

Traffic Benefits of Caltrain on Peninsula Freeways

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Background

Caltrain is a highly efficient system that enjoys a high degree of utilization in both directions not seen by peer transit systems, due to job sites and residences dispersed along the corridor. Caltrain is also a critical part of the Bay Area's strategy for achieving greenhouse gas reduction targets, with new electrified infrastructure being put in place now.

Caltrain relies heavily on farebox recovery to fund its operations. In pre-Covid times, 70% of Caltrain's operations budget came from ticket sales – a source of strength in terms of self-sufficiency, but also a weakness as highlighted by the Covid-19 pandemic, where ridership has dropped up to 98%.

Measure RR would help to stabilize Caltrain's finances and keep this essential service running into the future, preparing the railroad for growth and alleviating strain on voluntary financial contributions from the three Caltrain counties – funds that can be used to otherwise improve and save local transit services.

Caltrain's Impact on Traffic

There is no disputing how indispensable Caltrain is to the region's transportation network. Prior to the pandemic, Caltrain served 65,000 riders daily. Today's typical weekday Caltrain service with the diesel fleet is 5 trains per hour, per direction (phpd), with off-peak service every hour.

If Caltrain had to shut down service, passengers may be diverted to the roadway network. Freeways on the Peninsula would have to absorb the additional traffic – a dramatic impact that can be illustrated in the equivalent number of cars that the railroad otherwise removes from our streets and highways, or even freeway capacity that might otherwise need to be planned for expansion.

Comparing Caltrain Ridership to Freeway Lane Capacity

So, how many freeway lanes does Caltrain provide the equivalent for? One simplistic way to look at it is to take Caltrain's average weekday daily ridership (pre-Covid) and compare this to the capacity for a typical freeway. Caltrain's daily 65,000 riders translates to 56,522 cars, assuming 1.15 passengers per vehicle¹ - the equivalent carrying capacity of a 4-lane urban

¹ 2016 Life-Cycle Benefit-Cost Analysis Economic Parameters, Caltrans

freeway, using the FHWA's freeway service generalized volume table.²

As a second methodology, and to get more in-depth requires looking at the peak hour capacity of the Caltrain system - this is the most apt comparison of the commuter train to a freeway conveying cars and the most pressing point for capacity needs. Off peak ridership can be more easily absorbed into a free flowing highway outside of rush hour.

Freeway lane capacity can vary greatly based on speed and the type of vehicles on the roadway. Estimates typically range from 1500 to 2200 vehicles per hour per lane. For High Occupancy Toll (HOT) lane planning purposes, which are measured through electronic sensors, Caltrans uses 1,650 vehicles per hour as the operating standard.³ Trains also aren't subject to the same stop-and-go traffic or rush hour crawl on freeways - another reason why so many passengers choose Caltrain. We'll use this figure as a mid-range baseline to understand the order of magnitude of freeway lane impact by Caltrain.

The pre-Covid peak hour maximum ridership on Caltrain was 6,500 passengers.⁴ Translated into new freeway lanes, the current Caltrain system serves the equivalent of 3.93 lanes in the peak hour - essentially 4 lanes (since partial lanes wouldn't be built) and aligns with what was found in the first methodology.

Caltrain Expansion – Moderate Growth

CalMod, the infrastructure and modernization program to electrify the Caltrain system, is set to be largely complete by the end of 2021. These improvements will allow Caltrain, with a newly electrified rail corridor and train fleet, to move forward with planned service expansions to add an additional train per hour per direction, grow train lengths to 7 cars, and double the frequency in the off peak – a 30% boost in capacity. Measure RR will build upon this growth to help Caltrain realize its next level of potential: by 2030, Caltrain could begin service with up to 8 trains per hour, per direction.

Ridership under this scenario is projected to be about 113,000 on an average weekday. Again, converting to number of vehicles, this is the equivalent of 98,261 cars, approximately translating to between 6 to 8 lanes of a freeway.

Maximum peak hour capacity of Caltrain service with electrification, including standing room, is projected to increase to 5,400 passengers per hour direction - an estimated total of 10,200 at the peak.⁵ Using the assumption of 1,650 vehicles per hour per lane in a free flowing traffic setting, this translates to just over 5 lanes of total traffic.

² Simplified Highway Capacity Calculation Method for the Highway Performance Monitoring System, Appendix A. <https://www.fhwa.dot.gov/policyinformation/pubs/pl18003/chap04.cfm#t13>

³ US Highway 101 Managed Lanes Project Final EIR

⁴ Caltrain Business Plan Presentation

<https://www.caltrain.com/Assets/Caltrain+Modernization+Program/Meetings/LPMG/Caltrain+Business+Plan+Presentation+3.28.19.pdf>

⁵ Caltrain 2019 Annual Passenger Count, Key Findings

Caltrain Service Vision (2040)

The Moderate Growth scenario under the Caltrain Service Vision calls for 8 trains per hour per direction, with up to 10-car train lengths and even more frequent off-peak service. Under this ambitious plan, Caltrain is setting a target of 180,000 daily riders. At the equivalent of over 156,000 vehicles, the future of Caltrain is the equivalent of 10-12 freeway lanes worth of cars removed from our roads, referencing the FHWA conversion table.⁶

Measure RR would help Caltrain to achieve this potential, providing the stable source of operating funds needed for the system to accommodate growth and continue long range planning. Member agencies that support Caltrain would also be relieved of \$53 million in annual funding at today's levels, which could be used to support local transit service - and would certainly be increased if Measure RR does not pass.

Caltrain projects that 51,000 new jobs would be created along the corridor as a result of implementation of the Service Vision under the Caltrain Business Plan, an economic impact of \$40.8 billion.⁷

17,700 passengers would be projected to ride Caltrain in the peak hour under the adopted Moderate Growth Service Vision of the Caltrain Business Plan - an equivalent of 15391 vehicles. Dividing this figure by 1,650 vehicles per hour per lane, Caltrain's 2040 future replaces over 9 lanes of freeway - a slightly more conservative figure than the table lookup methodology and still a substantial improvement. Replacing freeway lanes with a high frequency, high quality transit experience is critical to helping California and the region achieve GhG and climate goals.

It's no exaggeration to say that Caltrain's future hangs in the balance. This essential commuter railroad along the spine of the Peninsula connects across a regional economic engine, with designs on evolving into a fully-fledged metro transit service. Caltrain has embarked on a well-considered strategic direction, leveraging federal funds for critical upgrades and to electrify the service - Measure RR provides the stability and a path forward to move beyond Covid-19 and maximize the benefit of investments into Caltrain for our Peninsula communities.

⁶ At larger vehicle volumes, these estimates may have a greater variance, so the second methodology for freeway lane equivalence is detailed below.

⁷ Caltrain 2040 Service Vision Fact Sheet

https://caltrain2040.org/wp-content/uploads/Caltrain_ServiceVisionFactSheet_V12-1.pdf