ZERO-EMISSION BUS (ZEB) IMPLEMENTATION PLAN

POMONA VALLEY TRANSPORTATION AUTHORITY (PVTA)

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Get About and Claremont Dial-a-Ride vehicles and riders. Image source: PVTA

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SECTION 1: PURPOSE AND OVERVIEW OF IMPLEMENTATION PLAN

California's Innovative Clean Transit (ICT) regulation states that transit agencies must gradually transition to zero-emission buses (ZEB)[1] over time. From 2026 through 2028, 25% of new bus[2] purchases made by small transit agencies must be ZEB. Starting in 2029, 100% of new bus purchases must be zero-emission. In addition to the ICT regulation that impacts buses with a Gross Vehicle Weight Rating (GVWR) of greater than 14,000 pounds, the State of California will no longer permit the sale of new gasoline powered cars and light duty vehicles by 2035. In other words, in the coming 12 years, Pomona Valley Transportation Authority (PVTA) will be making their last gasoline vehicle purchases and will be working towards replacing them at the end of their useful life with ZEBs and zero emission vehicles (ZEVs).

This Implementation Plan is intended to guide PVTA and the City of Claremont through the complex planning and implementation process of introducing ZEVs and associated infrastructure into their fleet.[3] To start, the plan first provides a summary of currently available and planned future ZEB/ZEV options for PVTA's fleet of cutaways, large vans, and minivans, limiting the inventory according to PVTA's vehicle specification preferences and range requirements (**Section 2**). The plan also identifies the opportunities and constraints of different zero-emission technologies, including battery electric bus and vehicle (BEB and BEV) and hydrogen fuel cell vehicle technologies. After identifying the electrical and space constraints at PVTA's existing, leased transit facility, the plan provides a timeline for when the agency should begin to transition to a new yard – whether it be owned or leased through a service contractor – that has the ability to meet the agency's operational needs (**Section 4**). Section 4 of the report also provides details on the minimum and desired transit yard requirements as well as charging infrastructure technology options.

This Implementation Plan is intended to guide PVTA and the City of Claremont through the complex planning and implementation process of introducing ZEVs and associated infrastructure into their fleet.

PVTA and the City of Claremont are at a pivotal moment in the planning phase before they transition to a zero-emission fleet. Over time, the agencies will be making important decisions on what vehicles and infrastructure to purchase as technologies evolve and as decisions are made about how to structure their service operator contract model. To help PVTA and the City of Claremont make informed decisions regarding potential operating models, a planning-level cost estimate has been provided to assess vehicle, charging infrastructure, facility, and operating costs (**Section 4**). Securing funding will be critical to enabling PVTA and the City of Claremont to

1 Zero-emission buses (ZEB) or zero-emission vehicles (ZEV) are generic terms used to describe a bus or vehicle that does not emit harmful pollutants.

2 Buses regulated under the ICT regulation include buses owned, leased, or operated with a gross vehicle weight rating (GVWR) greater than 14,000 pounds.

3 As explained throughout this implementation plan, transit agencies in California are required over the coming years to transition to zero-emission fleets. This requirement creates significant financial, operational, and planning challenges agencies must work to resolve. This implementation plan provides the agencies with guidance on how to approach these challenges.

go from planning for a zero-emission future to constructing a zero-emission future. The Implementation Plan will provide a roadmap which identifies when key decisions should be made to transition operations to a new facility and achieve the required transition timeline (**Section 5**).

It also identifies a strategy for securing funding, identifying funding streams that may be most suitable for PVTA and a potential partner[4] at the Federal, State, and local levels, as well as at different stages in the transition.

Finally, PVTA and the City of Claremont have the opportunity to reassess their service operator contract model, as their current contract is scheduled to end June 30, 2024. PVTA plans to extend the contract for a minimum of one year; therefore, by July 1, 2025 (FY 2026), PVTA anticipates making strategic modifications to their service contract model based on the decisions they have made about their preferred vehicle technology and whether they have been able to secure funding to purchase, rather than lease, a transit facility (**Section 6**).

4 It is recommended that PVTA collaborates with a partner agency or entity to secure funding for the transition to ZEV. With a partner that is eligible for federal funding sources, the agency will have access to additional funding streams.

SECTION 2: TRANSIT AGENCY INFORMATION

For over 40 years, PVTA and the City of Claremont have made it their mission to provide safe, reliable, and affordable transportation to the cities of Claremont, La Verne, Pomona, and San Dimas. Across these four cities, PVTA has a service area of approximately 61 square miles and a service area population of approximately 253,000 people. PVTA has developed a nuanced and creative mix of services, evolving to address the mobility needs of these residents and to maximize available funding. The current suite of programs includes a regional, reservation-based, shared-ride service called Get About; two premium Get About services; two individualized demand response services called Claremont Dial-a-Ride and San Dimas Dial-a-Cab; and its group service program in Claremont and Pomona.

Each of the seven services is highlighted in more detail below:

- **Pomona Group Service** accepts advanced reservations and regularly scheduled trip requests from groups with six or more people. Passengers can travel anywhere within the City of Pomona boundary.
- **Claremont Group Service** accepts advanced reservations and regularly scheduled trip requests from groups of six or more people. Passengers can travel

Get About rider boarding a bus. Image source: PVTA

anywhere within the City of Claremont boundary.

- **Get About** is a shared ride, advance reservation service for people over 60 years old or persons with disabilities of any age. Riders may be picked up at any address in Claremont, La Verne, Pomona, or San Dimas and transported within those cities or to some defined locations within Glendora and Covina, to Mt. San Antonio College in Walnut or to selected destinations in Montclair. The service is available between 6am and 7:30pm on weekdays, 8:30am to 5pm on Saturdays, and 7:30am to 5pm on Sundays.
- **Get About Ready Now** is a premium service for people over 60 years old or persons with disabilities of any age who need a same day ride for travel anywhere within the Get About service area. The service is available between 6am and 7:30pm on weekdays, 8:30am to 5pm on Saturdays, and 7:30am to 5pm on Sundays.
- **Get About One-Step Over the Line** is a premium, advance reservation service for people over 60 years old or persons with disabilities of any age who need rides to specific destinations in San Bernardino County, largely to medical facilities. The service is available between 6am and 7:30pm on weekdays, 8:30am to 5pm on Saturdays, and 7:30am to 5pm on Sundays.
- **Claremont Dial-a-Ride** is a shared ride cab service available to persons of all ages within the City of Claremont, with some service to some adjacent areas for persons picked-up within Claremont. The service is available from 6am to 10pm on weekdays and from 6am to 6pm on weekends.
- **San Dimas Dial-a-Cab** is a shared ride cab service available to persons of all ages traveling within the Dial-a-Cab service area which is generally the City of San Dimas and the City of La Verne with some adjacent areas to the south of Foothill Boulevard, north of the San Bernardino Freeway (I-10), and east to Grand Avenue in Covina. The service is available 24 hours a day, every day of the year.

SECTION 3: TRANSITIONING TO ZERO-EMISSION VEHICLES

Current Fleet

The two transit agencies currently have a total of 26 cutaways, one large van, and 10 minivans. PVTA and the City of Claremont are planning to reduce their combined fleet size and composition to approximately 11 cutaways, 11 large vans, and eight minivans by 2026. All 26 of the current cutaways are fueled by gasoline. As reflected in **Figure 1**, cutaways were purchased at four separate times with model years ranging from 2013 through 2019. As is reflected in the Fleet Progression Plan (**Appendix B**), PVTA and the City of Claremont are slowly retiring some of their older cutaways that have exceeded the 100,000-mile retirement timeline as well as some of their older minivans.

Zero-Emission Vehicle Technology Options

The transit vehicle industry is at an inflection point and is going through a period of rapid change. In recent years, there have been significant developments in BEV technologies, with new models coming on the market and constantly improving battery efficiencies. Currently, cutaway BEBs have advertised battery capacities of 100 kWh to 250 kWh with advertised mileages ranging from 100 to 150 miles. Today's available minivans and large vans have smaller battery capacities between approximately 70 kWh and 120 kWh with advertised mileages ranging from 100 to 200 miles. Note that real world range can be significantly less than advertised range once factors such as topography, driver behavior, weather, and the battery's unusable state of charge (SOC) are considered. Industry trends suggest that in the coming years, additional vehicle models will become available and further improvements will be made to existing BEV technologies, further increasing vehicle range. At the time of writing, there are currently no hydrogen fuel cell cutaway models on the market, but this is likely to change over the next couple of years. Heavy duty vehicles and larger buses are currently

Figure 1: Individual Vehicle Information of Current Fleet

Number of Vehicles	Engine Model Year	Vehicle Model Year	Fuel Type	Vehicle Type	Owner
6	2013	2013	Gasoline	Cutaway	PVTA
6	2016	2016	Gasoline	Cutaway	PVTA
4	2016	2016	Gasoline	Cutaway	Claremont
4	2017	2018	Gasoline	Cutaway	Claremont
6	2019	2019	Gasoline	Cutaway	PVTA
1	2018	2018	Gasoline	Large Van	Claremont
1	2014	2014	Gasoline	Minivan	PVTA
1	2014	2014	Gasoline	Minivan	Claremont
2	2017	2017	Gasoline	Minivan	PVTA
6	2018	2018	Gasoline	Minivan	PVTA

being prioritized by fuel cell vehicle Original Equipment Manufacturers (OEMs). Due to this factor, this plan primarily focuses on how to approach a transition to BEV. Elements of this plan could be amended in the future if fuel cell vehicles become available.

Because of the nature of this rapidly evolving industry, it is recommended that PVTA monitor and evaluate new technologies as they develop (e.g., hydrogen fuel cell technologies) and strategically assess fleet compatibility before making future vehicle purchases. In subsequent sections, this report provides recommendations on vehicle purchases which are most compatible based on what is currently available in today's market. To help PVTA assess compatibility of vehicle models that may become available in the future, the team developed a vehicle compatibility testing tool that can be utilized to identify how compatible a vehicle may be based on existing daily mileage needs (**Appendix A**). To remain resilient to change, PVTA has chosen to meet minimum electric bus purchase requirements in the short-term to allow the technologies to further mature. Strategies the agencies can use to maintain resilience in the face of this technological maturity challenge include:

- **Charging Infrastructure:** PVTA and the City of Claremont should select charging stations that do not require costly utility upgrades (such as chargers with built-in batteries) but are able to adequately charge the agency's fleet of ZEVs in an appropriate amount of time. The modeled estimate of charging cabinets and dispensers the agencies will need provides extra charging capacity, should a charger be out of commission and need repairs.
- **Fueling Infrastructure:** If PVTA uses hydrogen fuel in the future, it should either have fuel delivered or go to a local alternative fuel station, given its fleet size. PVTA should assess strategies to obtain hydrogen fuel in the most cost-effective way if they consider fuel cell vehicles in the future. Through the U.S. Department of Energy's Regional Clean Hydrogen Hubs project, funded by the Bipartisan Infrastructure Law (BIL), California has been awarded $1.2 billion in federal funding to develop production sites and deploy strategies for hydrogen in Los Angeles and Bay Area regions as well as other regions with large transportation corridors and ports.[5] With this project, and other investments in clean hydrogen, fuel cell vehicles may be come suitable option for PVTA.
- **Vehicle Purchase Plan:** PVTA and the City of Claremont should slowly transition to zero-emission technologies, piloting and testing different vehicle models to identify ones that meet the organization's needs. Some manufacturers will also allow agencies to do a real-world pilot of a vehicle for a short period of time before purchase. With battery performance rapidly improving, the agencies should continue to assess the performance and compatibility of vehicles that come on the market.
- **Collaboration with Adjacent Agencies:** Developing meaningful relationships with peer and adjacent transit agencies can allow for agencies to share funding resources and lessons learned during the transition to ZEV. Learning from agencies in the same geographic area can be particularly helpful because they will face similar constraints such as weather, utility and power challenges, hydrogen

5 California's Hydrogen Hub proposal, called ARCHES, will accelerate the development and deployment of clean and renewable hydrogen projects and infrastructure across the state. See this factsheet for more information.

fuel availability (e.g., green hydrogen and hydrogen fuel transport feasibility), etc.

As agencies begin to transition to ZEVs, they are faced with operational, technological, and budgetary challenges due to the novelty of the technology. A critical component of the zero-emission transition is ensuring agencies are strategic about their vehicle and infrastructure purchases and can be resilient and react efficiently as new and improved technologies become available.

Future Fleet

Cutaways

The ICT regulation states that from 2026 through 2028, 25% of new bus[6] purchases made by small transit agencies must be ZEB. **Figure 2** below shows how many ZEB purchases a small transit agency must make based on the total annual bus purchases each year. In 2029, 100% of new bus purchases must be zero-emission. According to CARB personnel, if an agency purchases a ZEB in a year prior to the regulation being active or in a year where annual purchases do not require a ZEB purchase, the agency may apply the earlier ZEB purchase to a future year that requires a ZEB purchase. Outside of the ICT requirements, the State of California will also ban the purchase of new gasoline-powered light duty vehicles beginning in 2035.

As shown in **Figure 3** a total of 22 BEB cutaways will be purchased from 2024 through 2037 to support a full transition to BEB. Note that some of these vehicles would replace other electric cutaways later in the transition (due to the ten-year retirement timeline). During this timeframe, the City of Claremont would make an estimated 13 cutaway purchases (7 of which would be electric) and PVTA would make an estimate 9 cutaway purchases (6 of which would be electric). The future fleet is planned to include 11 electric cutaways. The first purchase of a BEB will occur in 2025, allowing the agencies to pilot the technology for a few years before a full transition to BEB is required.[7] The agencies will scale up to two vehicles during this pilot period. Depending on the purchase timeline for the first vehicle, this first vehicle purchase could be purchased using Claremont's Federal grant. According to this purchase plan, all cutaways in the fleet will be zero-emission by 2039. It is important to note that this BEB purchase plan is flexible, and, if at any time, PVTA or the City of Claremont decide to utilize fuel cell vehicles instead of battery electric vehicles, these changes can be made.

6 Buses regulated under the ICT regulation include buses owned, leased, or operated with a gross vehicle weight rating (GVWR) greater than 14,000 pounds.

7 There is some flexibility in when this first BEB purchase will be made.

Figure 2: CARB Zero-Emission Bus Purchase Requirement

Total Annual Buses Purchased Each Year Between 2026 and 2028	ZEB Purchase Requirement Based on Total Bus Purchases
One (1) vehicle purchased	0
Two (2) vehicles purchased	0
Three (3) vehicles purchased	1
Four (4) vehicles purchased	1
Five (5) vehicles purchased	1

Figure 3: Future Cutaway Bus Purchases (By Purchase Date)

		Battery Electric Buses (BEBs)					Conventional Buses				
Procurement + Delivery Timeline (Year)	Vehicles in Purchase	Number of BEB Purchases	Percentage of Annual BEB Purchases	BEB Type(s)	BEB Fuel Type(s)	Agency	Number of Conv. Bus Purchases	Percentage of Annual Conv. Bus Purchases	Types of Conv. Buses[7]	Fuel Type(s) of Conv. Buses	Agency
2025-2027[8]	7	1	14%	Cutaway	Electric	Claremont (1)	6	86%	Cutaway	Gasoline	Claremont (4) PVTA (2)
2026-2027	2	0	0%	-	-	-	2	100%	Cutaway	Gasoline	Claremont (2)
2027-2029	1	1	100%	Cutaway	Electric	PVTA (1)	0	0%	-	-	-
2028-2029	1	0	0%	-	-	-	1	100%	Cutaway	Gasoline	PVTA (1)
2034-2036	6	6	100%	Cutaway	Electric	Claremont (4) PVTA (2)	0	0%	-	-	-
2035-2037	3	3	100%	Cutaway	Electric	Claremont (2) PVTA (1)	0	0%	-	-	-
2036	2	2	100%	Cutaway	Electric	PVTA (2)	0	0%	-	-	-

Note: Cutaway vehicle procurements should occur 2 years in advance of delivery. Blue columns pertain to zero emission cutaway purchases and grey columns pertain to gasoline cutaway purchases.

8 A conventional bus is a transit vehicle powered by a non-renewable power source.

9 There is some flexibility in when this first BEB purchase will be made.

Figure 4: Endera Vehicle

Currently, Endera's B4 buses are being considered as BEB replacements for existing cutaways in the fleet due to their layout, capacity, and manufacture location (**Figure 4**). Endera's B4 cutaways are approximately 24 feet long with a maximum capacity of up to 20 passengers. The Endera vehicle is similar in length and capacity to the City of Claremont and PVTA's current fleet (24 feet long and 18 passenger capacity). The Endera B4 vehicle has a battery capacity of 150 kWh and an advertised battery consumption rate of 1.0 kWh/mi., resulting in an estimated 150-mile range. The current estimated cost is $245,000. The agencies' gasoline-powered cutaways typically cost between $80,000 and $120,000, depending on whether they are low-floor, so securing funding will be a critical step to transitioning to BEB. While 150 miles would be sufficient to complete PVTA's observed vehicle assignments, there is typically a considerable gap between advertised range and real-world range due to factors such as topography, driver behavior, weather, and not using the entire capacity of the battery.

To determine the compatibility of the available battery size of the Endera B4, local conditions were used to estimate the vehicle's real-world range. **Figure 5** summarizes these estimates for the Endera B4, including performance when the vehicle is new and when its battery has degraded. These calculations incorporate the following assumptions:

- The energy consumption rate is increased 12.5% to reflect real-world performance due to driving habits, terrain, weather, air conditioning usage, etc.
- Battery capacity is reduced 25% to reflect the normally used battery SOC range. Vehicles generally are not able to begin service at a 100% SOC or to run all the way down to 0% SOC. The 25% reduction could reflect a vehicle beginning service at 95% SOC and maintaining a 20% reserve charge to prevent breakdowns.
- To estimate performance as a vehicle ages, it was assumed the battery of a cutaway vehicle will degrade 15% by the end of life. This is a typical estimate of degradation given the limited industry experience operating electric cutaways.

Observed daily mileage was then assessed in

Figure 5: Estimated Battery Consumption Rates for Endera Model B4 Cutaway Vehicles

	Estimated Range in Miles (adjusted battery consumption rate of 1.13 kWh/mi)
New vehicle: Capacity reduced 25% to reflect normally used SOC	100 miles
Degraded vehicle: Capacity reduced 25% for normally used SOC and 15% for degradation	85 miles

relation to the estimated range at the start and end of the vehicle's life to assess the overall compatibility. With this mileage range, it is estimated that the Endera B4 will be capable of completing 74% of trips at the beginning of its life and 42% of trips at the end of its life. As new vehicles come on the market, there may be a vehicle that has a higher compatibility. PVTA can utilize the vehicle compatibility worksheet to help assess whether a vehicle is compatible. Due to the demand response nature of the agencies' services, PVTA is well positioned to adjust duty cycles based on remaining battery capacity. In practice, this might mean sending a driver back to the garage in the middle of their shift to swap their vehicle with one that is fully charged. Over time, PVTA will also continue to evaluate how passenger capacities and mileage needs change in the post-pandemic travel environment to determine if a different vehicle model may better suit their evolving needs. In the future, for example, the agencies may shift towards more vans and fewer cutaways if passenger counts remain low.

Large Vans & Minivans

Large vans and minivans have an estimated life of seven and five years, respectively.[10] As shown in **Figure 6** below, a combined total of 54 van and minivans should be purchased between 2026 and 2039 to maintain an active fleet of 11 large vans and 8 minivans. During this timeframe, the City of Claremont would purchase three vehicles (all of which would be electric) and PVTA would purchase the remaining 51 vehicles (22 of which would be electric).[11] The vehicle purchase plan below allows PVTA and the City of Claremont to transition to BEVs over many years, which will provide time for the vehicle options to mature and grow. Under the current plan, the large van and minivan portion of the fleet will be 100% zero-emission beginning in 2041. A similar purchase plan could be followed if PVTA and the City of Claremont chose to utilize hydrogen fuel cell vehicles at any point in the future.

While specific vehicle models have not been identified by PVTA and the City of Claremont for the large van and minivan vehicle typologies, the agencies should be mindful of the following operational requirements when selecting a preferred vehicle model. These characteristics are also relevant if fuel cell vehicles are being considered.

- **Mileage:** To avoid needing to charge the vehicle during the middle of the day, the vehicle should ideally have the ability to travel at least 110 miles (adjusted mileage, not advertised mileage) on a single charge.
- **Passenger Capacity:** Large vans should have the capacity to carry 15 passengers, while minivans should have the capacity to carry five passengers. Both vehicle types should also be wheelchair compatible with a lift. If a wheelchair rider is present, it is acknowledged that passenger capacity would be reduced.
- **Funding:** To secure funding for vehicle purchases, vehicles should also be Buy America certified, Altoona tested, and, ideally, available through the California Association for Coordinated Transportation (CALACT).

10 If the vehicle reaches 100,000 miles before this year threshold, the agencies may replace the vehicle. These timelines have been identified for use during the vehicle replacement modeling effort due to these timelines reflecting how long the vehicles are typically in use by PVTA and the City of Claremont today.

11 There is flexibility in the number and type of vehicle each agency purchases. Through discussions between the two agencies, the agencies may agree to each purchase a different number or type of vehicles. A fleet size of 30 vehicles with 11 cutaways, 11 large vans, and 8 minivans, however, should be maintained.

Figure 6: Future Large Van and Minivan Purchases (By Purchase Date)

		Battery Electric Vehicles (BEVs)					Conventional Vehicles				
Procurement + Delivery Timeline (Year)	Vehicles in Purchase	Number of BEV Purchases	Percentage of Annual BEV Purchases	BEV Type(s)	BEV Fuel Type(s)	Agency	Number of Conv. Vehicles Purchases	Percentage of Annual Conv. Vehicles Purchases	Types of Conv. Vehicles[11]	Fuel Type(s) of Conv. Vehicles	Agency
2026-2027	12	0	0%	-	-	-	12	100%	Large Van (8) Minivan (4)	Gasoline	PVTA (12)
2027-2028	1	0	0%	-	-	-	1	100%	Minivan (1)	Gasoline	PVTA (1)
2028-2029	5	0	0%	-	-	-	5	100%	Large Van (2) Minivan (3)	Gasoline	PVTA (5)
2029-2032	1	1	100%	Large Van (1)	Electric	Claremont (1)	0	0%	-	-	-
2030-2032	1	1	100%	Minivan (1)	Electric	PVTA (1)	0	0%	-	-	-
2031-2033	4	1	25%	Minivan (1)	Electric	PVTA (1)	3	75%	Minivan (3)	Gasoline	PVTA (3)
2032-2034	3	3	100%	Large Van (2) Minivan (1)	Electric	PVTA (3)	0	0%	-	-	-
2033-2034	8	0	0%	-	-	-	8	100%	Large Van (6) Minivan (2)	Gasoline	PVTA (8)
2034-2036	2	2	100%	Large Van (2)	Electric	PVTA (2)	0	0%	-	-	-
2035-2037	4	4	100%	Minivan (4)	Electric	Claremont (1) PVTA (3)	0	0%	-	-	-
2036-2038	2	2	100%	Large Van (1) Minivan (1)	Electric	Claremont (1) PVTA (1)	0	0%	-	-	-
2037-2039	3	3	100%	Van (3)	Electric	PVTA (3)	0	0%	-	-	-
2039-2041	8	8	100%	Large Van (8)	Electric	PVTA (8)	0	0%	-	-	-

Note: Purchase timeline for fuel cell vehicles would be comparable to the purchase timeline for the BEVs (listed above).

12 A conventional vehicle is a transit vehicle powered by a non-renewable power source.

SECTION 4: TRANSITIONING TO A NEW TRANSIT FACILITY

Current Transit Yard

Bus operations and maintenance is currently contracted out to Transdev, a passenger transportation services company. Transdev and other similar contractors have experience with maintaining battery electric buses for agencies similar in scale and circumstance to PVTA and the City of Claremont. Therefore, the agencies plan to continue contracting maintenance and operations of its services to a third-party vendor for the foreseeable future, although the contracting model may evolve as the transition to a zero-emission fleet unfolds.

The majority of PVTA and the City of Claremont's fleet currently operates out of a transit facility that houses their cutaway vehicles and large vans. The facility is currently located at 1027 Brooks St. Ontario, CA 91762, as shown in **Figure 7**. Under the current operations contract, the main transit yard is leased by Transdev. The current lease, which is $12,937.83 per month, has been in place since July 1, 2020 and will end on June 30, 2024. This transit yard is approximately 16,400 square feet in a multi-tenant building. The facility includes a maintenance area of approximately three parking spaces, office spaces for dispatchers and maintenance staff, two single person restrooms, and a parking capacity for approximately 30 cutaway vehicles. Due to the limited space, some of the cutaway vehicles are parked in the driving lane overnight. This facility has a power capacity of 250 kW.

With the fleet purchase plan listed in Section 3, we can summarize the implications for PVTA and the City of Claremont's charging and facility needs as follows:

- The existing transit yard could effectively meet the fleet's needs through 2032. During this period, the charging needs of a few EVs could be met using a small pilot deployment of chargers with integrated batteries.
- From 2033 through 2035, the EV portion of the fleet would grow from five to eight EVs. While the current facility's electrical capacity would be sufficient to support the charging of this fleet, this would require a more substantial investment in chargers. Given that the chargers would need to be relocated just a couple of years later, we would not recommend continuing to use the existing site during this period.
- Starting in 2036, the charging infrastructure to support the EV fleet would likely surpass the current site's available electrical capacity.

Figure 7: Facilities Information and Construction Timeline

Division	Address	Main Function(s)	Type(s) of Infrastructure	Service Capacity	Estimated Construction Timeline
Transit Yard	1027 Brooks St. Ontario, CA 91762	Storage, charging, and maintenance facility for entire cutaway fleet	Charger such as those with an integrated battery	Capacity to charge four ZEB with traditional chargers	2032

Near/Medium-Term Compatibility (Before 2033)

Given the limited capacity and space constraints at the current site, the agencies anticipate the need for an alternative location that is better equipped to support their transition over the long-term. Based on the current fleet plan, we recommend establishing a new operations facility before 2033. (This would utilize the existing facility for initial EV operations, while avoiding more extensive charger investments that would need to be relocated.) In the near-term, the agencies will charge one BEB pilot vehicle at the City of Claremont's City Yard. Also, in the near-term (by 2027), at the Brooks Street transit yard, it is recommended that the agencies install a charger with integrated battery to charge buses overnight and/or during midday periods at the contractor's transit yard.[13] These chargers allow vehicles to charge quickly (at up to 150 kW, for about 0.5 to 1.7 hours) from the charger's internal battery pack that charges slowly (drawing up to 27 kW over the course of about 7-8 hours) using the existing power supply.

Because utilizing chargers with integrated batteries minimizes the need for permanent infrastructure investments, installing these chargers will be faster and potentially less costly. Requiring no utility improvements, they also will be easier to relocate, when needed. The main downside to this approach is higher charger equipment costs. In summary, these near-term chargers will provide a stopgap solution, given that PVTA and the City of Claremont seek to move to a PVTA-owned facility and due to the current site not having the electrical capacity to support an all-electric fleet.

In their next operating contract, the agencies will include facility requirements as well as language specifying when service will need to be transitioned to a more appropriate property for electric bus operations of an entirely zero-emission fleet. Facility requirements for their future yard, based on fleet size, energy needs, and space requirements, are discussed in subsequent sections of this Implementation Plan. Regardless of whether the agencies or the contractor lease or own the future transit yard facility, it should have the power capacity to support a full ZEV transition over the long-term or it should be able to accommodate the appropriate electrical upgrades (a minimum of 400 kW and up to 550 kW to support different types of chargers), as well as have the square footage to meet their needs. A detailed space needs requirement for a future transit yard as well as planning-level cost estimates for owning and leasing a future transit yard and associated infrastructure are discussed in more detail below.

Future Transit Yard Planning

PVTA is interested in exploring new models for owning or leasing a transit yard to achieve additional operational flexibility and cost savings. To compare the planning-level monetary costs of owning versus leasing a transit yard, please see the Cost Analysis section below. In addition to the fact that the current yard does not have the electrical capacity to support a fully electric fleet, the agencies have voiced interest in locating a future transit yard within the four-city core service area (the current facility is approximately three miles from the core service area). While the upfront costs of owning and constructing a transit yard are

13 Integrated chargers use the existing low-voltage grid. FreeWire Technologies, Inc. is a company that makes chargers with integrated batteries.

significant, as shown in the Cost Analysis section below, there may be both monetary and non-monetary costs and benefits to consider as well, that may apply for decades to come. Owning a transit yard, for example, has value that extends beyond a service contracting period, as land and building investments have value for decades. Owning a transit yard facility could also allow PVTA to think more long-term about strategic investments because they know where their operations will be based. Lastly, eliminating the property and facility needs can generate more competitive contract operator pricing, lowering the daily service operating costs.

Future Transit Yard Requirements and Space Needs

PVTA's future ZEV fleet will be housed, maintained, and operated from the future transit yard facility. In order for this transit yard to efficiently support parking, fueling, and maintenance for PVTA vehicles, it is imperative to allocate adequate space to the various facility areas. This section provides a summary of the key building and site area requirements as outlined in the space needs program (**Appendix C**).

The space needs program incorporates space for the following uses:

- **Administration (1,000 square feet):** Ten shared workstations and two private offices with a total capacity of accommodating 15 staff members. Space has also been identified for a flex space for a copy, work, and/or supply room.
- **Staff Support (1,100 square feet):** Break/ training room that can accommodate 40 people. A total of six restrooms (2 male, 2 female, and 2 gender neutral and ADA accessible) is recommended on-site. Space has also been identified for office materials storage.
- **Vehicle Maintenance (4,300 square feet) and Storage Areas (2,700 square feet):** It is recommended the site have three maintenance and repair bays. Space has also been allocated in the space needs program for tool storage, a work area, and a tire bay. Maintenance equipment storage space has also been identified.
- **Building Support (2,300 square feet):** Utility rooms have been identified for mechanical and electrical equipment, MEP storage, and data/communication equipment.

The site should include parking facilities for staff (25 stalls), visitor parking (2 stalls), along with parking to support 40 PVTA fleet vehicles. In total, approximately 17,900 square feet of parking is needed to support staff, visitors, and the fleet. The space needs program calculation results in an estimated total area for the transit yard facility (facility and site areas) at approximately 81,600 square feet.

It is crucial to emphasize the need for a thorough review of building codes and requirements as well as to consider how decisions may impact future yard expansion efforts. This approach ensures that the facility's design aligns with regulatory standards and corresponds to the outlined space needs program. Please note, the space needs program does not account for hydrogen related infrastructure, as PVTA is not considering hydrogen fuel cell electric vehicles for their fleet at this time. Infrastructure to meet resiliency needs, such as solar power and battery storage, is also not accounted for. Solar panels could likely be mounted on the facility's roof, while a marginal amount of space may be needed for battery storage. Installing solar panels involves adhering to many complex building and electrical codes, such as the National Electrical Code (NEC), International Building Code (IBC) and International Fire Code (IFC), along with considering structural loading to reduce overall risk and prevent electrical

faults, fire hazard, or structural failures. Coordination with the local Authority Having Jurisdiction (AHJ) and further code analysis would be recommended for subsequent phases.

Charging Infrastructure

Near Term

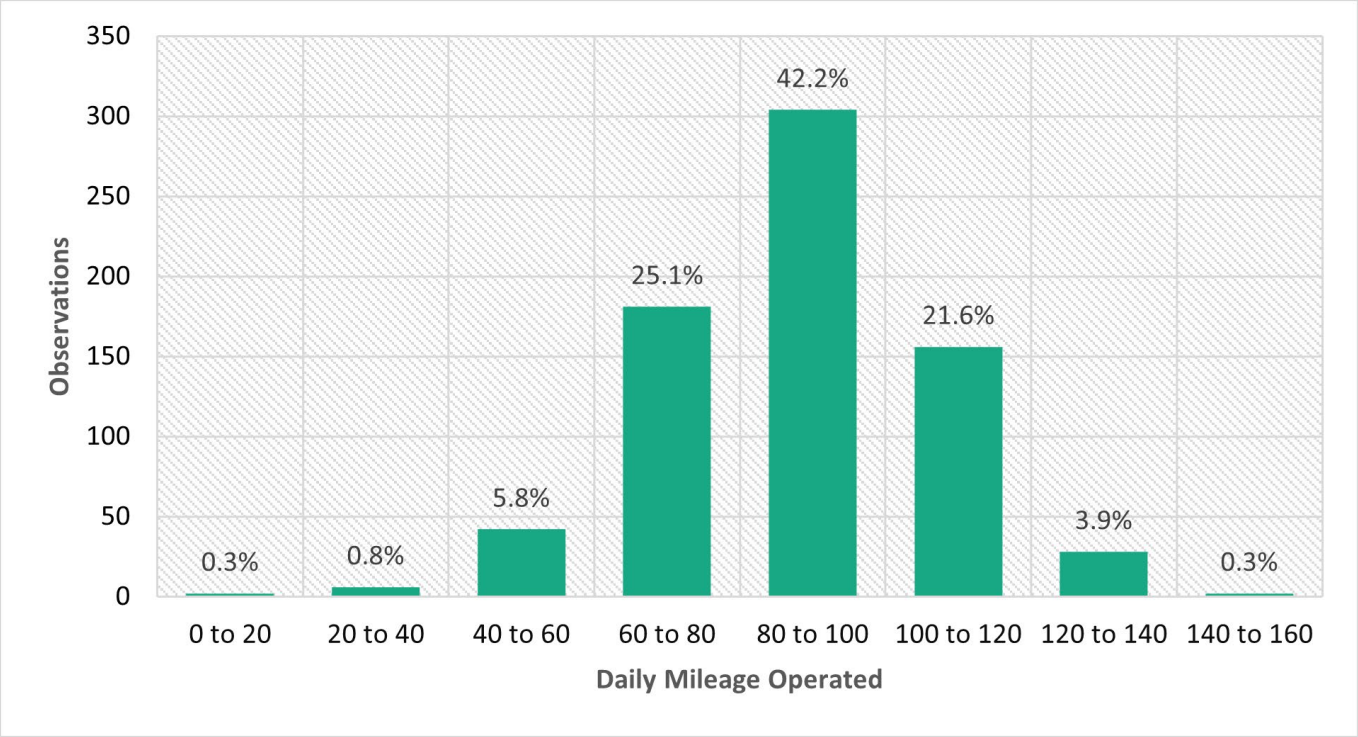
In the spirit of preparing PVTA to be adaptable and resilient to future vehicle and charging technologies, this Implementation Plan recommends PVTA install chargers with an integrated battery to charge buses and vans overnight and/or during midday periods at the current contractor's transit yard in the near-term. The integrated battery in this type of charger will charge over the course of several hours using relatively low levels of power that are readily available; it can then discharge its energy to electric vehicles at a higher rate. This approach requires less-intensive facility investments and allows for chargers to be easily relocated if PVTA chooses to purchase land for a transit yard or relocate to another leased facility in the future.

These near-term chargers (only recommended through 2032[14]) will provide a stopgap solution, given that the current contractor's leased facility does not have sufficient space or electrical capacity to support an all-electric fleet. The main drawback of the chargers with integrated batteries is the higher upfront cost, between $160,000 to $175,000, of the chargers themselves. In comparison, traditional chargers range from approximately $12,500 for each 20-30 kW charger to as much as $100,000 for each 75-80 kW charger.[15] With a lifespan of approximately five years, chargers with integrated batteries will help PVTA transition to BEV in the near-term and allow

14 While the current facility's electrical capacity could support the EV fleet through 2035, using it that long would involve installing chargers that then need to be removed a couple years later.

15 The cost estimates for chargers of various size are detailed in High-Level Cost Estimate for EV Implementation spreadsheet.

Figure 8: Vehicle Operating Mileage Data (October 2022 – December 2022)



them to reassess the state of the battery-electric and fuel cell vehicle market once the industry is more mature.

Long Term

Over the long-term (before 2033), should PVTA decide to fully invest in BEB/BEV over fuel cell technology, either PVTA and the City of Claremont or the contract operator should deploy permanent chargers at the future transit yard that has a power capacity that meets PVTA and the City of Claremont's long-term needs. Several potential charger configurations were studied to meet the charging requirements of the planned fleet. This analysis followed the following steps:

- Estimating each vehicle's energy requirements by combining two elements:
  - The estimated energy consumption rates of PVTA's preferred vehicles while in service.
  - Data describing the actual mileage that PVTA vehicles have operated historically, shown in **Figure 8** below. SSE estimated needs when distances are at the 85th percentile (i.e., towards the upper end of the distances observed), specifically 106 miles.
- Identifying the energy requirements a vehicle needs to complete the mileage of a typical service day, therefore identifying the returning state of charge of the vehicle.
- Estimating charging times to obtain the needed energy based on various charger power level options, factoring in the fact that vehicles accept less power than chargers provide (depending on battery state of charge (SOC)).
- Comparing charging times with vehicle schedules to ensure that charging can be reliably and efficiently completed during available time while vehicles are at the transit yard. PVTA operator schedules show that vehicles typically spend about 15.5 hours at the garage overnight. However, to be conservative, the analysis reduces the available time for charging to 12 hours. (The reduction could accommodate late arrivals, vehicle servicing, and pre-trip activities.)

This analysis found that the following scenarios would be capable of meeting the needs of the 18 PVTA vehicles operated in maximum daily service. Each scenario includes the worst-case power draw that could occur associated with the chargers; these values can be used in combination with estimates of other facility power draws to determine appropriate facility electrical capacity to meet operational needs. When considering the below analysis and a recent utility bill, an appropriate range for the power needs at a fully built out facility may be a minimum of 400 kW and up to 550 kW to support different types of chargers.

- **Option 1 | Using 25-30 kW charger cabinets:** 16 charger cabinets and 18 total dispensers (one or two per cabinet) yielding a worst-case power draw of about 530 kW.
- **Option 2| Using 50 kW charger cabinets:** 7 charger cabinets with 18 total dispensers (two or three per cabinet) yielding a worst-case power draw of about 380 kW.
- **Option 3 | Using 75-80 kW charger cabinets:** 5 charger cabinets with 18 total dispensers (three or four per cabinet) yielding a worst-case power draw of about 440 kW.

Each option above will fulfill the charging needs of the fleet. The agencies should communicate early and often with the local utility throughout the planning process to determine the appropriate electrical infrastructure to have available on-site. Instead of installing more chargers than needed to provide resiliency in case of unanticipated downtime, it is recommended to address the need for uptime

OTHER TRANSIT AUTHORITY FLEET CHARGING METHODS

Transit authorities around the United States are implementing different methods for charging their growing EV fleets. Some transit authorities are utilizing one or a mix of depot and on-route charging. Charging infrastructure differs as well, such as plug-in chargers, pantograph chargers, and wireless inductive charging pads. Transit authorities should consider what is feasible and what makes the most sense for their fleet based on several factors including fleet size, vehicle types, daily usage, location, etc.

The Sacramento Regional Transit District (SacRT) which offers a DAR, for example, is using a couple of different methods for charging the cutaways and vans in their fleet. The 2022 SacRT Zero Emissions Bus (Phase 2) report gives concepts for depot charging at multiple garages, which will require a transition plan from existing garage locations to new ZEB garage locations. It is proposed that the fleet cutaways and vans will be charged using 180 kW chargers, with each charger servicing three parking spots. SacRT also recently partnered to launch a high-speed charging hub at a light rail station in Sacramento. It utilizes 175 kW chargers (Level 3) and offers charging for public use, as well as on-route charging for SacRT buses and paratransit.

through rapid repair and parts replacement (parts for chargers could be stored on-site). Adding additional chargers can complicate the equipment sizing conversation PVTA and the City of Claremont will have with Southern California Edison. In Option 1 and 3 where PVTA owns the EV equipment, PVTA is responsible for charger maintenance or contracting out EV charger maintenance services. In Option 2 where PVTA leases the EV equipment, charger maintenance may be a part of the leasing contract. Language that develops a system for the agency to meet service key performance indicators (KPIs) to help enforce charger repair and downtime timelines is recommended.

Cost Analysis

Methodology

The planning-level cost estimate (**Appendix D**) includes vehicle, charging and infrastructure, operating, and facility costs. The cost estimate is a 10-year program model, with Year 1 representing an arbitrary start year that can be defined by PVTA. The unit costs for Year 1 were developed using 2023 dollars. The unit costs in the cost model should be updated to the specific year of Year 1 when it is selected (for example, when PVTA and the City of Claremont have identified a property and funding). The cost estimate spreadsheet option tabs have a "Price" column (Column C) where the unit cost for each line item can be updated. Due to the volatility in infrastructure and vehicle costs and uncertainty in future technology, a 10-year program model is used. The 10-year program model projects out the infrastructure costs based on current best practices for EV charging infrastructure and vehicle procurement.

Three scenarios were considered based on PVTA feedback to compare the different options for facility and ZEV charging infrastructure ownership strategies. In all scenarios, PVTA will own the vehicles and contract out the maintenance and operations. The three scenarios are defined as:

- **Scenario 1:** PVTA purchases the land, constructs a new facility, and owns the EV charging infrastructure.

- **Scenario 2:** PVTA leases the site and leases the EV charging infrastructure from the service contractor.
- **Scenario 3:** PVTA leases the site from the service contractor and owns the EV charging infrastructure.

Vehicle Cost Analysis

A detailed procurement and delivery timeline for the PVTA future ZEV purchases are found in Section 3. For the cost estimate that was performed, with its main purpose being to provide a cost comparison of the relative merits of the three procurement scenarios, a simplified procurement analysis is used instead which includes the purchase of 30 ZEVs. The vehicle costs remain the same across all scenarios and therefore do not contribute to the scenario comparison.

The simplified procurement analysis assumes all ZEV fleet vehicles are purchased in Year 1 and not replaced during the modeled 10-year period. As confirmed by PVTA and the City of Claremont, the future ZEV fleet will include 11 cutaways, 11 vans, and 8 minivans for a 30 electric vehicle fleet. Please note, the price of gasoline and hydrogen vehicles were not included in this analysis, instead this cost estimate focuses only on battery electric vehicles. The price assumption for each vehicle is based on historical costs from previous projects as well as cost research. The life cycle for each vehicle type will determine the repurchasing schedule, and utilizing the assumption that cutaways will be replaced after ten years and vans and minivans will be replaced after seven and five years, respectively. In a real-world 10-year period, PVTA and the City of Claremont will likely need to purchase more vehicles to maintain their active fleet.

Charging Installation & Infrastructure Cost Analysis

The EV charging infrastructure for the future transit yard will be either owned or leased by PVTA. Based on future fleet needs, there are three options for the charging cabinets:

- **Option 1:** 25-30 kW charger cabinets would require 16 cabinets and 18 dispensers.
- **Option 2:** 50 kW charger cabinets would require 7 chargers and 18 dispensers.
- **Option 3:** 75-80 kW charger cabinets would require 5 chargers and 18 dispensers.

For the scenarios where PVTA owns the charging infrastructure, the cost analysis estimates the cost for each charging cabinet option using recent cost assumptions from other projects. To compare owning and leasing options (Scenarios 1 and 3), the cost for the three charging cabinet options was averaged and included in the total charging installation and infrastructure cost. For the scenario where PVTA leases the charging infrastructure (Scenario 2), the cost estimate assumes that the cost to lease the charging cabinets yearly is 20% less than the upfront cost to purchase and own the cabinets. This accounts for the upfront savings to lease but the long-term cost savings to own the cabinets. The cost reduction is a high-level assumption due to there being limited data on cost of owning versus leasing EV charger cabinets. PVTA should obtain bids for an accurate estimate of leasing EV equipment. In the scenario where charging infrastructure is purchased by the agencies, the cost estimate assumes procurement for the charging cabinets in Year 1 and replacement every five years. Charger testing and commissioning cost is accounted for at the time of charger cabinets installation and each reinstallation. Annual charger maintenance and repair is also accounted for in the charger section of the cost estimate.[16] The charger maintenance

16 For more information on charger cost estimates, please see the High-Level Cost Estimate for EV Implementation spreadsheet.

and repair cost is included in the capital costs for Scenario 1 and 3, where PVTA owns the EV equipment. The charger maintenance and repair costs are included in the operating costs for Scenario 2, where PVTA is leasing the EV equipment.

Other charging infrastructure includes service switchgear, an exterior electrical panel, and conduit/cable to route power to the charger cabinets. The price assumptions are recent costs from previous projects.

Operating Costs

The cost estimate considers a monthly rate and a fixed hourly rate for dedicated vehicle services for the PVTA and City of Claremont operations and maintenance costs. The monthly rate includes vehicles, maintenance, driver training, and reporting. The fixed hourly rate includes per hour vehicle use and drivers. Electricity cost for vehicle charging is assumed to be similar to or lower than the existing fleet fueling cost, which is accounted for in the monthly rate of dedicated vehicle services. The EV charging needs and electricity cost are consistent across all three scenarios and do not add to the scenario comparison.

Both the monthly and fixed hourly rate cost assumptions are based on the 2024 dollars in the current PVTA contract with Transdev. The cost estimate assumes 20,000 annual vehicle revenue hours as a conservative value from the National Transit Database (NTD) PVTA 2021 profile. While EV maintenance costs are typically lower than for a gasoline-powered vehicle, due to the high-level nature of the model, it assumes that the operations and maintenance costs will be similar in all scenarios.

Facility Costs

The property for the future transit yard will either be owned or leased by PVTA, with ownership being the preferred option. The property and facilities costs are assumed to be paid off in Year 1 for model simplicity. The cost estimate considers several contributing cost factors for both owning and leasing the site.

For PVTA to own the future transit yard property, the cost considerations include right of way cost, annual cost of ownership, and building construction cost. The right of way cost is based on a typical industrial and commercial cost per square foot in the City of Pomona in 2023. The cost of ownership includes property taxes (Pomona tax rate), as well as typical commercial building and utilities maintenance costs. The building construction cost is based on a typical commercial construction cost per square foot. Design and administration/management fees are accounted for with the assumption that the design will be 8% and the administration fee will be 2% of the building construction (capital costs for Scenario 1) or building modification cost (operating costs for Scenario 2 and 3).

The property itself and construction of the site is assumed to have a working lifespan of 30 years. For the total cost for Year 1, all the right of way and building construction costs are included to reflect the upfront cost for simplicity. If upfront funding for the site's purchase and construction is not available and financing is required, PVTA would need to assume a higher cost due to interest. Annual cost of ownership was applied for each year. For this cost analysis to compare owning and leasing options at the end of the 10-year program, one-third of the right of way and building construction costs were included for the 10-year program to account for the value of the land and property beyond the 10-year modeled period.

For PVTA to lease the future transit property, the cost considerations include annual building

leasing costs and building modifications (tenant improvement). The leasing cost is based on a typical lease rate per square foot for the City of Pomona in 2023. The tenant improvement cost per square foot is a conservative assumption for a building with open space, maintenance/charging facilities, and small office spaces.

Key Findings & Considerations

Figure 9 summarizes the cost estimate results by showing the Year 1 capital and hourly operation costs, as well as the Year 1-10 capital, operational, and total (sum of capital and operational) costs. Capital costs account for PVTA ownership of the site and EV equipment as well as vehicle procurement. Operational costs account for operations and maintenance as well as PVTA leasing the site and EV equipment. The hourly operations costs are per vehicle revenue hour which is the unit of payment expected in the future PVTA contract.

Figure 9: Cost Estimates Summary

		Year 1		10-Year Program (Year 1-10)		
Option	Description	Capital Costs	Hourly Operation Costs	Capital Costs	Operation Costs	Total Costs
1	Own Site, Own EV Equipment	$15.85M	$108	$18.39M	$25.92M	$44.30M
2	Lease Site, Lease EV Equipment	$4.00M	$254	$10.72M	$33.90M	$44.62M
3	Lease Site, Own EV Equipment	$4.81M	$218	$13.07M	$31.82M	$44.89M

Figure 10 summaries the capital cost estimate results by category for options 1, 2, and 3. The categories are vehicle, charger, operating, and new facility cost. Costs are shown for both year 1 and the 10-year program (year 1-10).

When considering capital and operational costs for each scenario over the 10-year program, the results show similar total cost for the three scenarios. Though, the actual costs of the scenarios could vary from this cost estimate based on a number of factors. It is recommended that PVTA also consider other non-monetary benefits when deciding which of the three scenarios to pursue. Factors to consider may include the following:

- **Funding Availability:** Purchasing land and constructing a transit yard will require a substantial upfront financial investment, which may only be possible if funding is secured that can be used to purchase and construct the yard. Grant opportunities typically provide funding for both land acquisition and transit yard construction.
- **Contractor Price Competitiveness:** PVTA and the City of Claremont may be able to leverage owning land and a transit yard to secure more competitive monthly and hourly service contractor rates.
- **Land Ownership Benefits:** The benefits of owning a transit yard extend well beyond the 10-year modeled program, and, potentially, even beyond a 50-year time horizon. Knowing the agency will remain in the same location over such a long period of time could allow the agency to think more strategically about infrastructure investments that could further improve operational and cost efficiency in the future. While the upfront costs for land purchase are significant, PVTA could benefit from decades of lower operating costs.

The limitations of the cost estimate include simplified procurement assumptions and limited sources for cost and quantity information. To further refine the estimate, PVTA should obtain bids for EV equipment and property leasing from service contractors to confirm the planning level costs provided. Further refinement can be made for vehicle purchasing and infrastructure construction to determine funding for the transition to ZEV based on the selected scenario. Modifications would also be needed to provide planning-level cost estimates if PVTA wanted to transition to hydrogen fuel cell vehicles.

Figure 10: Capital Cost Estimate – Category Breakdown

		Year 1 Capital Costs				10 Year Program (Year 1-10) Capital Costs			
Option	Description	Vehicle	Charger	Operating	New Facility	Vehicle	Charger	Operating	New Facility
1	Own Site, Own EV Equipment	$4.00M	$0.81M	$2.16M	$11.04M	$10.72M	$2.36M	$25.92M	$5.32M
2	Lease Site, Lease EV Equipment	$4.00M	$0.73M	$2.16M	$2.19M	$10.72M	$2.08M	$25.92M	$5.90M
3	Lease Site, Own EV Equipment	$4.00M	$0.81M	$2.16M	$2.19M	$10.72M	$2.36M	$25.92M	$5.90M

SECTION 5: FUNDING STRATEGY & ROADMAP

Funding Strategy

General Assumptions

As outlined in PVTA's Rollout Plan, there are numerous grant and incentive programs that provide funding for ZEVs and transit facilities. There are a few key overarching considerations for the state and federal programs with the greatest funding potential:

- Most programs require or prefer a local match;
- Most programs are reimbursable; and
- Most programs provide three to four years to obligate funds.

It is expected that identified state grant funding opportunities for transit capital projects will, at a minimum, stay at current levels for the foreseeable future. The federal funding opportunities presently available, due to the Infrastructure Investment and Jobs Act (IIJA), are significant in scale and may not continue at such levels beyond 2026. In light of the currently available federal funding, it would be possible to pursue significant grant funding as early as 2026 to support a new transit facility.

While some funding programs can be utilized for ZEV purchases and facility construction or upgrades, some programs are only eligible for vehicle purchases. The next subsections of this report will define the priority programs for both purposes and lay out the recommended steps to be eligible and competitive for such programs in the future.

Considerations regarding the eventual transition to a new facility should take into account the increased state and federal funding to support large-scale capital grants for zero-emission bus facilities. Such funding opportunities, to be outlined in more detail below, are significant, but due to the competitive discretionary nature of the relevant funding programs there is no guarantee of major funding. If funding is not secured, it is recommended that PVTA continue utilizing a similar service operator contract model, wherein the transit facility is leased by the agencies or through the contractor.

Priority Funding Programs

Federal

The Federal Transit Administration (FTA) administers both the **Low and No-Emission Vehicle** and **Bus and Bus Facilities Programs**. Through Fiscal Year 2026, there will be at least $1.5 billion available each year for these two programs (In FY 2022 an even greater amount, $1.6 billion, was available, which provided $1.2 billion for the Low-No program and $400 million for the Bus and Bus Facilities Program). FTA's Low-No and Bus and Bus Facilities programs have drastically increased funding levels through at least FY 2026 (e.g. the expiration of the Infrastructure Investment and Jobs Act) but are not guaranteed to continue at elevated levels. The future vehicle and facility needs for PVTA would be eligible for both programs, through the City of Claremont or Foothill Transit's FTA funding eligibility.

Grant awards from both programs can range from less than a million dollars to the tens of millions of dollars. The federal share is up to 80% of total project costs and can be up to 90% for zero-emission vehicle purchases. Local funds (e.g., Measure R) and state funding programs can serve as a match for a federal grant for zero-emission vehicles. FTA frequently makes grants under $500k to smaller jurisdictions for such uses, and

the 90% federal share helps minimize the non-federal match required. However, when considering a large capital grant for a transit facility of greater than $10 million, the scale of the non-federal match being greater than $2 million could be a significant hurdle, which could be mitigated by early and constructive conversations and collaboration with entities like LA Metro, Southern California Association of Governments (SCAG), and California State Transportation Agency (CalSTA). Those funding partners are oftentimes favorable to supporting agencies and projects that can leverage local funds to secure federal grants.

The federal requirements associated with these programs, namely Buy America, are a key challenge that should not be overlooked due to current limited domestic options and supply of Buy America-complaint transit vehicles.

State

The California State Transportation Agency administers the Transit and Intercity Rail Capital Program (TIRCP). While FTA's programs operate on an annual basis, the TIRCP program has historically operated on a two-year cycle.[17] The next TIRCP cycles should occur in 2024 and 2026. Even though PVTA itself is not eligible for this program, the agency could partner with an entity that is eligible for this competitive discretionary program and access funds through the partner. CalSTA's TIRCP program is well-established and funded through California's cap-and-trade system which generates funding for the state's Greenhouse Gas Reduction Fund which is required by law through at least 2030. A key difference from FTA's programs is that the TIRCP program does not make very small grant awards solely for zero-emission purchases. They do provide grants to transit agencies, but normally for vehicles and a new or improved facility. The smallest TIRCP grant in the 2023 round was $2.27 million. Importantly, the TIRCP program does not require a local match, which is a significant consideration if looking at a capital grant for a $10+ million transit facility.

Funding Recipient

Because PVTA is not a recipient of federal funding – which is where a significant amount of funds to support transit facility construction are currently available – PVTA will likely need to partner with an outside entity to be eligible for some federal funding opportunities. For example, PVTA could partner with other local transportation providers, recipients of federal funding dollars, and/or local school districts. Partnering with such entities can provide a considerable competitive advantage in the application process. In 2022, for example, the Antelope Valley Transit Authority received a $4.8 million TIRCP grant for zero-emission microtransit buses, zero-emission school buses, and associated charging infrastructure in partnership with the school transportation agency.

Roadmap

As discussed above, a key factor and potential challenge in planning for a new transit facility is identifying suitable site locations that meet operational requirements and provide adequate power capacity for future charging needs. Although the current leased facility should meet PVTA's needs through approximately 2033, the availability of grant funding to purchase a bus-related facility creates the incentive to continue analyzing future transit yard ownership options. In particular, while lease payments for bus-related facilities are considered a capital expense and eligible under FTA's Low-No and

17 The standard two-year cadence of funding cycles got changed in 2023 (Cycle 6) due to the passage of supplemental state transportation funding.

Bus and Bus Facilities Competitive Program, the potential to secure grant funding to cover 80% of the purchase of a new transit facility and then reap the long-term benefits of lower operating costs should be taken into consideration, especially as land availability for transit yards (due to zoning limitations) becomes more and more difficult to find and secure.

An agency can receive a grant for a new transit facility from these programs ((1) Low No, (2) Bus and Bus Facilities, and (3) TIRCP) while still in the early stages of project development. Additionally, successful agencies frequently submit applications for both zero-emission vehicles and associated facilities. Thus, in order to be prepared for a future effort to compete for grant funding, PVTA should prioritize the following steps (**Figure 11**) so that they have the necessary information to be eligible and competitive. Please note, **Figure 11** reflects the timeline for the most highly recommended funding sources, but PVTA should also consider other funding sources, for example those listed in the ZEB Rollout Plan, as the facility plan develops.

Figure 11: Detailed Funding Roadmap

Date	Task	Task Owner	Task Summary & Next Steps	Funding Category
Winter – Spring 2024	Funding Discussion with Partners	PVTA	PVTA should begin having discussions with outside partners as early as possible to gauge interest in applying for joint projects. Many funding sources will require partnership with a federal funding recipient. With an outside funding partner, PVTA will have a better chance of securing funds adequate to build a transit facility in the four-city service area. PVTA could discuss partnership opportunities with the City of Claremont, City of Glendora, Foothill Transit, and/or the Los Angeles Unified School District (LAUSD).	Federal
Winter 2024	Identify Site Location(s)	PVTA	It is strongly encouraged for funding applicants to identify the potential future site location, or multiple site location options, that will be available for purchase. PVTA should consider the necessary square footage identified in the space needs program and the site's electrical capacity. If the site becomes unavailable after an application's submission, the applicant can make amendments after award. Discussions with Monument could identify a parcel or numerous parcels to purchase and consolidate. LAUSD may also have underutilized transit yard space nearby, and there may be opportunities to explore co-locating PVTA's fleet at an underutilized transit yard. If a funding partner and/or land for purchase cannot be identified, PVTA should explore Options 2 or 3 where a transit yard is leased. This would need to happen sometime between 2026 – 2032 so that the agency has enough time to prepare the site for operation beginning in 2033.	N/A

Figure 11: Detailed Funding Roadmap (cont.)

Date	Task	Task Owner	Task Summary & Next Steps	Funding Category
Spring 2024 – Fall 2025	Satisfy Grant Requirements	PVTA	Perform preliminary engineering work and other technical tasks to meet funding program application requirements. While there are exceptions to this, funding partners rarely provide large discretionary capital grants for projects that have not moved beyond the conceptual planning stage. To be clear, to receive a major grant for a transit facility the project does not need to be 'shovel ready', or even in final design, but the applicant should be able to demonstrate that the application is grounded in some degree of preliminary engineering. Perform CEQA and/or NEPA as well as other regulatory steps that are required or identify a strategy for meeting CEQA requirements. Please note the State will not allocate funds for design, right-of-way, or construction until CEQA approval has been granted. For federal funding programs, there is more leniency. An agency can be awarded a federal grant at the same time as starting the NEPA process, but similar to at the state-level, an agency cannot obligate funds until NEPA approval has been granted.	N/A
Summer – Fall 2025	Develop Zero-Emission Fleet Transition Plan	PVTA	Agencies applying to the Bus and Bus Facilities and/or the Low or No Emission Programs must develop a Zero-Emission Fleet Transition plan, demonstrating a long-term strategy for how the applicant intends to use the requested resources, examining the workforce impacts, discussion of partnerships with the utility, consideration of legislation impacting the zero-emission technology, etc. The rollout plan submitted to fulfill the State of California requirement will largely satisfy this requirement; however, some additional details may be required.	N/A
Spring 2026	Apply for TIRCP	PVTA	PVTA should submit an application during the next cycle of the TIRCP program (one application cycle every two years). No agency match is required for this program.	TIRCP (state funding)
Spring 2026	Submit Allocation Request for Low Carbon Transit Operations Program (LCTOP)	PVTA	If PVTA is able to develop a partnership, the federal funding recipient partner should submit an allocation request to the LCTOP program to receive access to apportioned funds as a supplemental funding source and to have funds available to support the local match requirement for federal funding programs. Local match funds should be lined up in order to be competitive and successful in any federal funding application. This can include programmed or committed funds, but the agencies should be able to prove the funds are real.	LCTOP (state funding)

Figure 11: Detailed Funding Roadmap (cont.)

Date	Task	Task Owner	Task Summary & Next Steps	Funding Category
Spring – Summer 2026	Federal Funding Program Application Submission	Outside Partner	On behalf of PVTA, an outside funding partner could submit a grant application for the Low or No Emission Vehicle Program or the Bus and Bus Facilities program during the application period, which typically runs from January to April. Awards have historically been announced in June.	Low or No Emission and/or Bus and Bus Facilities (federal funding)
Summer 2026	Purchase Land	PVTA	If an outside partner and grant is secured, PVTA should utilize grant funding to finalize the purchase of one of the parcels identified above. Timeline depends on application submission date.	Utilize federal grant funding
2026 – 2032	Detailed design planning and construction	PVTA	Develop detailed plans for design and construction of new transit yard. Because grant funds awarded from these programs are available for obligation for three years beyond the year of award, that creates the potential for PVTA or an outside partner to pursue and secure a multi-million dollar grant in FY 2026 that could be obligated through FY 2029 for both vehicle acquisitions and new transit facility acquisition or leasing capital costs.	N/A
2028 – 2033	Funding for Electric Vehicle Purchases	PVTA	Once construction of the new transit facility is underway and PVTA has begun the transition to ZEV, the agency could utilize the California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), Low Carbon Fuel Standard (LCFS), and the Charge Ready Program (administered by Southern California Edison) for vehicle and charging infrastructure procurement.	HVIP, LCFS, Charge Ready
2033	New Transit Facility	PVTA	New transit facility is fully functional.	N/A

FUTURE CONTRACTUAL REQUIREMENTS

RFP Development

Numerous components, including the preferred service contractor model that results from the Service Design Analysis and whether PVTA is able to acquire funding to purchase and construct a transit agency are factors that will impact the language included in the future RFP. There are three main topics, however, in the RFP that will be impacted by the transition to ZEV: the transition to a new facility, staffing, and maintenance needs.

Transit Facility Transition

As identified above, PVTA will need to transition to a new transit facility in the future that has the capacity to meet the agency's operational needs. PVTA should add language in the RFP identifying this need, mentioning the recommended year to transition by, according to the fleet transition plan identified in this report (2033).

In the interim phase between the present and when PVTA has a new transit facility, there will ideally be one service contract. Ideally, this service contract would remain in place until it is expected that the new facility would be online. There should be some extensions clauses in place in case the construction of the new facility is delayed. Once the new transit facility is complete and usable, PVTA could start a new contract. It would be preferable to start a new contract when the transit facility comes online due to differences in model cost structures.

Staffing Needs

The new charging and vehicle technologies that are associated with a transition to ZEV will undoubtedly require training to ensure a smooth adoption and transition to ZEV. Vehicle manufacturers often provide a training package for drivers and mechanics to ensure those operating and maintaining the vehicles have the appropriate training for the specific vehicle models in the fleet.

Maintenance Needs

The contractor's maintenance personnel should also be trained for the specific vehicles purchased. Depending on what operations model is utilized, PVTA should also include language specifying the types of chargers that should be provided by the contractor and language around their maintenance to ensure that chargers are repaired rapidly and online the vast majority of the time.

APPENDIX A:
VEHICLE COMPATIBILITY

See PVTA Vehicle Range Compatibility Calculator.xlsx

APPENDIX B:
FLEET PROGRESSION PLAN

See PVTA Fleet Progression Final.xlsx

APPENDIX C:
SPACE NEEDS PROGRAM

Date: 09-20-2023

TYLin

PVTA ZEB **Phase 1. Task 2.1- Space Needs Program**

Department	Space	Qty.	Dimension/Std Size	Area (SF)	Total Area (SF)	Notes
Site Areas						
Parking Uncovered						
	Large Vehicles (Cutaways)	30	12' x 30'	10800.00		
	Minivans	10	9' x 18'	1620.00		
	Employee Parking	25	9' x 18'	4050.00		
	Visitor Parking	2	9' x 18'	324.00		
	Downline/Readyline	3	12' x 30'	1080.00		
Total Parking Uncovered				17874.00	17874.00	
Charging Stand/Distribution		1	10% of parking	1787.40		
Generator		1	20' x 30' w 10%	660.00		Would require fuel storage on-site or a natural gas hook-up
Waste/Garbage/ Recycling	x	1	x	200.00		
Recycling	x	1	x	0.00		
Load/Unload Area	x	1	20' x 70'	1400.00		
Exterior Storage Area	x	1	x	200.00		
Staff Outdoor Space	x	1	30' x 30'	900.00		For staff to gather, etc.
Total NSF				40895.40	40895.40	
Circulation	72% of total SF		72% of total SF	29444.69	29444.69	(%) of site circulation could vary with site orientation & configuration.
Total NOSF	**(NSF + Circulation)**			**70340.09**	**70340.09**	
Facility/ Building Areas						
Administration/Office Space						
	Workstation (Shared)	10	64 SF	640.00		
	Workstation (Shared)	0	64 SF	0.00		
	Private Office	0	15' x 10'	0.00		
	Private Office	0	15' x 20'	0.00		
	Private Office	2	15' x 10'	300.00		
	Copy/Workroom/Supplies	1	4 SF/Staff	60.00		Office storage
Staff Support/ Shared Space						
	Lobby	0	x	0.00		
	Restrooms (Male, Female)	4	50 SF	200.00		Verify quantity per code
	Restrooms (Gender Neutral/ ADA)	2	75 SF	150.00		Verify quantity per code
	Break Room w/Kitchenette	1	15 SF/Staff	600.00		Can be used for training; 40 people; include tables, chairs, and cabinets for storage
	Meeting/ Training Room	0	20 SF/Staff	0.00		
	Office Supply Storage	1	0.5 SF/Staff	30.00		Support 15-20 people
	Custodial Room	1	80'	80.00		
	Janitors Closet	2	20'	40.00		
Total (Admin.+Staff Supp.)				2100.00	2100.00	
Vehicle Maintenance						
	Maintenance/ Repair Bay	3	20' x 40'	2400.00		
	Facility Maintenance Shop	1	x	500.00		Light shop work w/equipment, project staging, etc.
	Tool Storage	1	x	200.00		Hand tools, bin bolt storage, close to the Shop area, quick pick.
	Common Work Area	1	50 SF/Bay	150.00		Two spaces minimum
	Handwash Sink / Em. Eye Wash	3	80'	240.00		Locate throughout Shop & Bay Areas; Verify quantity per Code
	Tire Bay	1	20' x 40'	800.00		
Storage						
	Tire Storage	1	8 SF/Tire	320.00		Assuming 40 tires for new and used, need to confirm, may need larger
	Safety/Training Storage	1	20% of Training Room	0.00		
	Large Parts Storage	1	x	1400.00		Custodial supplies, paper products, parts storage, PPE vending machines, secured storage, etc.
	Staging Area	1	x	200.00		Outside parts area.
	Shipping/Receiveing Area	1	x	200.00		May need additional exterior space.
	Exterior Drop Area	1	x	200.00		Deliveries
	Cleaning Supply Storage	1	x	100.00		Cleaning supplies, carts, mop sink, storage shelving
	Lube/Compressor Room	1	x	300.00		Includes Compressor, dryer and receiver (125 SF), If all electric fleet, storage for fluid tanks may not need
Total (VM+ Stor.)				7010.00	7010.00	
Total Facility/ Build. Area				9110.00	**9110.00**	
Building Support						
	Mechanical Room	1	10% of total SF	911.00		10% of MEP (Mechanical Room + MEP Storage)=
	MEP Storage	1	10% of Mech. Room	91.10		100.21
	Electrical Room	1	10% of total SF	911.00		
	Data/Communication Room	1	2% of total SF	182.20		
	Fire Sprinkler	1	0.5% of total SF	45.55		
	Exterior Walls	x	2% of total SF	182.20	182.20	
Total NSF				11250.85	11250.85	Not included: Exterior walls
Circulation	30% of total SF		30% of total SF	3375.26	3375.26	
Total NOSF	NSF + Circulation			14626.11	14626.11	
Subtotal	(NOSF/ %Efficiency) + 10% MEP			11069.79	11069.79	10969.57875
Total GSF	**Subtotal + Exterior Walls**			**11251.99**	**11251.99**	

** Assuming Efficiency= 75%; (Key formula: Efficiency= work output/work input x100%)

Total Area for PVTA (SF)= **81592.08** Site setback, landscaping not included.

NSF= Net SF
NOSF= Net Operating SF
GSF= Gross SF

APPENDIX D:
HIGH-LEVEL COST ESTIMATE FOR EV IMPLEMENTATION

See PVTA EV Implementation Cost Estimates.xlsx