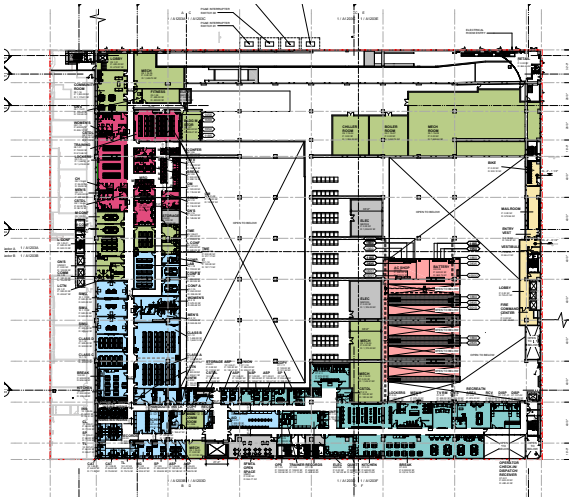
4 lanes x 6 = 24 40’ ETB charging
1 lane x 5 = 5 40’ ETB charging
21 lanes x 6 = 126 40’ ETB charging
.75 lanes x 4 = 4 40’ ETB charging
153 40’ ETB charging

23.25 lanes x 4= **93 60’ ETB charging**

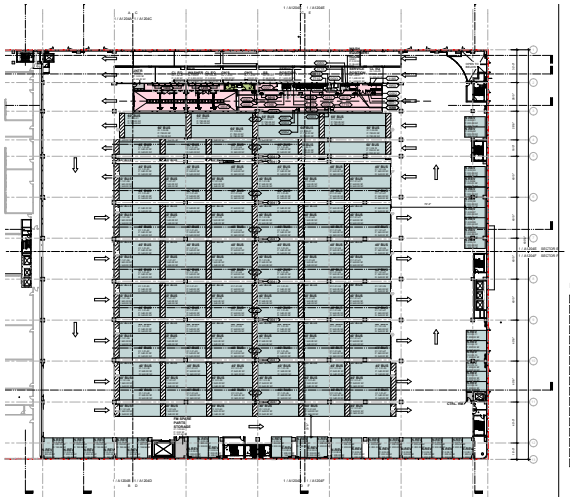
Basement
Fare Box



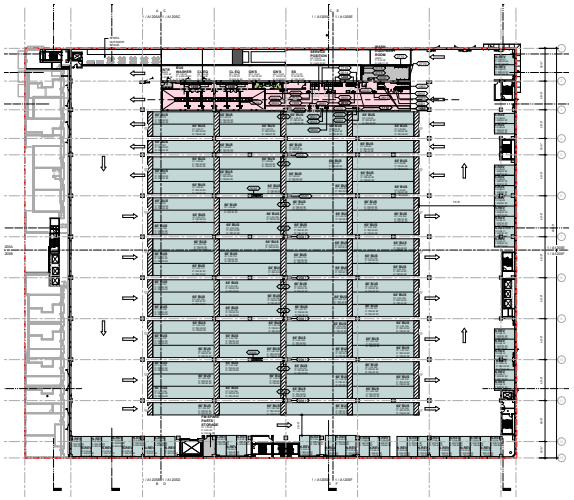
First Bus Floor
19 Maintenance Bays
29 40’ ETB charging



Interim Floor
Operations
Training
Equipment



Second Bus Floor
Storage Capacity
22 lanes x 6 = 132 40’ ETB charing **or**
22 lanes x 4 = 88 60’ ETB charging

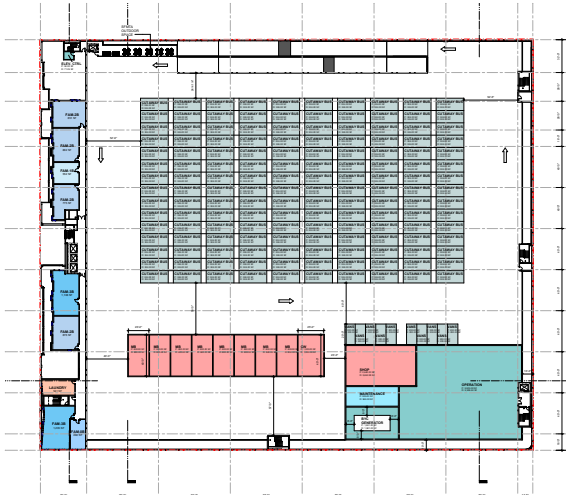


Third Bus Floor
Storage Capacity
22 lanes x 6 = 132 40’ ETB charging **or**
22 lanes x 4 = 88 60’ ETB charging

IBI Group (Bus Yard Component Architect for the Potrero Neighborhood Collective), 24 April 2024, Schematic Design Drawings.
Second Bus Floor Planing parking layout modified to show more 40-foot ETB parking.

Potrero Possible
Fourth Floor Options

Possible Fourth Floor Option
Housing



Possible Fourth Floor Option
Paratransit

Housing: City and County of San Francisco Planning Department, 3 December 2023, Potrero Yard Modernization Project Response to Comments (Case No. 2019-021884ENV), Figure 8.21: Refined Project Proposed Joint Development Floor 7

Paratransit: City and County of San Francisco Planning Department, 3 December 2023, Potrero Yard Modernization Project Response to Comments (Case No. 2019-021884ENV),Figure 8.29: Refined Project Variant Roof Plan.

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Woods

Location: 1095 Indiana Street

Site: 8.2 acres

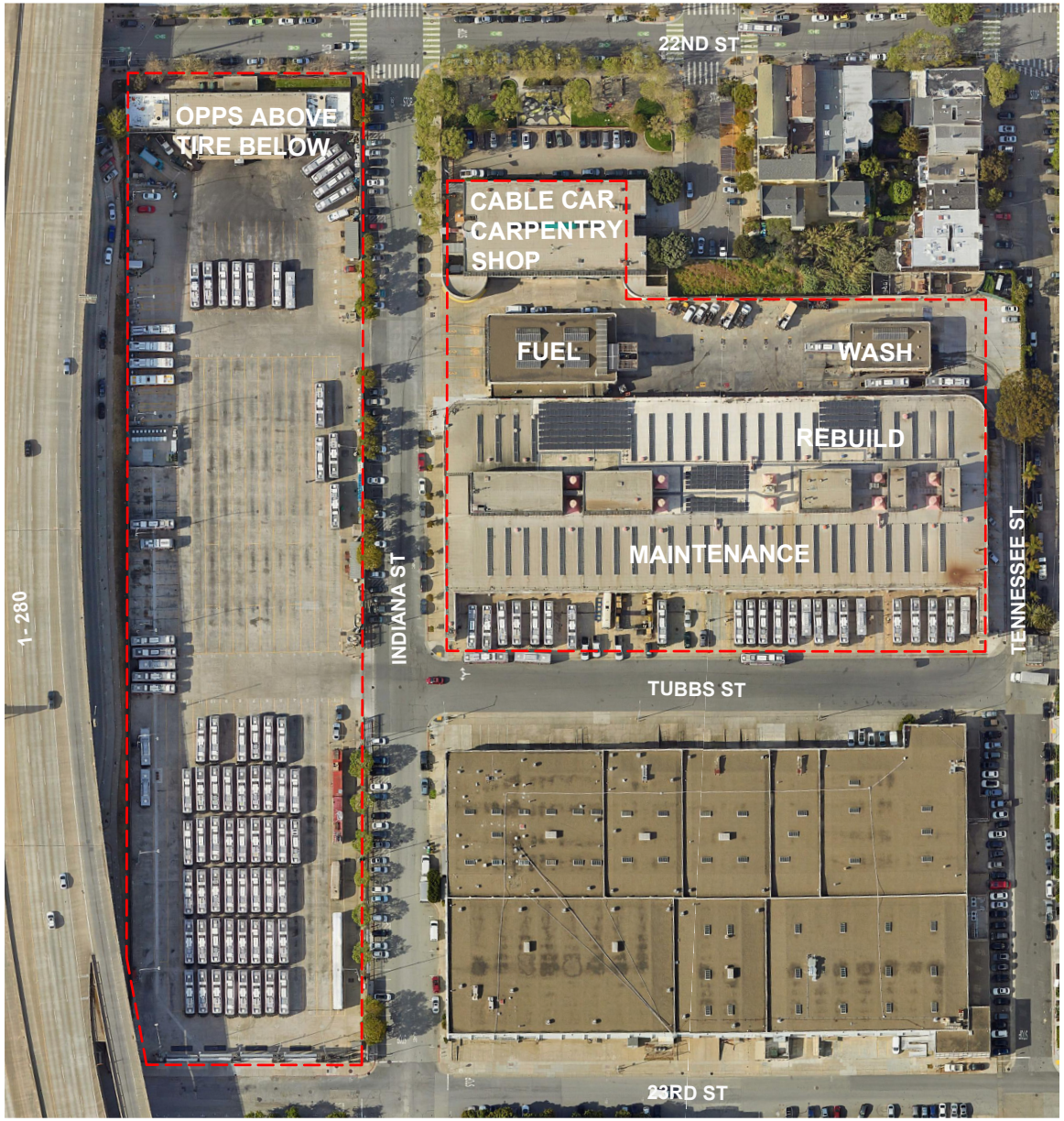
Building: 158,000 sf opened 1974-1978

Current Use: 40’ hybrid bus yard, and specialized maintenance facility

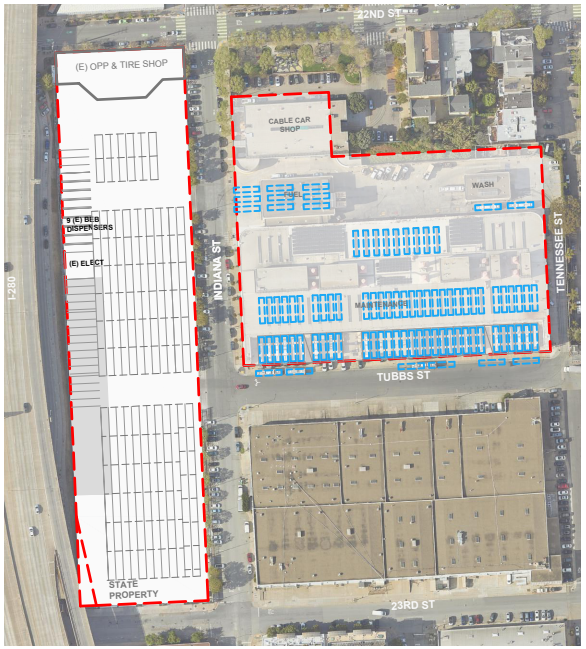
Facility Plan: The Woods Yard, completed in 1978, is located on two parcels separated by a street. It is a 40-foot hybrid bus yard. Woods provides operations and maintenance for its fleet, heavy maintenance for the Kirkland fleet, and body repair and paint for the entire bus fleet. It also has a 40-foot BEB pilot that will be expanded. Woods could be converted to a battery electric bus yard, or one or both parcels could be rebuilt as a multi-level battery electric bus yard. If rebuilt the project could include joint development and possibly the SFMTA’s paratransit BEV facility in addition to the planned bus yard.

The test fit diagrams on the next pages include the BEB pilot expansion and a yard conversion option and two rebuild options.

One rebuild option includes a three level bus facility on the west parcel and joint development on the east parcel. The other option includes a three level bus facility and joint development on the east parcel and converting the west parcel. Although not shown in the test fit, the west parcel could be rebuilt with bus parking on the first floor and the SFMTA paratransit facility on the second floor.



Woods
Pilot & Conversion Option



During BEB Pilot Construction

9 40’ BEB charging
3 40’ crush parking

8 lanes x 2 = 16 30’ hybrid parking
2 lanes x 7 = 14 30’ hybrid parking
30 30’ hybrid parking

20 lanes x 6 = **120 40’ hybrid parking**
90 40’ super crush parking

After BEB Pilot Construction

21 40’ BEB charging
3 40’ crush parking

8 lanes x 2 = 16 30’ hybrid parking
2 lanes x7 = 14 30’ hybrid parking
30 30’ hybrid parking

20 lanes x 6 = 120 40’ hybrid parking
3 lanes x 5 = 15 40’ hybrid parking
135 40’ hybrid parking
90 40’ super crush parking

After BEB Conversion Construction

20 lanes x 6 = 120 40’ BEB charging
4 40’ crush parking

Woods
West Parcel Rebuild Option

9 lanes x 13 = 117 40’ BEB charging

11 lanes x 8 = 88 60’ BEB charging
2 lanes x 9 = 18 60’ BEB charging
106 60’ BEB charging
8 60’ crush parking

First Floor

20 Maintenance Bays
8 crush parking in bays

Second Floor

Storage Capacity:
11 lanes x 12 = 132 40’ charging positions or
11 lanes x 8 = 88 60’ BEB charging positions

Rebuild Option - Third Floor

Storage Capacity
9 lanes x 13 = 117 40’ BEB
2 lanes x 9 = 18 60’ BEB positions

Woods
West Parcel Converted
East Parcel Rebuild Option

West Parcel
18 lanes x 6 = 108 40’ BEB charging
2 lanes x 3 = 6 40’ BEB charging
114 40’ BEB charging

East Parcel
26 lanes x 4 = **104 60’ BEB charging**
8 60’ crush parking

Rebuild Option - First Floor
Building
20 Maintenance Bays
8 60’ crush parking in bays

Yard Storage Capacity:
128 40’ BEB charging positions

Rebuild Option - Second Floor
Building Storage Capacity:
13 x 6 = 78 40’ BEB charging positions or
13 x 4 = 52 60’ BEB charging positions

Rebuild Option - Third Floor
Building Storage Capacity:
13 x 6 = 78 40’ BEB charging positions or
13 x 4 = 52 60’ BEB charging positions

Presidio, Photograph by IDEO

Appendix 2: Bus Parking Analysis

New Bus Procurement and Delivery

The *New Bus Delivery Plan* on the next page shows the number of buses the SFMTA plans to have delivered each year. The table lists the years and planned project completion dates and delivery notes in the left columns and the number of 32-foot, 40-foot, and 60-foot hybrid, battery electric and trolley buses the SFMTA plans to have delivered each year in the rows.

The SFMTA developed the *New Bus Delivery Plan* to meet service demand while rebuilding and converting each bus yard and transitioning the fleet to an all zero-emission bus fleet.

To maximize replacing hybrid buses with zero emission buses, the SFMTA plans to operate about half of its buses longer than the standard minimum useful life based on vehicle type and size.

With the exception of Potrero, which will remain a trolley bus yard, each of the SFMTA's five other bus yards will be rebuilt as or converted to a BEB yard. After each BEB yard project is complete there will be a large increase in available BEB charging positions and the agency will be able to procure more battery electric buses. The *New Bus Delivery Plan* is based on yard project completion dates, as well as, bus ages and the number of buses that the SFMTA is able to accept in a given year.

New buses need to be procured 18-24 months before they are delivered and placed in revenue service. The agency will need to develop a plan to procure, accept, and place into service new buses and retire the existing buses they are replacing.

New Bus Delivery Plan

Calendar Year	Planned Bus Yard Construction Completion Dates (Note: Project completion dates based on 2024 Facility Framework Bus Yard Project Schedule)	Hybrid				BEB				TC			Total
		32ft	40ft	60ft	SubT	32ft	40ft	60ft	SubT	40ft	60ft	SubT	
2024		13	0	0	13	0	2	0	2	0	0	0	15
2025		0	47	0	47	0	0	0	0	0	0	0	47
2026	Woods 40-ft BEB Pilot - Q4 2026 Islais Creek 60-ft BEB Pilot - Q4 2026	0	47	0	47	0	12	0	12	0	0	0	59
2027		0	0	0	0	0	0	6	6	0	0	0	6
2028	Kirkland BEB Conversion - Q2 2028 Potrero Rebuild - Q2 2029	0	0	0	0	0	48	0	48	0	0	0	48
2029		0	0	40	40	0	56	0	56	0	0	0	96
2030		0	0	92	92	0	0	0	0	0	0	0	92
2031	Islais Creek Phase 1 BEB Conversion - Q1 2031	0	28	23	51	0	0	5	5	0	0	0	56
2032	Islais Creek Phase 2 BEB Conversion - Q2 2032 Presidio Rebuild - Q4 2032	0	0	0	0	0	0	40	40	0	0	0	40
2033		0	0	0	0	8	51	24	83	0	13	13	96
2034		0	0	0	0	8	40	0	48	0	48	48	96
2035		0	0	0	0	14	19	0	33	55	8	63	96
2036	Flynn Rebuild - Q4 2036	0	0	0	0	0	2	0	2	70	24	94	96
2037		0	0	0	0	0	56	0	56	28	0	28	84
2038		0	0	0	0	0	78	6	84	0	0	0	84
2039		0	0	0	0	0	32	47	79	0	0	0	79
2040	Woods Conversion - Q4 2040	0	0	0	0	0	56	0	56	0	0	0	56
2041		0	0	0	0	0	56	40	96	0	0	0	96
2042		0	0	0	0	0	4	92	96	0	0	0	96
2043		0	0	0	0	0	68	28	96	0	0	0	96
		13	122	155	290	30	580	288	898	153	93	246	1434

Bus Parking Analysis

The *Scenario 1 Bus Parking Analysis Tables* on the following page includes the *Bus Parking Demand Table,* the *Bus Parking Table*, and the *Bus Parking Demand vs Yard Capacity Table*.

Bus Parking Demand
The *Bus Parking Demand Table* includes the SFMTA's bus parking demand for regular service, changes to service due to construction, training, and spares, as well as its acceptance bus and historic bus parking needs. The type of bus (hybrid, trolley, battery electric, historic, acceptance) are listed in the left column and the number of 32-foot, 40-foot, and 60-foot buses in each calendar year in the rows. The service, construction, training, and spare vehicle demand is based on the SFMTA's current *New Bus Delivery Plan* shown on the previous page.

Scenario 1 Bus Parking
The *Bus Parking Table* shows the number of each type and length of bus assigned to each yard each year to meet the *Bus Parking Demand Table* assuming the *Scenario 1 Bus Yard Projects Schedule*. On-site construction phases, when yards are partially or fully closed, are highlighted in light red, hybrid bus quantities in gray, electric trolley bus quantities in tan, battery electric bus quantities in green, historic buses quantities in blue, and acceptance buses quantities in white. Lane parking/charging position quantities are shown in black text and crush parking quantities (parking in maintenance bays, drive aisles, or other locations without charging) are shown in blue.

Scenario 1 Bus Parking Demand vs Yard Capacity
The *Bus Parking Demand vs Yard Capacity Table* compares bus parking demand to the total available parking spaces/charging positions in all yards each year. Parking demand quantities are shown in gray text, total parking spaces/charging positions in black, surplus parking spaces/charging positions in green, and shortfall of parking spaces/charging positions in red.

The table shows some parking/charging surpluses and shortfalls in some years. In order to provide adequate parking/charging without reconfiguring pantograph layouts between yard projects the SFMTA will need to use some surpluses to mitigate some shortfalls:

- Use some BEB charging positions at Islais Creek and Kirkland, which will still have fuel stations after BEB conversion, for hybrid bus parking until the hybrid buses are retired and replaced with BEBs.
- Use surplus 60-foot hybrid parking spaces for 40-foot hybrids in some years.
- Use surplus 60-foot BEB charging positions for 40-foot BEBs in some years.
- Increase crush parking when there is a parking/charging shortfall that cannot be met by the other strategies described above.

While the Kirkland and Potrero yards are closed for construction and the Woods and Islais Creek pilots are both under construction there will be 40-foot hybrid bus parking shortfall that cannot fully be mitigated by the strategies noted above. Temporarily assigning 8 40-foot hybrids to Islais Creek would reduce the shortfall. However approximately 15 40-foot hybrid bus parking shortfall remains. The SFMTA will need to determine if parking demand and yard capacity can be balanced or if supplemental parking will be needed.

Scenario 1 Bus Parking Analysis Tables

LEGEND

Fill colour key	Text colour key
Hybrid	Fleet Parking/Charging Demand
Battery Electric	Parking/Charging Positions
Trolley	Crush Parking
Historic Buses	Parking/Charging Positions Surplus
Acceptance	Parking/Charging Position Shortfall
Construction	

BUS PARKING DEMAND	2024								2026				2027				2028			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	30	312	224	566	30	345	235	610	30	331	233	594	30	331	227	588	30	246	224	500
BEB		12		12		12		12		24		24		24	6	30		72	6	78
Trolley		185	93	278		185	93	278		185	93	278		185	93	278		185	93	278
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	531	323	884	30	564	334	928	30	562	332	924	30	562	332	924	30	525	329	884

BUS PARKING DEMAND	2029				2030				2031				2032				2033			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	30	190	224	444	30	190	224	444	30	190	219	439	30	190	179	399	22	174	155	351
BEB		128	6	134		128	6	134		128	11	139		128	51	179	8	176	75	259
Trolley		185	93	278		185	93	278		185	93	278		185	93	278		153	93	246
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	525	329	884	30	525	329	884	30	525	329	884	30	525	329	884	30	525	329	884

BUS PARKING DEMAND	2034				2035				2036				2037				2038			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	14	138	155	307	0	122	155	277	0	122	155	277	0	75	155	230	0	28	155	183
BEB	16	212	75	303	30	228	75	333	30	228	75	333	30	284	75	389	30	350	75	455
Trolley		153	93	246		153	93	246		153	93	246		153	93	246		153	93	246
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	525	329	884	30	525	329	884	30	525	329	884	30	534	329	893	30	553	329	912

BUS PARKING DEMAND	2039				2040				2041				2042				2043			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	0	28	155	183	0	28	155	183	0	28	115	143	0	28	23	51	0	0	0	0
BEB	30	382	122	534	30	390	122	542	30	390	162	582	30	394	254	678	30	462	277	769
Trolley		153	93	246		153	93	246		153	93	246		153	93	246		153	93	246
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	585	376	991	30	593	376	999	30	593	376	999	30	597	376	1003	30	637	376	1043

BUS PARKING	2024				2025				2026				2027				2028			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN						UPGRADE														
Hybrid										88				88				88		
Acceptance			6				6				6				6				6	
KIRKLAND									KIRKLAND CONVERSION											
Hybrid		132				132														
Battery Electric																		104		
ISLAIS CREEK								BEB PILOT												
Hybrid			120				111				111				111				111	
Battery Electric															6				6	
Acceptance																				
MME STORAGE																				
Trolley Storage						32	91			32	91			32	91			32	91	
POTRERO						POTRERO REBUILD														
Trolley		53	93																	
PRESIDIO																				
Trolley		132				153				153				153				153		
Battery Electric																				
Historic Bus Storage		22				22				22				22				22		
FLYNN																				
Hybrid			130				130				128				128				128	
Trolley (In-Motion)							2				2				2				2	
Battery Electric																				
WOODS								BEB PILOT												
Hybrid	30	238			30	222			30	222			30	228			30	228		
Battery Electric		12				12				24				24				24		
OFF SITE STORAGE																				
Historic Bus Storage																				

BUS PARKING	2029				2030				2031				2032				2033			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																				
Hybrid			64				64				64				64				64	
Acceptance			6				6				6				6				6	
KIRKLAND																				
Hybrid																				
Battery Electric		104				104				104				104				104		
ISLAIS CREEK			ISLAIS CREEK CONVERSION																	
Hybrid			42				42													
Battery Electric			6				6				56				56				91	
Acceptance																				
MME STORAGE																				
Trolley Storage						32				32				32				11		
POTRERO																				
Trolley		153	93			153	93			153	93			153	93			153	93	
PRESIDIO					PRESIDIO REBUILD															
Trolley		32																		
Battery Electric																	33	110	80	
Historic Bus Storage		22																22		
FLYNN																				
Hybrid			130				130				130				130				130	
Trolley (In-Motion)																				
Battery Electric																				
WOODS																				
Hybrid	30	228			30	228			30	228			30	228			30	228		
Battery Electric		24				24				24				24				24		
OFF SITE STORAGE																				
Historic Bus Storage						22				22				22						

BUS PARKING	2034				2035				2036				2037				2038			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																				
Hybrid			64				64				64				64				64	
Acceptance			6				6				6				6				6	
KIRKLAND																				
Hybrid																				
Battery Electric		104				104				104				104				104		
ISLAIS CREEK																				
Hybrid																				
Battery Electric			91				91				91				91				91	
Acceptance																				
MME STORAGE																				
Trolley Storage																				
POTRERO																				
Trolley		153	93			153	93			153	93			153	93			153	93	
PRESIDIO																				
Trolley																				
Battery Electric	33	110	80		33	110	80		33	110	80		33	110	80		33	110	80	
Historic Bus Storage		22				22				22				22				22		
FLYNN	FLYNN REBUILD																			
Hybrid																				
Trolley (In-Motion)																				
Battery Electric														138	122			138	122	
WOODS																	WOODS TBD (CONVERSION ASSUMED)			
Hybrid	30	228			30	228			30	228			30	228						
Battery Electric		24				24				24				24						
OFF SITE STORAGE																				
Historic Bus Storage																				

BUS PARKING	2039				2040				2041				2042				2043			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																				
Hybrid			64				64				64			28	36					
Acceptance			6				6													
KIRKLAND																				
Hybrid																				
Battery Electric		104				104				90				90				90		
ISLAIS CREEK																				
Hybrid																				
Battery Electric			91				91				85				85				85	
Acceptance											6				6				6	
MME STORAGE																				
Trolley Storage																				
POTRERO																				
Trolley		153	93			153	93			153	93			153	93			153	93	
PRESIDIO																				
Trolley																				
Battery Electric	33	110	80		33	110	80		33	110	80		33	110	80		33	110	80	
Historic Bus Storage		22				22				22				22				22		
FLYNN																				
Hybrid																				
Trolley (In-Motion)																				
Battery Electric		138	122			138	122			138	122			138	122			138	122	
WOODS																				
Hybrid																				
Battery Electric										124				124				124		
OFF SITE STORAGE																				
Historic Bus Storage																				

BUS PARKING DEMAND VS YARD CAPACITY	2024				2025				2026				2027				2028			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
Hybrid Fleet	30	312	224		30	345	235		30	331	233		30	331	227		30	246	224	
Hybrid Parking	30	370	250		30	354	241		30	310	239		30	316	239		30	316	239	
Park Surplus/Shortfall	0	58	26		0	9	6		0	-21	6		0	-15	12		0	70	15	
Bat Elect Fleet	0	12	0		0	1	0		0	24	0		0	24	6		0	72	6	
Bat Elect Parking	0	12	0		0	12	0		0	24	0		0	24	6		0	128	6	
Park Surplus/Shortfall	0	0	0		0	11	0		0	0	0		0	0	0		0	56	0	
Trolley Fleet		185	93			185	93			185	93		0	185	93			185	93	
Trolley Parking		185	93			185	93			185	93			185	93			185	93	
Park Surplus/Shortfall		0	0			0	0			0	0			0	0			0	0	
Historic Fleet		22				22				22				22				22		
Historic Parking		22				22				22				22				22		
Acceptance Fleet			6				6				6				6				6	
Acceptance Parking			6				6				6				6				6	

BUS PARKING DEMAND VS YARD CAPACITY	2029				2030				2031				2032				2033			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
Hybrid Fleet	30	190	224		30	190	224		30	190	219		30	190	179		22	174	155	
Hybrid Parking	30	228	236		30	228	236		30	228	194		30	228	194		30	228	194	
Park Surplus/Shortfall	0	38	12		0	38	12		0	38	-25		0	38	15		8	54	39	
Bat Elect Fleet	0	128	6		0	128	6		0	128	11		0	128	51		8	176	75	
Bat Elect Parking	0	128	6		0	128	6		0	128	56		0	128	56		33	238	171	
Park Surplus/Shortfall	0	0	0		0	0	0		0	0	45		0	0	5		25	62	96	
Trolley Fleet		185	93			185	93			185	93			185	93			153	93	
Trolley Parking		185	93			185	93			185	93			185	93			164	93	
Park Surplus/Shortfall		0	0			0	0			0	0			0	0			11	0	
Historic Fleet		22				22				22				22				22		
Historic Parking		22				22				22				22				22		
Acceptance Fleet			6				6				6				6				6	
Acceptance Parking			6				6				6				6				6	

BUS PARKING DEMAND VS YARD CAPACITY	2034				2035				2036				2037				2038			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
Hybrid Fleet	14	138	155		0	122	155		0	122	155		0	75	155		0	28	155	
Hybrid Parking	30	228	64		30	228	64		30	228	64		30	228	64		0	0	64	
Park Surplus/Shortfall	16	90	-91		30	106	-91		30	106	-91		30	153	-91		0	-28	-91	
Bat Elect Fleet	16	212	75		30	228	75		30	228	75		30	284	75		30	350	75	
Bat Elect Parking	33	238	171		33	238	171		33	238	171		33	376	293		33	352	293	
Park Surplus/Shortfall	17	26	96		3	10	96		3	10	96		3	92	218		3	2	218	
Trolley Fleet		153	93			153	93			153	93			153	93			153	93	
Trolley Parking		153	93			153	93			153	93			153	93			153	93	
Park Surplus/Shortfall		0	0			0	0			0	0			0	0			0	0	
Historic Fleet		22				22				22				22				22		
Historic Parking		22				22				22				22				22		
Acceptance Fleet			6				6				6				6				6	
Acceptance Parking			6				6				6				6				6	

BUS PARKING DEMAND VS YARD CAPACITY	2039				2040				2041				2042				2043			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
Hybrid Fleet	0	28	155		0	28	155		0	28	115		0	28	23		0	0	0	
Hybrid Parking	0	0	64		0	0	64		0	0	64		0	28	36		0	0	0	
Park Surplus/Shortfall	0	-28	-91		0	-28	-91		0	-28	-51		0	0	13		0	0	0	
Bat Elect Fleet	30	382	122		30	390	122		30	390	162		30	394	254		30	462	277	
Bat Elect Parking	33	352	293		33	352	293		33	462	287		33	462	287		33	462	287	
Park Surplus/Shortfall	3	-30	171		3	-38	171		3	72	125		3	68	33		3	0	10	
Trolley Fleet		153	93			153	93			153	93			153	93			153	93	
Trolley Parking		153	93			153	93			153	93			153	93			153	93	
Park Surplus/Shortfall		0	0			0	0			0	0			0	0			0	0	
Historic Fleet		22				22				22				22				22		
Historic Parking		22				22				22				22				22		
Acceptance Fleet			6				6				6				6				6	
Acceptance Parking			6				6				6				6				6	

Presidio, Photograph by IDEO

Appendix 3: Scenario 2

Scenario 2

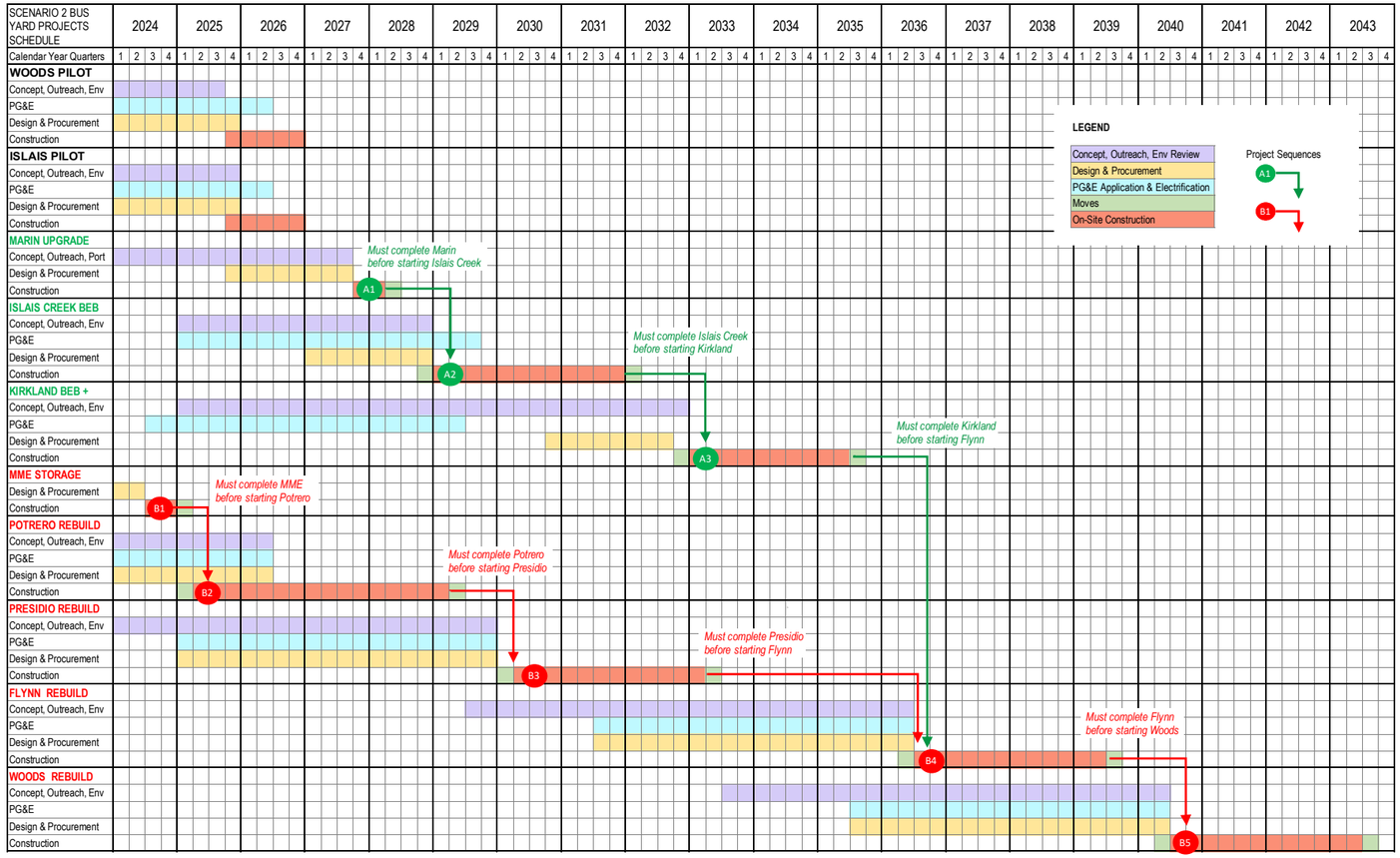
The *Scenario 2 Bus Yard Projects Schedule*, shown below, has the same bus yard projects as Scenario 1, but assumes that the Islais Creek BEB yard conversion project occurs before the Kirkland BEB yard conversion project.

The *Scenario 2 Bus Parking Analysis Tables* on the following page assume the same Bus Parking Demand and Bus Yard Capacities as Scenario 1, but the year by year *Bus Parking* and *Bus Parking Demand vs Yard Capacity* analysis assumes the *Scenario 2 Bus Yard Projects Schedule* and thus is different than Scenario 1.

The *Scenario 2 Bus Parking* and *Bus Parking Demand vs Yard Capacity Table* shows parking/charging surpluses (green text) and shortfalls (red text) in some years. While some shortfalls can be mitigated using surpluses similar to Scenario 1, the 40-foot BEB charging position shortfalls from 2028 through 2033 and in 2038 and 2042 cannot. The SFMTA would need to modify the new bus procurement and delivery plan, delaying the replacement of some 40-foot hybrid buses with battery electric buses.

The SFMTA has not vetted the Scenario 2 schedule or its new bus delivery and bus yard parking capacity ramifications. The scenario is provided, along with other recommendations in this Appendix for the SFMTA's consideration.

Scenario 2 Bus Yard Projects Schedule



Scenario 2 Bus Parking Analysis Tables

LEGEND

Hybrid	Fleet Parking/Charging Demand
Battery Electric	Parking/Charging Positions
Trolley	Crush Parking
Historic Buses	Parking/Charging Positions Surplus
Acceptance	Parking/Charging Position Shortfall
Construction	

BUS PARKING DEMAND	2024				2025				2026				2027				2028			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	30	312	224	566	30	345	235	610	30	331	233	594	30	331	227	588	30	246	224	500
BEB		12		12		12		12		24		24		24	6	30		72	6	78
Trolley		185	93	278		185	93	278		185	93	278		185	93	278		185	93	278
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	531	323	884	30	564	334	928	30	562	332	924	30	562	332	924	30	525	329	884

BUS PARKING DEMAND	2029				2030				2031				2032				2033			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	30	190	224	444	30	190	224	444	30	190	219	439	30	190	179	399	22	174	155	351
BEB		128	6	134		128	6	134		128	11	139		128	51	179	8	176	75	259
Trolley		185	93	278		185	93	278		185	93	278		185	93	278		153	93	246
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	525	329	884	30	525	329	884	30	525	329	884	30	525	329	884	30	525	329	884

BUS PARKING DEMAND	2034				2035				2036				2037				2038			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	14	138	155	307	0	122	155	277	0	122	155	277	0	75	155	230	0	28	155	183
BEB	16	212	75	303	30	228	75	333	30	228	75	333	30	284	75	389	30	350	75	455
Trolley		153	93	246		153	93	246		153	93	246		153	93	246		153	93	246
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	525	329	884	30	525	329	884	30	525	329	884	30	534	329	893	30	553	329	912

BUS PARKING DEMAND	2039				2040				2041				2042				2043			
Bus Lengths	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total	32'	40'	60'	Total
Hybrid	0	28	155	183	0	28	155	183	0	28	115	143	0	28	23	51	0	0	0	0
BEB	30	382	122	534	30	390	122	542	30	390	162	582	30	394	254	678	30	462	277	769
Trolley		153	93	246		153	93	246		153	93	246		153	93	246		153	93	246
Historic		22		22		22		22		22		22		22		22		22		22
Acceptance			6	6			6	6			6	6			6	6			6	6
Total Parking Demand	30	585	376	991	30	593	376	999	30	593	376	999	30	597	376	1003	30	637	376	1043

BUS PARKING	2024				2025				2026				2027				2028			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																UPGRADE				
Hybrid																				
Acceptance			6				6				6				6				6	
ISLAIS CREEK								BEB PILOT												
Hybrid			120				111				111				111				111	
Battery Electric															6				6	
Acceptance																				
KIRKLAND																				
Hybrid		132				132				132				132				132		
Battery Electric																				
MME STORAGE																				
Trolley Storage						32	91			32	91			32	91			32	91	
POTRERO						POTRERO REBUILD														
Trolley		53	93																	
PRESIDIO																				
Trolley		132				153				153				153				153		
Battery Electric																				
Historic Bus Storage		22				22				22				22				22		
FLYNN																				
Hybrid			130				130				128				128				128	
Trolley (In-Motion)							2				2				2				2	
Battery Electric																				
WOODS								BEB PILOT												
Hybrid	30	238			30	222			30	222			30	228			30	228		
Battery Electric		12				12				24				24				24		
OFF SITE STORAGE																				
Historic Bus Storage																				

BUS PARKING	2029				2030				2031				2032				2033			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																				
Hybrid			64				64				64				64			88		
Acceptance			6				6				6				6				6	
ISLAIS CREEK	ISLAIS CREEK CONVERSION																			
Hybrid			42				42													
Battery Electric			6				6				56				56				91	
Acceptance																				
KIRKLAND																	KIRKLAND CONVERSION			
Hybrid		132				132				132				132						
Battery Electric																				
MME STORAGE																				
Trolley Storage						32				32				32				11		
POTRERO																				
Trolley		153	93			153	93			153	93			153	93			153	93	
PRESIDIO						PRESIDIO REBUILD														
Trolley		32																		
Battery Electric																	33	110	80	
Historic Bus Storage		22																22		
FLYNN																				
Hybrid			130				130				130				130				130	
Trolley (In-Motion)																				
Battery Electric																				
WOODS																				
Hybrid	30	228			30	228			30	228			30	228			30	228		
Battery Electric		24				24				24				24				24		
OFF SITE STORAGE																				
Historic Bus Storage						22				22				22						

BUS PARKING	2034				2035				2036				2037				2038			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																				
Hybrid		88				88					64				64				64	
Acceptance			6				6				6				6				6	
ISLAIS CREEK																				
Hybrid																				
Battery Electric			91				91				91				91				91	
Acceptance																				
KIRKLAND																				
Hybrid																				
Battery Electric						104				104				104				104		
MME STORAGE																				
Trolley Storage																				
POTRERO																				
Trolley		153	93			153	93			153	93			153	93			153	93	
PRESIDIO																				
Trolley																				
Battery Electric	33	110	80		33	110	80		33	110	80		33	110	80		33	110	80	
Historic Bus Storage		22				22				22				22				22		
FLYNN											FLYNN REBUILD									
Hybrid			130				130													
Trolley (In-Motion)																				
Battery Electric																				
WOODS																				
Hybrid	30	228			30	228			30	228			30	228			30	228		
Battery Electric		24				24				24				24				24		
OFF SITE STORAGE																				
Historic Bus Storage																				

BUS PARKING	2039				2040				2041				2042				2043			
Bus Lengths	32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'		32'	40'	60'	
MARIN																				
Hybrid			64				64				64			28	23					
Acceptance			6				6													
ISLAIS CREEK																				
Hybrid																				
Battery Electric			91				91				85				85				85	
Acceptance											6				6				6	
KIRKLAND																				
Hybrid																				
Battery Electric		104				104				90				90				90		
MME STORAGE																				
Trolley Storage																				
POTRERO																				
Trolley		153	93			153	93			153	93			153	93			153	93	
PRESIDIO																				
Trolley																				
Battery Electric	33	110	80		33	110	80		33	110	80		33	110	80		33	110	80	
Historic Bus Storage		22				22				22				22				22		
FLYNN																				
Hybrid																				
Trolley (In-Motion)																				
Battery Electric		138	122			138	122			138	122			138	122			138	122	
WOODS							WOODS TBD (CONVERSION ASSUMED)													
Hybrid	30	228																		
Battery Electric		24																124		
OFF SITE STORAGE																				
Historic Bus Storage																				

BUS PARKING DEMAND VS YARD CAPACITY	2024			2025			2026			2027			2028		
Bus Lengths	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'
Hybrid Fleet	30	312	224	30	345	235	30	331	233	30	331	227	30	246	224
Hybrid Parking	30	370	250	30	354	241	30	354	239	30	360	239	30	360	239
Park Surplus/Shortfall	0	58	26	0	9	6	0	23	6	0	29	12	0	114	15
Bat Elect Fleet	0	12	0	0	1	0	0	24	0	0	24	6	0	72	6
Bat Elect Parking	0	12	0	0	12	0	0	24	0	0	24	6	0	24	6
Park Surplus/Shortfall	0	0	0	0	11	0	0	0	0	0	0	0	0	-48	0
Trolley Fleet		185	93		185	93		185	93	0	185	93		185	93
Trolley Parking		185	93		185	93		185	93		185	93		185	93
Park Surplus/Shortfall		0	0		0	0		0	0		0	0		0	0
Historic Fleet		22			22			22			22			22	
Historic Parking		22			22			22			22			22	
Acceptance Fleet			6			6			6			6			6
Acceptance Parking			6			6			6			6			6

BUS PARKING DEMAND VS YARD CAPACITY	2029			2030			2031			2032			2033		
Bus Lengths	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'
Hybrid Fleet	30	190	224	30	190	224	30	190	219	30	190	179	22	174	155
Hybrid Parking	30	360	236	30	360	236	30	360	194	30	360	194	30	316	130
Park Surplus/Shortfall	0	170	12	0	170	12	0	170	-25	0	170	15	8	142	-25
Bat Elect Fleet	0	128	6	0	128	6	0	128	11	0	128	51	8	176	75
Bat Elect Parking	0	24	6	0	24	6	0	24	56	0	24	56	33	134	171
Park Surplus/Shortfall	0	-104	0	0	-104	0	0	-104	45	0	-104	5	25	-42	96
Trolley Fleet		185	93		185	93		185	93		185	93		153	93
Trolley Parking		185	93		185	93		185	93		185	93		164	93
Park Surplus/Shortfall		0	0		0	0		0	0		0	0		11	0
Historic Fleet		22			22			22			22			22	
Historic Parking		22			22			22			22			22	
Acceptance Fleet			6			6			6			6			6
Acceptance Parking			6			6			6			6			6

BUS PARKING DEMAND VS YARD CAPACITY	2034			2035			2036			2037			2038		
Bus Lengths	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'
Hybrid Fleet	14	138	155	0	122	155	0	122	155	0	75	155	0	28	155
Hybrid Parking	30	316	130	30	316	130	30	228	64	30	228	64	30	228	64
Park Surplus/Shortfall	16	178	-25	30	194	-25	30	106	-91	30	153	-91	30	200	-91
Bat Elect Fleet	16	212	75	30	228	75	30	228	75	30	284	75	30	350	75
Bat Elect Parking	33	134	171	33	238	171	33	238	171	33	238	171	33	238	171
Park Surplus/Shortfall	17	-78	96	3	10	96	3	10	96	3	-46	96	3	-112	96
Trolley Fleet		153	93		153	93		153	93		153	93		153	93
Trolley Parking		153	93		153	93		153	93		153	93		153	93
Park Surplus/Shortfall		0	0		0	0		0	0		0	0		0	0
Historic Fleet		22			22			22			22			22	
Historic Parking		22			22			22			22			22	
Acceptance Fleet			6			6			6			6			6
Acceptance Parking			6			6			6			6			6

BUS PARKING DEMAND VS YARD CAPACITY	2039			2040			2041			2042			2043		
Bus Lengths	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'	32'	40'	60'
Hybrid Fleet	0	28	155	0	28	155	0	28	115	0	28	23	0	0	0
Hybrid Parking	30	228	64	0	0	64	0	0	64	0	28	23	0	0	0
Park Surplus/Shortfall	30	200	-91	0	-28	-91	0	-28	-51	0	0	0	0	0	0
Bat Elect Fleet	30	382	122	30	390	122	30	390	162	30	394	254	30	462	277
Bat Elect Parking	33	376	293	33	352	293	33	338	287	33	338	287	33	462	287
Park Surplus/Shortfall	3	-6	171	3	-38	171	3	-52	125	3	-56	33	3	0	10
Trolley Fleet		153	93		153	93		153	93		153	93		153	93
Trolley Parking		153	93		153	93		153	93		153	93		153	93
Park Surplus/Shortfall		0	0		0	0		0	0		0	0		0	0
Historic Fleet		22			22			22			22			22	
Historic Parking		22			22			22			22			22	
Acceptance Fleet			6			6			6			6			6
Acceptance Parking			6			6			6			6			6

Scenario Comparison and Recommendations

Kirkland and Islais Creek BEB Yard Conversion Projects
The Kirkland Yard, built circa 1950, is currently a 40-foot hybrid bus yard. The Islais Creek Yard, completed in 2017, can accommodate 40-foot buses and is currently a 60-foot hybrid bus yard. Both yards are planned to be converted to BEB yards with similar numbers of charging positions and crush parking spaces:

- Kirkland: 80 40-foot BEB charging positions plus 10-24 crush parking spaces.
- Islais Creek: 75 60-foot BEB charging positions plus 16 crush parking spaces.

However given the Kirkland Yard's layout and age, the Kirkland project includes changes to maximize BEB bus charging capacity and meet building code requirements and thus is expected to cost more than the Islais Creek project.

Project Sequences and Schedules
Scenario 1 assumes that the Kirkland BEB yard conversion project occurs before the Islais Creek BEB yard conversion project. Scenario 2 assumes that the Islais Creek project occurs before the Kirkland project. As shown in the *Scenarios 1 and 2 Construction Schedule Comparison* on the next page, assuming funding is available, Scenario 1 could be completed sooner than Scenario 2 because the SFMTA has submitted a PG&E application for new electrical service for the Kirkland BEB yard conversion project but not for the Islais Creek BEB yard conversion project.

- Scenario 1: Kirkland electrification in late 2027 and construction complete in mid 2028. Woods, the last bus yard project complete in late 2040.
- Scenario 2: Islais Creek phase 1 electrification in late 2029 and phase 1 construction complete in mid 2030. Woods, the last bus yard project complete in mid 2043.

Bus Yard Fleet Mixes and New Bus Procurement
The Scenario 1 bus yard fleet mixes and the new bus procurement and delivery plan were developed together to meet services needs while optimizing the replacement of retiring hybrid buses with battery electric buses.

Assuming the same fleet mixes and new bus procurement and delivery plan, Scenario 2 has significant 40-foot BEB charging position shortfalls from 2028 through 2033 and in 2038 and 2042.

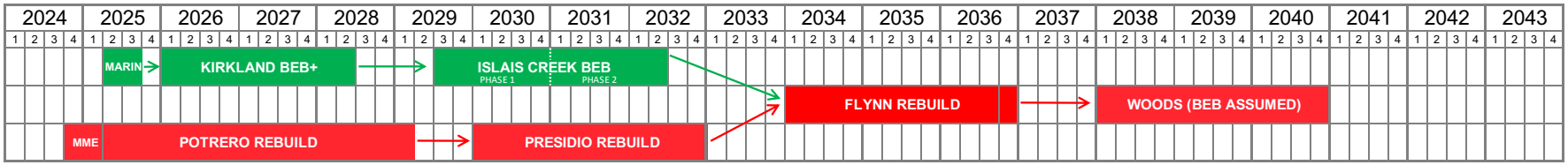
Scenario Considerations
Scenario 1, which includes the Kirkland BEB yard conversion project before the Islais Creek BEB yard conversion project, is better for the SFMTA's bus retirement and procurement plan and would allow converting to an all zero-emission bus fleet sooner than Scenario 2.

In addition, the Kirkland project—the first yard conversion project in Scenario 1—is further along in concept development, environmental review, and PG&E review than the Islais Creek project—the first yard conversion project in Scenario 2.

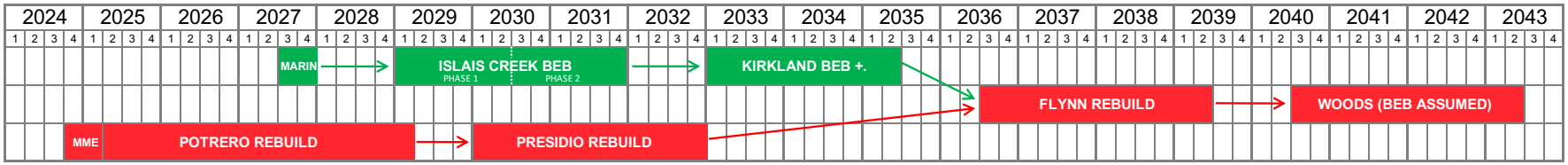
However, the Islais Creek project could be a simpler and less

Scenarios 1 and 2 Construction Schedule Comparison

SCENARIO 1 CONSTRUCTION SCHEDULE



SCENARIO 2 CONSTRUCTION SCHEDULE



costly project to deliver than the Kirkland project.

Given the current challenge of funding four near-term projects (two pilot projects, Potrero, and Kirkland) at the same time in Scenario 1, the SFMTA should evaluate *Facility Framework* implementation options that optimize use of available funding and/or allow more time to secure funding.

One option is to delay the Kirkland project and subsequent projects in Scenario 1. Another option is to pivot to Scenario 2 in which the Islais Creek project occurs before Kirkland project and it and subsequent projects are delayed.

Assuming funding is available Scenario 1 would allow hybrid buses to be replaced with battery electric buses sooner and all hybrid buses to replaced with battery electric buses by 2043.

Both a delayed Scenario 1 and Scenario 2 would delay replacing some hybrid buses with battery electric buses. Both also would likely increase project costs due to additional escalation.

See the *Scenario 1 and Scenario 2 Considerations* table on the following page for a summary of planning issues.

Recommendations

The SFMTA should start the long lead items for both scenarios, review and update as needed their schedules and associated project costs and new bus delivery plans and select the preferred scenario as soon as possible.

The SFMTA should:

- Develop the Kirkland and Islais Creek BEB yard conversion project concept designs.
- Submit a PG&E application for the Islais Creek BEB yard conversion project.
- Complete the entitlements and community outreach for the Kirkland project.
- Begin the entitlements and community outreach for the Islais Creek project.
- Update as needed the scenario schedules and develop a cost estimate including escalation for each scenario. Also develop a modified new bus delivery plan and bus parking analysis and for each scenario.

With a refined understanding of the Kirkland and Islais Creek BEB yard conversion projects, the scenario schedules and associated project costs and impacts on new bus deliveries, the SFMTA can select a preferred *Facility Framework* scenario.

Scenarios 1 and 2 Considerations

	Scenario 1 - Kirkland conversion occurs before Islais Creek conversion.	Scenario 2 - Islais Creek conversion occurs before Kirkland conversion.
Bus Procurement and CARB's All Zero-Emission 2040 Goal	Although it's schedule is ambitious, Scenario 1 is better for bus retirement and procurement needs and would allow converting to an all zero-emission bus fleet sooner than Scenario 2. A delayed Scenario 1 would require modifying the bus retirement and procurement plan and would extending the timeline for converting the fleet.	Scenario 2 pushes the Kirkland project and subsequent projects out several years and would extend the timeline for converting to an all zero-emission bus fleet compared to Scenario 1. Scenario 2 would require developing a new bus retirement and procurement plan and adjusting some bus yard fleet mixes.
Planning, Environmental Review, and PG&E	The Kirkland concept design, environmental review and PG&E application review are underway.	The Islais Creek concept design, environmental review and PG&E application have not been started. Completing the Kirkland concept design and environmental review and then pausing the project likely would not require additional environmental review unless the project concept is changed. However the delay likely would require submitting a new PG&E application.
Funding and Phasing	The Kirkland project is expected to be a more complex and expensive project than the Islais Creek project. Due the Kirkland site's small size and the project's complexity, the Kirkland project needs to be built in one phase. Thus funding for the entire project is needed before beginning construction. A delayed Scenario 1 would allow more time to secure funds but also would increase costs due to additional escalation.	The Islais Creek project could be a simpler and less costly project than the Kirkland project. If needed due to funding constraints the Islais Creek project could be built as two projects instead of sequential phases of one project as currently planned. Scenario 2 would allow more time to secure funds but also would increase costs due to additional escalation.