



# Memorandum

## AGENDA ITEM 11

**DATE:** June 20, 2023  
**TO:** Transportation Authority Board  
**FROM:** Carl Holmes - Deputy Director for Capital Projects  
**SUBJECT:** 06/27/23 Board: Major Capital Project Update: Caltrain Modernization Program

<p><b>RECOMMENDATION</b>   <input checked="" type="checkbox"/> <b>Information</b>   <input type="checkbox"/> <b>Action</b></p> <p>None. This is an information item.</p> <p><b>SUMMARY</b></p> <p>The Caltrain Modernization (CalMod) program is a \$2.72 billion suite of projects, which includes Positive Train Control (PTC) and the Peninsula Corridor Electrification Project (PCEP). PTC was completed in December 2020. PCEP is comprised of electrification of the Caltrain line between San Jose and San Francisco, upgrade of the signal system, and the procurement of electric multiple-unit vehicles (EMUs). As of April 30, 2023, PCEP has expended 82.19% of its current budget. Work is continuing on the installation of the Overhead Contact System (OCS) poles, cantilever arms, and contact wire, and the traction power facilities are nearing completion. The first four EMU trainsets have been delivered and are undergoing static testing. On June 5, 2023, the first train was run on the project’s drill track under OCS power, a most anticipated event. The current PCEP Baseline Budget is \$2.44 billion, and the project is fully funded. In January 2023, Caltrain received \$367 million from the state’s Transit and Intercity Rail Capital Program which, together with the previously awarded \$43 million from the federal Omnibus Appropriations Bill, fully covers the \$410 million funding shortfall resulting from the December 2021 Baseline Budget adjustment. The planned revenue service date is September 2024. Caltrain staff will attend the June 27 Board meeting to provide a brief project update.</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Fund Allocation</li> <li><input type="checkbox"/> Fund Programming</li> <li><input type="checkbox"/> Policy/Legislation</li> <li><input type="checkbox"/> Plan/Study</li> <li><input checked="" type="checkbox"/> Capital Project Oversight/Delivery</li> <li><input type="checkbox"/> Budget/Finance</li> <li><input type="checkbox"/> Contract/Agreement</li> <li><input type="checkbox"/> Other: _____</li> </ul>
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## BACKGROUND

CalMod is a \$2.72 billion suite of sustainable projects that will electrify and upgrade the performance, operating efficiency, capacity, safety, and reliability of Caltrain commuter rail service, while improving air quality and reducing greenhouse gas emissions. CalMod includes the PTC Project, which was completed on December 17, 2020, and the PCEP, which has two components: electrification of the Caltrain line between San Jose and San Francisco; and the purchase of EMUs to operate on the electrified railroad. Revenue service is scheduled for September 2024.

The CalMod Program will improve system performance with faster, more reliable service while minimizing equipment and operating costs. The CalMod Program is critical to the long-term financial sustainability of Caltrain. The improvements will extend for 52 miles from San Francisco to San Jose and will also prepare the alignment for the future High-Speed Rail blended system. The Federal Transit Administration (FTA) approved the Full Funding Grant Agreement for the project in 2017.

Like any large capital project, the CalMod funding plan relies on contributions from multiple funding partners including the three Peninsula Corridor Joint Powers Board (PCJPB) member counties (San Francisco, San Mateo, and Santa Clara), the Transportation Authority, MTC, and the California High-Speed Rail Authority (CHSRA), in addition to the FTA. Funding contributions were codified in a series of memorandums of agreement, of which the latest included an oversight protocol. The three PCJPB counties have provided a local contribution of \$80 million each to the CalMod program. The Transportation Authority provided about \$41 million, primarily from the Prop K sales tax and One Bay Area Grant programs. The San Francisco Municipal Transportation Agency provided the remaining \$39 million of San Francisco's local contribution from the Prop AA General Obligation Bond.

The Funding Partners oversight protocol for CalMod requires the Executive Director of Caltrain to attend a Board of Supervisors meeting twice a year to provide an update on the CalMod Program. With the concurrence of the President of the Board of Supervisors, the updates since 2019 have taken place at Transportation Authority Board meetings.

## DISCUSSION

The paragraphs below provide a brief status update on the CalMod program.

**Positive Train Control (PTC) [COMPLETED].** This \$329.3 million project is complete. PTC is an advanced signal system that equipped the corridor with federally mandated safety technology. Caltrain received conditional approval of the PTC Safety Plan from the Federal Railroad Administration (FRA) in December 2020. PTC is currently in Revenue Service and is fully interoperable with all tenants. Caltrain's Interoperable Electronic Train Management System is now certified by the FRA as a mixed PTC system. Caltrain has established a follow-on maintenance agreement with Wabtec Corporation, the project's contractor.



**Peninsula Corridor Electrification Project (PCEP).** As of April 30, 2023, expenditures on the PCEP reached \$2.04 billion, 82.19% of the \$2.44 billion current budget. Work is progressing on both the Electrification and the Vehicles components of the project.

**Electrification design-build contract.** In August 2016, Caltrain awarded the Design-Build Electrification contract to Balfour Beatty Infrastructure in the amount of \$697 million. The contract was initially issued with a \$108 million Limited Notice to Proceed, which was followed by full Notice to Proceed on June 19, 2017.

Overhead Contact System (OCS) poles, cantilever arm, and wire installation continues. OCS foundations are complete and pole installation is 99% complete. Contact wire installation is 84% complete. Completion of all work on the OCS is anticipated for October 2023.

Work continues on the ten Traction Power Facilities. Nine of the ten Traction Power Substations are over 90% complete, with the exception of Power Substation 3. Punchlist work is underway.

Signals and Communication Systems construction also continues. Signal cutovers for Segment 3 (Palo Alto, Mountain View, and Sunnyvale) were completed in April 2023. As of that date, the project has completed cutovers for Segments 2, 3 and 4. Only Segment 1 (San Francisco) remains. It is expected to be complete by October 2023.

**Tunnels. [COMPLETED]** Work on modifications to the 100-year-old San Francisco tunnels reached Substantial Completion on September 17, 2020, and Final Acceptance was reached in December 2020.

**Vehicles.** On September 6, 2016, Caltrain gave a limited Notice to Proceed to Stadler Rail for the \$551 million EMU contract to design and fabricate 96 electric vehicles. After receipt of the Full Funding Grant Agreement, Caltrain issued the full Notice to Proceed on June 1, 2017. Subsequently, Caltrain executed an option for an additional 37 cars, bringing the total to 133 cars. In accordance with the Buy America provisions of the FTA funding, the vehicles are being manufactured by Stadler US at its new facility in Salt Lake City, Utah.

The first four trainsets have been delivered to Caltrain and are undergoing static testing prior to dynamic testing on Segment 4 (Santa Clara to San Jose). Two additional trainsets have been completed and are in storage at the Stadler facility. The balance of the original 14 trains will be delivered by March 2024 and the 19<sup>th</sup> and final trainset's anticipated arrival is in summer 2024. Trains 15 through 19 represent additional trainsets purchased with funding outside of the PCEP budget.

Operator training has been underway since August 2022 and will continue until all operators are trained, anticipated by the end of June 2023.

On June 5, the first train was run on the project's drill track under OCS power.

**Central Equipment and Maintenance Facility. [COMPLETED]** Located in San Jose since 2007, this facility accommodates inspections, maintenance, repair, train washing, and storage for the rail fleet. As part of the PCEP, the facility just went through an overhaul to accommodate the new electric vehicles. All work at the facility was completed in July 2022.



**Cost and Schedule.** The current Baseline Budget for the PCEP, adopted by the PCJPB in December 2021, is \$2.44 billion. The December 2021 change to the Baseline Budget represented an increase of \$462 million over the original Baseline Budget.

The current budget includes a total of \$90 million in contingency: \$50 million in a shared risk pool and \$40 million in allocated and unallocated contingency. As of April 30, 2023, \$74.86 million in contingency remained. The Revenue Service date remains unchanged for September 2024, which includes a six-month contingency.

**Funding.** The project is now fully funded. On January 31, 2023, Caltrain received \$367 million from the state's Transit and Intercity Rail Capital Program (TIRCP) which, together with the previously awarded \$43 million from the federal Omnibus Appropriations Bill, fully covers the \$410 million funding shortfall resulting from the December 2021 Baseline Budget adjustment. Achieving full funding had the added benefit of pushing off Caltrain's projected operating deficit for two years (i.e., anticipated operating deficit of \$33 million is now in Fiscal Year 2025/2026) by freeing up Measure RR funds that would have otherwise been needed to help close the funding gap.

**Progress Reports.** Detailed CalMod monthly reports are provided to the Caltrain Board and are publicly available. Peninsula Corridor Electrification Project reports are located at:

[http://www.caltrain.com/projectsplans/CaltrainModernization/CalMod\\_Document\\_Library.html - electric](http://www.caltrain.com/projectsplans/CaltrainModernization/CalMod_Document_Library.html - electric)

**Challenges and Opportunities.** There are some challenges that may impact Caltrain's ability to complete CalMod, even within a new schedule and budget. The Risk Management Team meets on a monthly basis to evaluate risks and make any needed adjustments. The results of the most recent Monte Carlo quantitative risk analysis forecasted a reduced risk to the budget and schedule. Broadly, this analysis indicates that the program is headed in the right direction. The primary risk items that we are monitoring include the risks that:

- TASI (Caltrain's operating contractor) may not have sufficient field support resources (Rail Worker in Charge, watchmen, flaggers, signal maintainers) for testing.
- Delivery of permanent low voltage (power for power drops for new signal and wayside power cubicle locations along PCEP alignment may delay schedule.
- Potential for Stadler's sub-suppliers to fall behind schedule or delays in parts supply chain result in late completion of vehicles.
- OCSs construction productivity continues to fall below what's required to meet the scheduled completion of October 2023.
- Short-circuit test failure at traction power substation-2 may signal a larger issue.

The Transportation Authority's PMO continues to oversee the project in accordance with the



Funding Partners Oversight Protocol.

**FINANCIAL IMPACT**

None. This is an information item.

**CAC POSITION**

None. This is an information item. The Community Advisory Committee will consider this item at its June 28, 2023 meeting.

Attachment:

1. Caltrain Electrification Presentation

# Caltrain Electrification Update

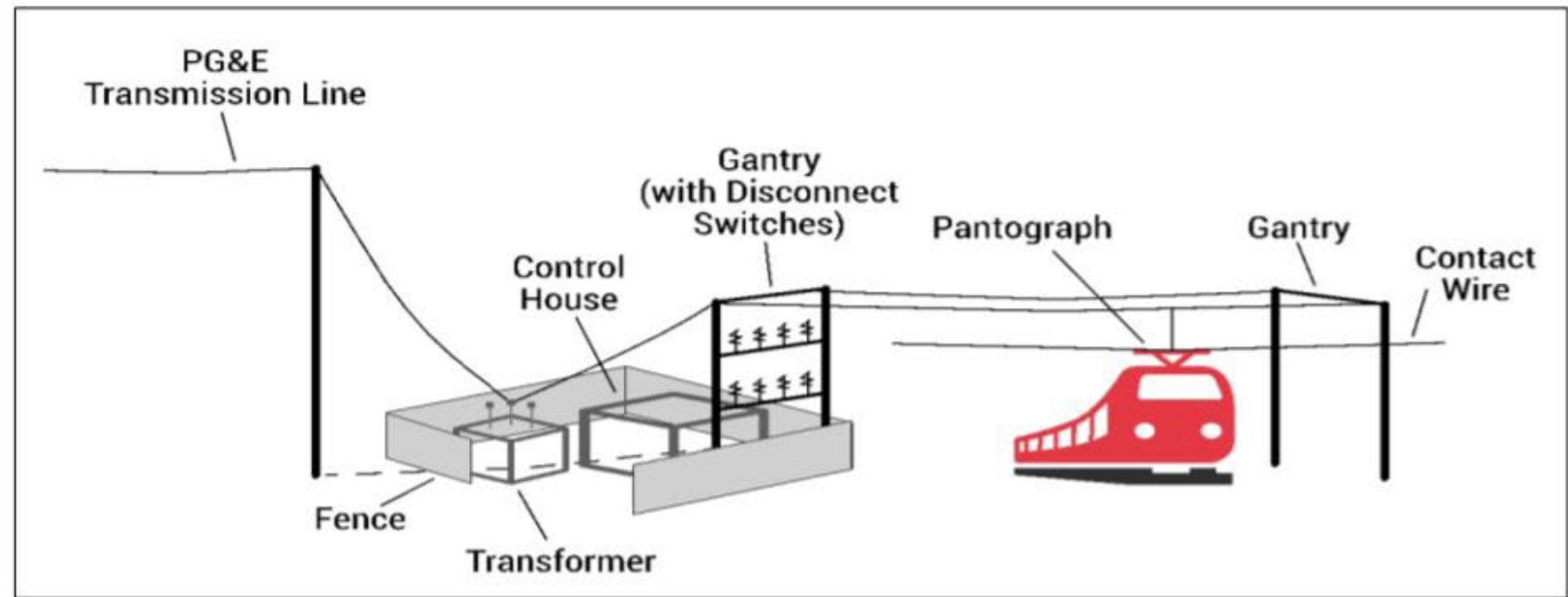
San Francisco County Transportation  
Authority  
June 27, 2023



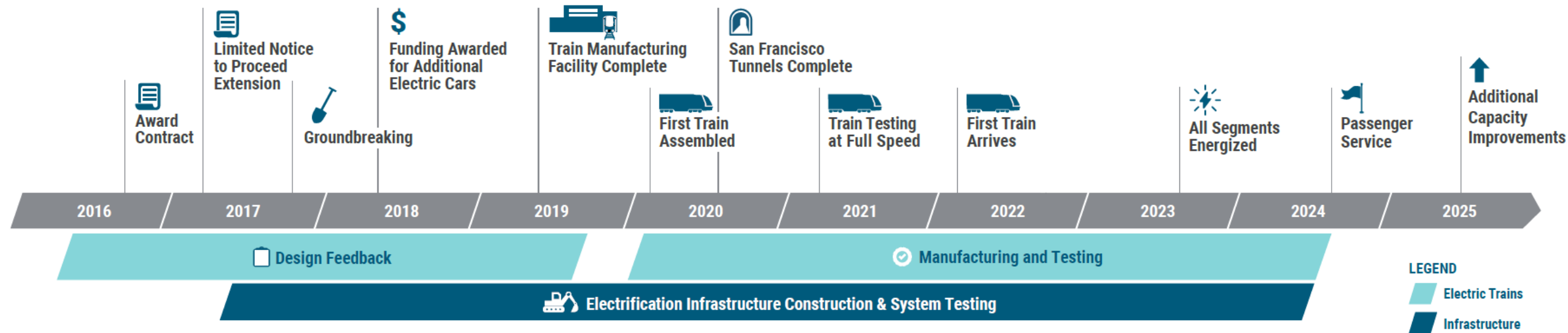
# Transition from Diesel to Electric

## First Electric Commuter Railroad in CA

- 25KV Overhead Contact System (used by high-speed rail system)
- 19 EMU 7-car trainsets (replaces 75% of diesel fleet)
- Two-Speed Check signal system (approved by FRA, UP and CHSRA)



# Timeline





# Project Milestones

- Overhead Contact System
  - 99% of poles installed
  - 86% of wire installed
  - Overhead Contact System construction completion in October 2023
- Electric Trains
  - Drill tracks live runs started June 5, 2023
  - Main track live runs Summer 2023
  - All train cars in production
  - 4 trainsets on site at Caltrain; next two trainsets expected fall 2023
- Pre-Revenue Service: Spring 2024
- Revenue Service: September 2024



*Foundations*



*Overhead Catenary System*

# Project Fully Funded!



# Project Budget

	(A)	(B)	(C)	(D)	(E)	(F) = (D) + (E)
Description of Work	Re-Baseline Budget	Current Budget	Cost This Month	Cost To Date	Estimate To Complete	Estimate At Completion
<b>Electrification</b>	\$1,097,149,881	\$1,097,149,881	\$13,193,833	\$917,528,775	\$179,505,106	\$1,097,033,881
<b>EMU Procurement</b>	\$556,072,601	\$556,248,486	\$0	\$420,210,493	\$144,452,993	\$564,663,486
<b>Minor Construction Contracts ( SSF, 25th Grade, Tunnel, CEMOF, SCADA, Non-BBI OCS)</b>	\$67,055,072	\$68,091,194	\$0	\$64,677,734	\$3,413,459	\$68,091,194
<b>Real Estate Acquisition &amp; Support</b>	\$34,914,177	\$34,914,177	\$32,986	\$24,052,357	\$10,861,820	\$34,914,177
<b>PG&amp;E, Utilities</b>	\$132,088,994	\$132,088,994	\$471,589	\$204,034,318	-\$75,774,924	\$128,259,394
<b>Management Oversight &amp; Support</b>	\$312,699,697	\$315,007,767	\$3,089,399	\$269,617,046	\$45,390,721	\$315,007,767
<b>TASI Support</b>	\$114,488,767	\$114,488,767	\$1,774,608	\$97,279,623	\$17,209,144	\$114,488,767
<b>Finance Charges</b>	\$9,898,638	\$9,898,638	\$0	\$9,361,780	\$536,858	\$9,898,638
<b>Insurance</b>	\$6,581,851	\$6,581,851	\$0	\$6,118,411	\$463,440	\$6,581,851
<b>Other Required Projects &amp; Services</b>	\$9,084,176	\$10,484,176	\$352,862	\$4,216,324	\$6,467,852	\$10,684,176
<b>Environmental Mitigation</b>	\$14,438,866	\$13,038,866	\$434	\$1,242,663	\$11,596,203	\$12,838,866
<b>Caltrain Capital Overhead (ICAP)</b>	\$48,217,887	\$48,217,887	\$663,057	\$23,771,053	\$24,446,834	\$48,217,887
<b>Contingency</b>	\$40,000,089	\$36,480,012	\$0	\$0	\$32,010,612	\$32,010,612
<b>Total</b>	\$2,442,690,697	\$2,442,690,697	\$19,578,768	\$2,042,110,578	\$400,580,119	\$2,442,690,697

Notes: "Re-Baseline Budget" includes executed change orders and awarded contracts;

"Cost This Month" represents cost of work performed April 2023;

"Cost To Date" includes actuals (amount paid) and accruals (amount of work performed) as of April 2023;

"Contingency" budget is drawn down and transferred to other elements after CMB approvals as reflected in the Estimate at Completion.



# Project Contingency and Shared Risk Pool

Item	Amount	Executed in April 2023	Executed To Date	Amount Remaining
BBII Shared Risk Pool	\$50.00M	\$1.86M	\$7.09M	\$42.91M
Project Contingency	\$40.00M	\$0.00M	\$3.52M	\$36.48M
<b>Total</b>	<b>\$90.00M</b>	<b>\$1.86M</b>	<b>\$10.61M</b>	<b>\$79.39M</b>

- \$1.73M for temporary generators for signal houses from BBII Shared Risk Pool
- \$0.12M for track access delays and differing site conditions from BBII Shared Risk Pool

# Top Risks and Mitigations

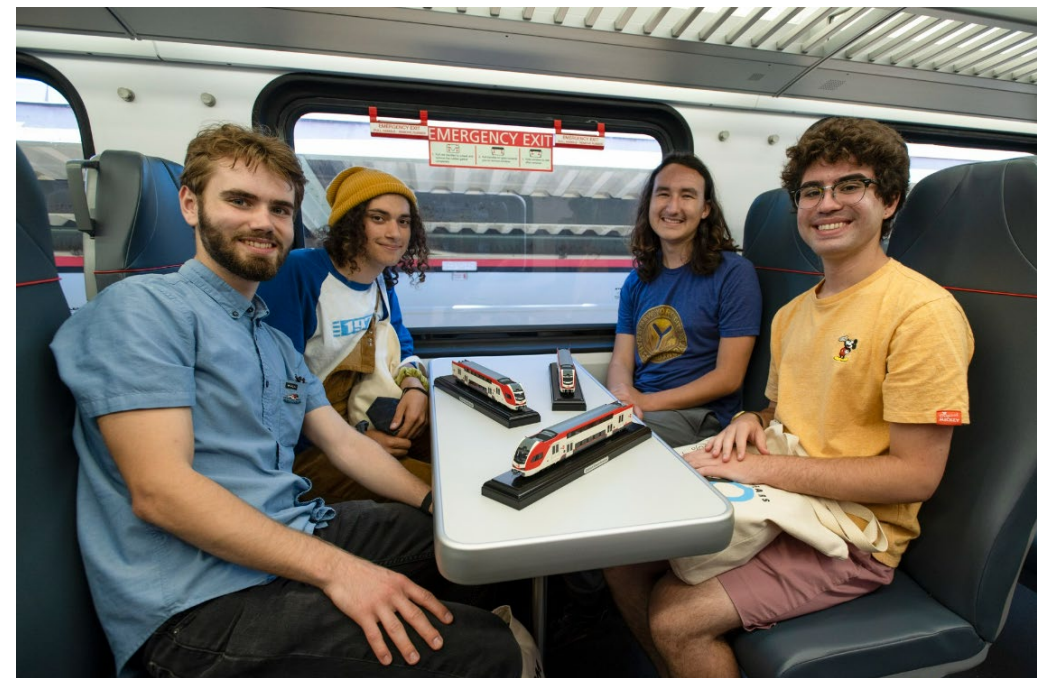
- Overhead Contact System Installation Productivity
- Traction Power Substations Short Circuit Testing
- Quality Control & Quality Assurance

# Signal System Update

- Electrified system requires new signal and grade crossing activation system to be installed
- 39 crossings cutover as of May 2023
- Subsequent Crossing Optimization Project (separate from Electrification) will provide real-time information between train and signal system

City	Number of Crossings	2 Speed Check Implementation
San Jose	2	Completed
Millbrae	1	Completed
Burlingame	6	Completed
San Mateo	9	Completed
South San Francisco	1	Completed
San Bruno	1	Completed
Redwood City	6	Completed
Atherton	2	Completed
Menlo Park	4	Completed
Palo Alto (Alma and Churchill)	2	Completed
Palo Alto (Charleston and East Meadow)	2	Completed
Mountain View	2	Completed
Sunnyvale	2	Completed
San Francisco	2	August 2023

Public Train Tours  
San Jose - July 29<sup>th</sup>, 2023  
San Francisco - September 2023  
San Mateo County - Fall/Winter 2023



FOR MORE INFORMATION

[WWW.CALTRAIN.COM](http://WWW.CALTRAIN.COM)





# Caltrain Corridor Overview

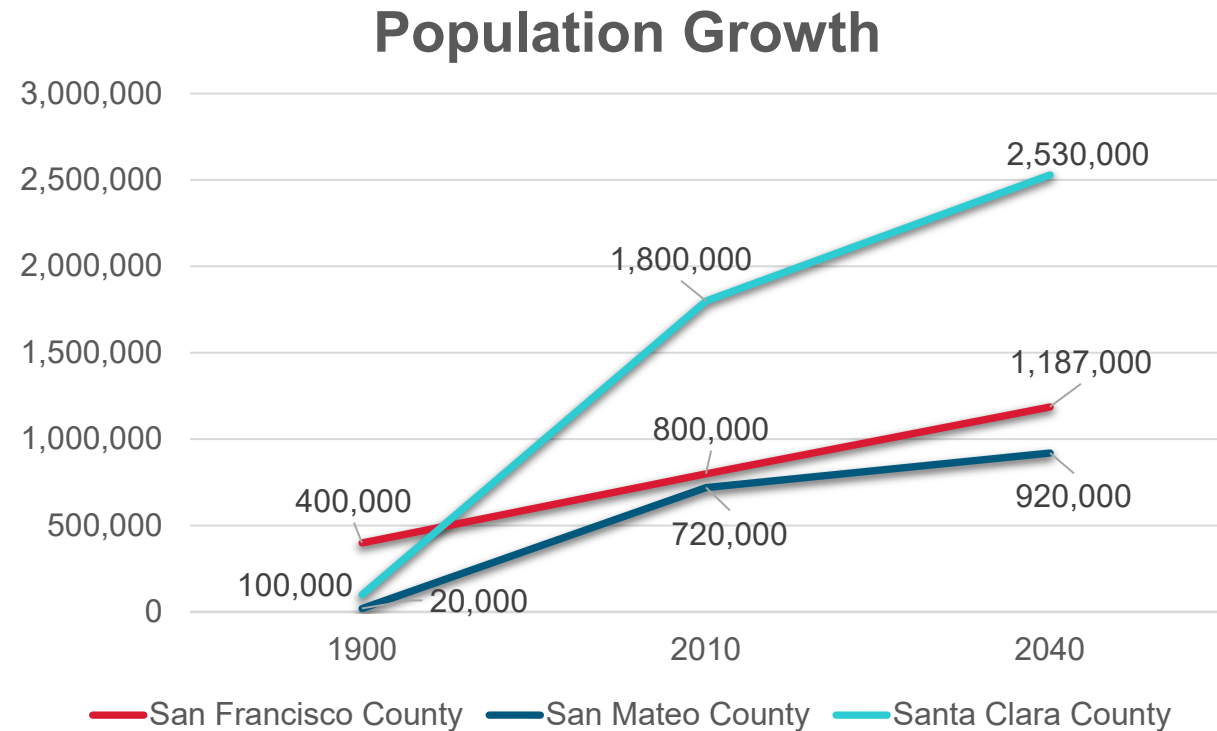
# Caltrain Corridor

- 77 miles of track from end to end
- 31 stations
- Bi-directional commute
- 41 at-grade crossings
- Pre-pandemic:
  - 7<sup>th</sup> largest commuter rail in the country
  - 70% farebox recovery
  - Over 18 million Unlinked Passenger Trips (UPT) in 2019
  - Frequently overcrowded trains, standing room only



# Corridor Growth 40% Increase

By 2040, an additional 1.2 million people will work and live within 2 miles of the Caltrain corridor.



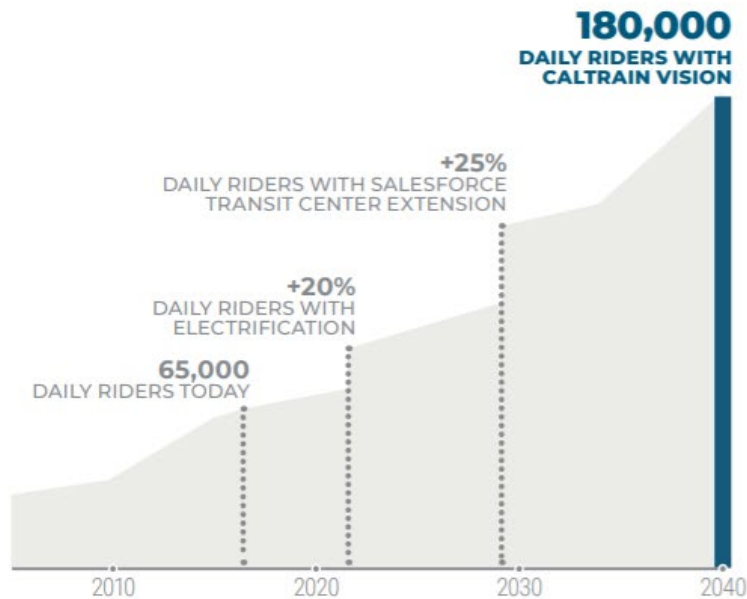
# 2040 Vision

## Zero Emission Future

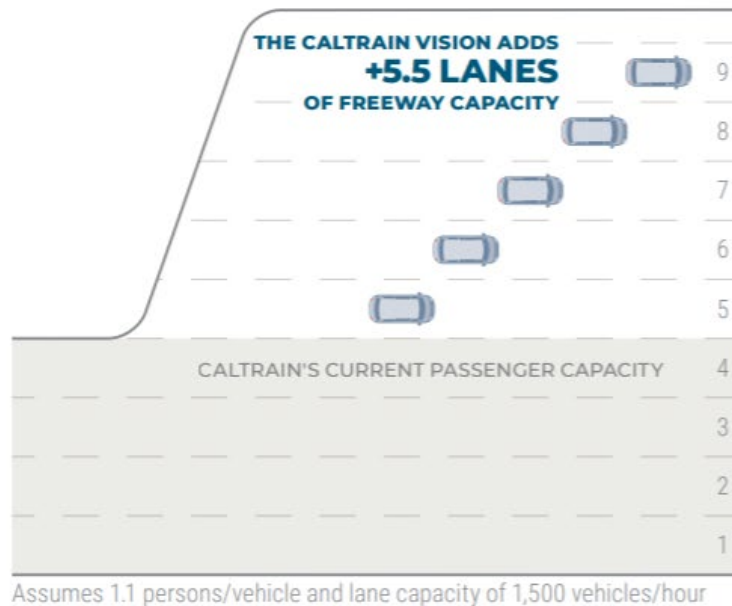
### MORE TRANSPORTATION CAPACITY



#### CARRYING MORE PEOPLE



#### TRAINS VS LANES

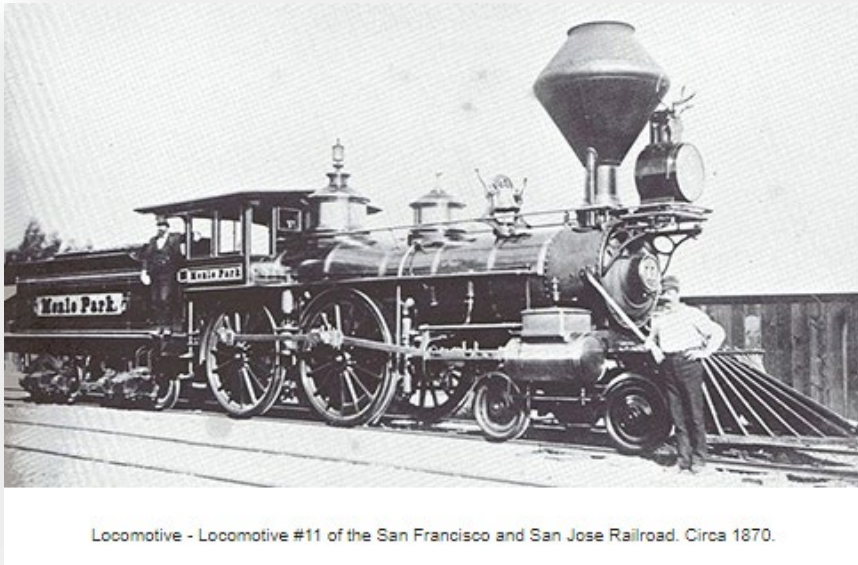


Caltrain's 2040 future service vision supports regional growth, arrival of high-speed rail, and more equitable, sustainable service.

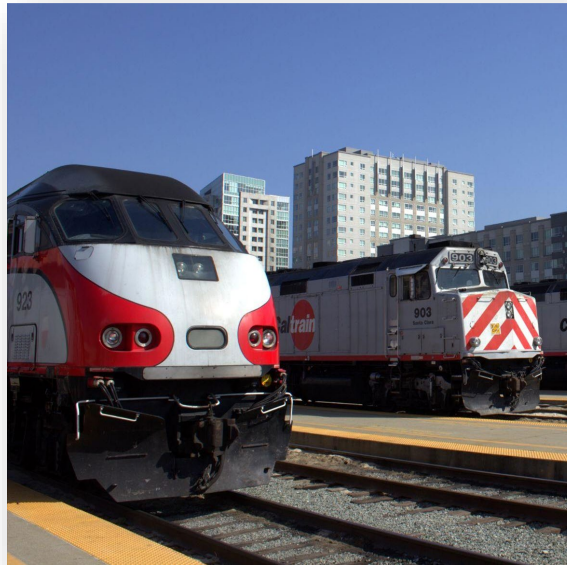


# Transformational Moment

Electrification will help Caltrain become a cleaner, more efficient component of the transportation network.



Steam 1860s



Diesel 1950s to present



Electric 2024



# A Connected Future

- Electrified Caltrain corridor will enable additional investments expanding the Bay Area intercity rail network.
- Existing and future tenants
  - Capital Corridor (Amtrak)
  - Altamont Corridor Express
  - California High Speed Rail
- Expansion projects
  - San Francisco Downtown Extension
  - San Jose Diridon Station Rebuild
  - Grade Separations



California High-Speed Rail, Draft Business Plan, Pg. 23

# Electrification Project Benefits

# Safety

- Crash energy management technology (meets FRA Alternate Compliance requirements for mixed traffic).
- Crash absorption system protecting train driver and passengers (meets FRA crashworthiness standard).
- Latest generation of vehicle control systems including detailed diagnostic features.
- Improved braking performance.





# Sustainability

- Eliminates 2.09 million tons of carbon emissions.
- Future Caltrain will carry equivalent of 5½ lanes of freeway traffic.



## SUSTAINABILITY

Replacing old diesel trains with new electric trains will reduce GHG emissions and improve air quality



# Energy Independence

- Reduce dependence on foreign energy sources; Rely on cleaner, renewable domestic energy sources.
- California committed to renewable and zero-carbon energy resources supplying 100% electric retail sales to customers by 2045.
- EMU trains include regenerative braking for additional energy savings

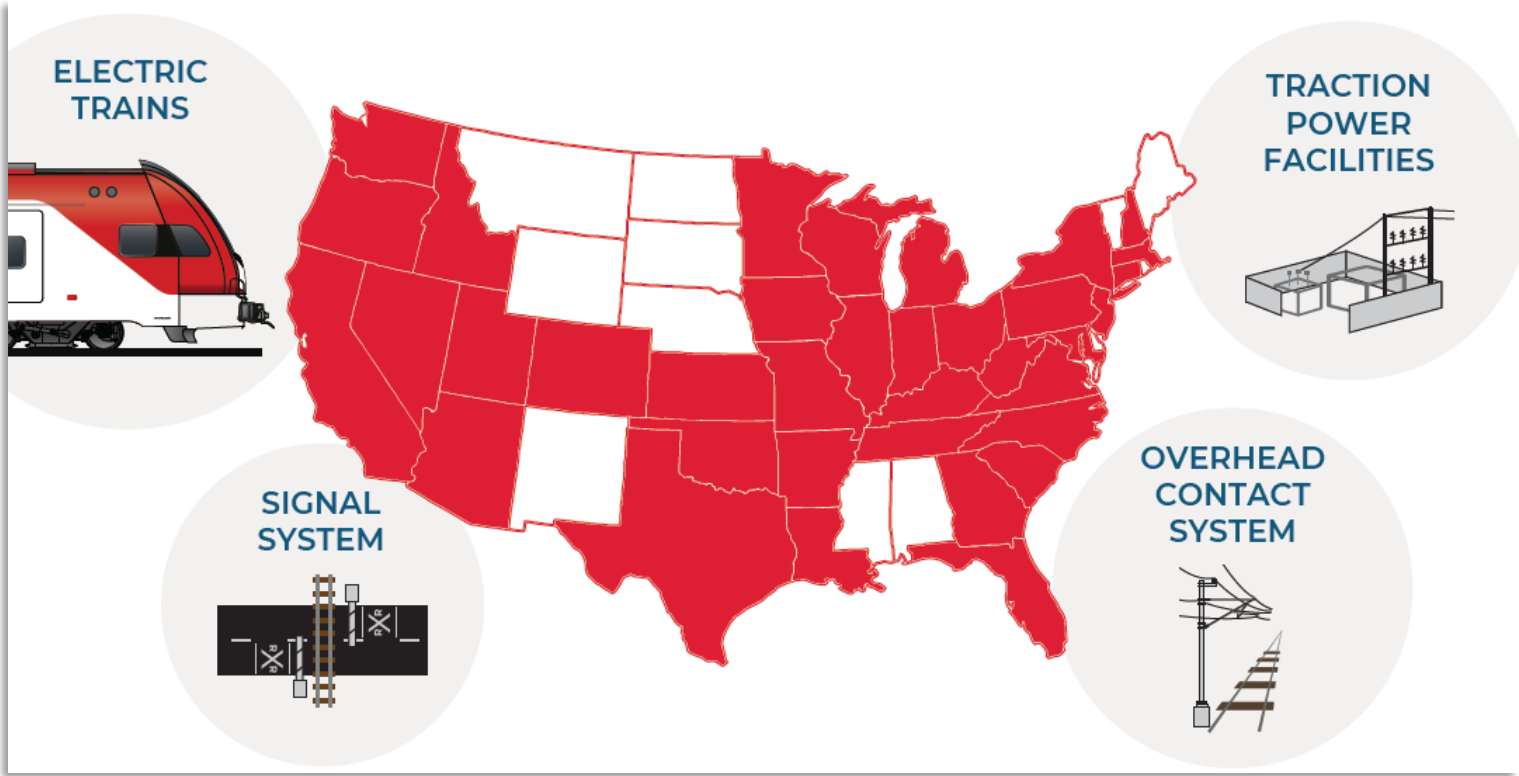


# Equity

- Decreases emissions and noise pollution in communities of concern
- Benefits disadvantaged communities:
  - San Francisco (Bayview)
  - Santa Clara
  - Redwood City
  - San Bruno
  - South San Francisco
- Improves mid-day and off-peak service for essential workers

# Economic Growth and Job Creation

33,000 Jobs Created in 36 States



# Buy America Compliant

- Stadler (Switzerland based company) opened first facility in the US with guarantee of Caltrain Electrification Project contract
- Stadler Salt Lake City Facility:
  - 400+ employees
  - Local apprenticeship program
- Additional foreign suppliers opening US locations in order to be Buy America compliant

