



CALTRAIN BUSINESS PLAN

SUMMARY REPORT

May 2020
Foreword & Afterword updated in 2022



ACKNOWLEDGMENTS

From funders, staff, and consultants to Board members, elected officials, advocates, and members of the public, the Business Plan involved the work and participation of hundreds of individuals and dozens of organizations. Caltrain is grateful to all who contributed their time and effort to this work.

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Caltrain Bicycle Advisory Committee
Caltrain City/County Staff Coordinating Group
Caltrain Stakeholder Advisory Group

Caltrain is grateful for the time and effort of the 93 agencies and organizations that participated in the Caltrain Business Plan Stakeholder Advisory Group.

PROJECT FUNDERS

City and County of San Francisco
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San Mateo County Transportation Authority
Santa Clara Valley Transportation Authority
California State Transportation Agency
Stanford University
Prologis
Google
Genentech
Facebook

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Santa Clara Valley Transportation Authority
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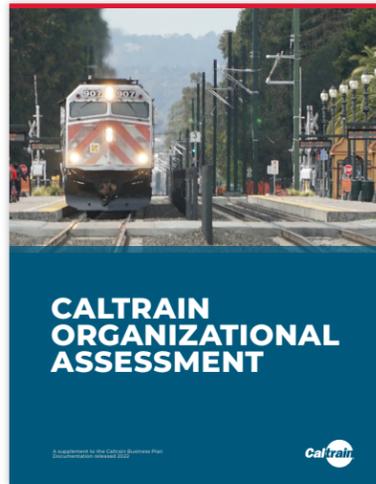
ADDITIONAL CONTRIBUTING FIRMS

Business Models Inc.
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LTK
Kimley-Horn

The following report documents Caltrain's Business Plan – an extensive and multifaceted planning effort the railroad undertook between 2017 and 2020 before the COVID-19 pandemic brought the process to an abrupt close. The report's chapters describe the Business Plan process and document the major analysis and findings that supported the Peninsula Corridor Joint Powers Board's adoption of the Plan's culminating policy outcome – Caltrain's first Long-Range Service Vision.

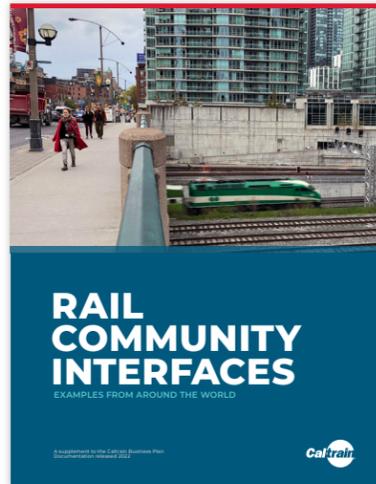
Caltrain began work on the Business Plan in 2017, shortly after construction had commenced on the railroad's long-awaited Peninsula Corridor Electrification Project. The planning process started with a unique convening of staff, Caltrain Board members, partner public agencies, representatives of corridor cities, advocates, and private sector institutions. Together, this group challenged each other to confront a range of big, difficult questions about the future of the railroad.

SUPPLEMENTS TO THIS SUMMARY REPORT



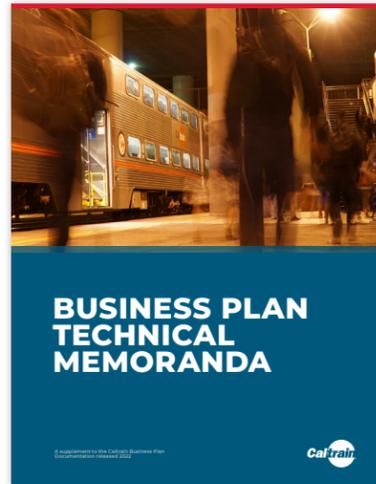
CALTRAIN ORGANIZATIONAL ASSESSMENT

The Organizational Assessment was initially provided to the JPB and public in the fall of 2019. It preceded a series of important organizational decisions and governance discussions that have been an ongoing focus for the railroad over the past two years, resulting in adoption of a new Memorandum of Understanding between the JPB's three member agencies in summer 2022.



RAIL COMMUNITY INTERFACES

The Rail Community Interfaces include two documents: Definitions and Examples from Around the World. This volume of work focused on documenting and exploring the unique relationship (or "interface") between the JPB-owned rail corridor and its surrounding communities.



BUSINESS PLAN TECHNICAL MEMORANDA

A separate volume of technical memoranda provides further documentation of the various streams of analysis developed during the planning process.

WHAT WAS THE BUSINESS PLAN?



SERVICE

What is the best service Caltrain can provide to meet the needs of our customers and the communities we serve? How many trains should we run? How do we best match service to riders' needs? What infrastructure improvements will be needed to provide the service? How can Caltrain effectively connect to other transit services?



BUSINESS CASE

Why should we choose one service vision over another? How can we maximize the value of current and future investments in the Caltrain corridor? How much will the service cost to operate? How will we fund it and what new sources are needed?



COMMUNITY INTERFACE

What are the benefits and impacts of increasing service on the corridor to each community? How can we work together to grow the railroad in a way that balances the needs of all communities along the corridor with the goal to expand service and operate a safe and efficient railroad? How can we ensure the planning process and its outcomes are equitable?



ORGANIZATION

What is the best organizational structure for overseeing and growing Caltrain service in the future?

THE BUSINESS PLANNING PROCESS

Building on a unique partnership with Stanford University, a multidisciplinary team of staff, consultants, and corridor stakeholders spent the next two years answering the questions on the previous page through an integrated and highly public planning process. The Business Plan culminated in the fall of 2019 with the adoption of **Caltrain's Long-Range Service Vision (Service Vision)**, a foundational policy document that provides a service-focused blueprint for how Caltrain can grow to meet the needs of its customers and the larger public while also integrating with the larger regional and state transit network.

The adoption of the Service Vision represented a significant achievement for the railroad by establishing a bold, new, enduring vision for Caltrain's future. The policy language adopted by the Board in 2019 was deliberately

written in a manner that balances key touch points of specificity with a degree of future flexibility. It has and will continue to serve Caltrain by providing a foundational vision for the railroad's future, and it remains the blueprint for Caltrain's future growth, even as the agency addresses nearer-term challenges and opportunities that could affect when the Service Vision is realized. Through the Business Plan process, the adoption of the Service Vision has provided the agency with an enduring policy document that guides how Caltrain can grow and deeply informs a range of future decisions across the railroad.

Like many so many things in 2020, the Business Plan did not end as initially envisioned. Following the 2019 adoption of the Service Vision and the public release of a comprehensive Organizational Assessment, staff worked in earnest from fall 2019

through winter 2020 towards plans to conclude the Business Plan process. Building on the adopted Service Vision, it was envisioned to include a detailed implementation approach and the development of a series of financial strategies to support the railroad's growth towards achieving the Long-Range Service Vision. The rapid spread of COVID-19 in March of 2020 and ensuing lockdowns brought about an immediate, existential crisis for Caltrain as ridership and revenues plunged. Work on the Business Plan ceased, and resources, staff, and stakeholder attention quickly pivoted to COVID-19 response planning and adoption of **Caltrain's Equity, Connectivity, Recovery, and Growth Policy Framework**. The Business Plan – at least the planning process that had been envisioned and initiated in 2017 – effectively came to an end by summer of 2020.

HOW TO USE THIS REPORT

Writing in 2022, with the benefit of nearly two years since the pandemic started and major work on the Business Plan stopped, it is worth briefly reflecting on what the Business Plan process meant for the railroad and how it can continue to be of use going forward.

Documentation of the Business Plan went unfinished during the pandemic as staff resources were reassigned, but the policies, analysis, tools, and ideas developed in the Plan have moved forward in significant ways over the course of the last two years. This record of change is the ultimate measure of the Plan's impact and meaning to Caltrain. The "afterward" to this summary report briefly highlights some of the many decisions and initiatives that have occurred or are currently underway as a result of the Business Plan. Beyond the larger impact of the Plan, however, there are

several areas where this report and other documentation of the process may specifically be useful.

First, the report provides important background and context on the analysis used to develop Caltrain's Long-Range Service Vision (the text of which can be found on page 75). The Service Vision itself is not a long document, but it was rooted in a tremendous amount of underlying technical analysis. This report explains that analysis in detail and provides key facts and insights that will be of use as Caltrain continues to deploy the Service Vision in support of individual projects and plans and as any updates to the Vision are considered in the future.

More broadly, the report may be a helpful document for those seeking to understand and think about Caltrain as a complete "system." At its core, the Business Plan process was an attempt to develop an integrated, system-level strategy for Caltrain: one that considered not just the physical, operational, and financial elements of the railroad, but also their interdependence with surrounding economic, social, and political systems. This summary report and its various supporting documents attempt to show these connections, all of which play a critical role in shaping the future of Caltrain.

Finally, this report may be useful as an example of a planning process that was specifically designed to address a complex and ambiguous set of issues. The questions the Business Plan sought to answer did not have neat disciplinary boundaries, and in

many cases, they involved multiple communities, outside agencies, and layers of decision-making authorities. The Plan was funded by multiple public and private sector entities, staffed by a wide range of consultants, and overseen by a project committee of staff from ten different public agencies as well as a representative from Stanford University. The analysis in the Plan was conducted and negotiated in real-time, with a regular monthly cadence of substantive updates delivered through hundreds of stakeholder meetings. Working at this scale and pace was both costly and time intensive, but was also essential to build the foundational understanding and buy-in that has allowed for such an acceleration of change at Caltrain over the last two years. The Plan was able to gain momentum, drive decisions, and influence outcomes because the process was flexible and adaptive, embraced complexity, and invited many different voices and perspectives into the tent. The value of the Business Plan was ultimately realized through the process – not as a document.

As a closing note, the reader should be aware that this report and supporting analyses are fixed in a specific moment in time. Outside of this foreword and the aforementioned afterward, the data, conclusions, and statements contained herein reflect work completed between 2018 – 2020 and are consistent with information that was presented publicly during that period. Facts, figures, and statements have not been updated to reflect the events of the last two years and should be understood and used accordingly.



CALTRAIN BUSINESS PLAN

SUMMARY REPORT

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01

THE CASE FOR TRANSFORMATIVE INVESTMENT IN CALTRAIN

**GROWING CALTRAIN INTO A WORLD-
CLASS METROPOLITAN RAILWAY**

CALTRAIN IS A VITAL LINK IN A GROWING REGIONAL AND MEGAREGIONAL RAIL NETWORK



CALTRAIN



BART



ACE

Altamont Corridor Express



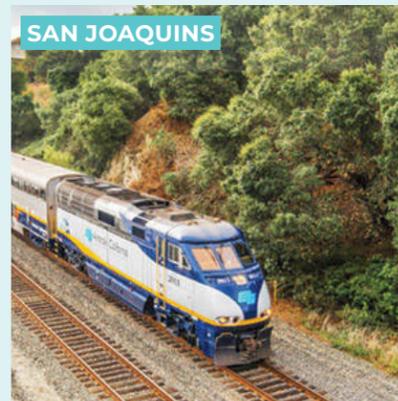
SMART

Sonoma-Marín Area Rail Transit



CAPITOL CORRIDOR

Capitol Corridor



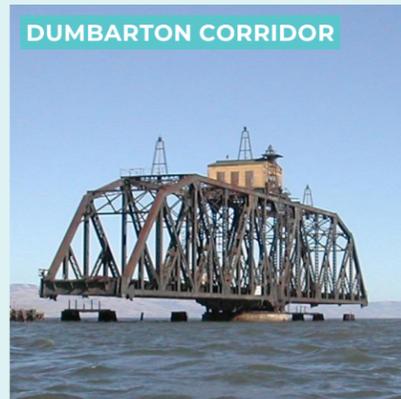
SAN JOAQUINS

Amtrak San Joaquins



HIGH SPEED RAIL

California High Speed Rail Authority

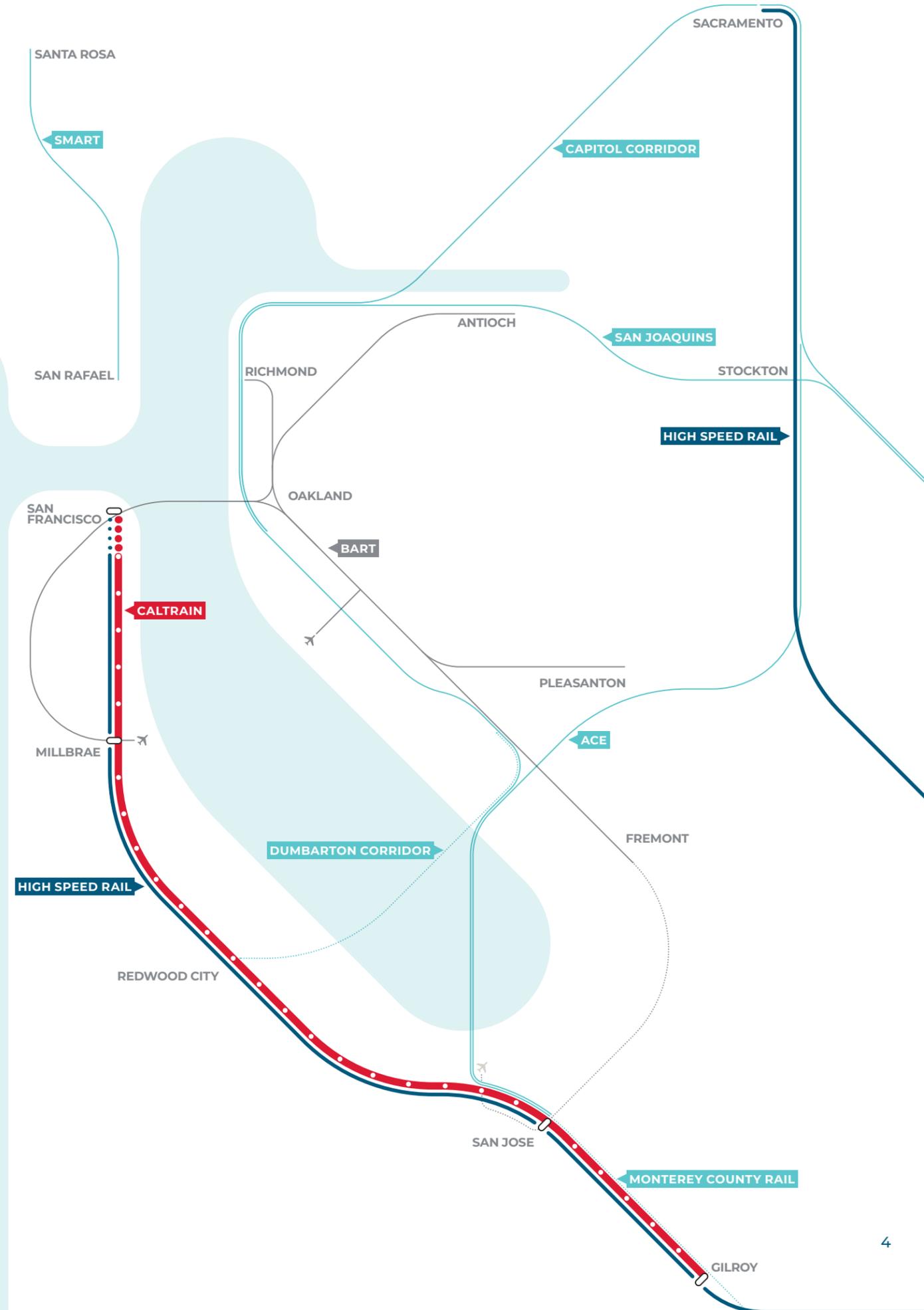


DUMBARTON CORRIDOR

Wikipedia user Urdangaray



MONTEREY COUNTY RAIL



WHY CALTRAIN NEEDS A LONG-RANGE VISION



This is a pivotal moment for Caltrain. Passenger trains have traversed its corridor for over 150 years, running between San Francisco, San José, and Gilroy. During this time, the places and people Caltrain serves have changed tremendously. Where once the trains connected a series of rural communities and small towns, they now course through a continuous and booming urban region.

San Mateo County, for example, has grown from 20,000 people in 1900 to over 700,000 people in 2010, and is projected to grow to nearly a million residents in the coming decades. This course of rapid growth and change is occurring throughout the corridor, in core districts such as downtown San Francisco and downtown San José, as well as across smaller and mid-size cities such as Brisbane, Belmont, Mountain View, and Sunnyvale. After two decades of rapidly increasing ridership, Caltrain finds itself underpinning the regional economy while directly supporting and influencing the daily lives of hundreds of thousands of people.

The Bay Area is an enterprising and influential region, home to institutions and corporations whose global reach continues to shape the modern era. **Despite its economic and cultural prominence, the region faces significant challenges**, notably a chronic housing shortage and a transportation network straining under geographic challenges and the weight of the region's demands. Most Bay Area residents are struggling with high housing costs and many also suffer commutes that are getting longer, less predictable, and more crowded. The region is also subject to impacts of the growing global climate crisis, with rising sea levels, increased incidence and severity of wildfires and flooding directly impacting millions through enforced electricity shutoffs, hazardous air quality, and property damage. These challenges frame the long-range context within which the

Caltrain organization must plan and make decisions.

The challenges of urban growth are not unique to the Bay Area, nor is the notion that railroads are a critical tool to help enable and manage urban change. **Railroads are an old technology, dating to the 1800s, but rail continues to garner increasing investment around the world to make improvements to efficiency, passenger experience, and integration with other networks.** The passenger rail industry is very robust, with trillions of dollars in assets and ongoing investment driving continual innovation and efficiency.

In the Bay Area, a cohesive vision for the future of rail is still forming. Many individual projects and plans are underway. These include the Downtown Extension to the Salesforce Transit Center in San Francisco, which will one day be the northern terminal for Caltrain and High-Speed Rail service; redevelopment of Diridon Station in San José; the statewide High-Speed Rail system, which would connect with Caltrain and the Bay Area; potential increased Capital Corridor and Altamont Corridor Express (ACE) service between the South Bay, Sacramento, and northern San Joaquin regions; a possible rail connection across the Dumbarton Bridge corridor; and a new rail crossing between Oakland and San Francisco as envisioned in Link21. Planning efforts are ongoing at the local, regional, and state levels to integrate these projects into a unified system.

A BUSINESS PLAN FOCUSED ON SERVING CUSTOMERS



Caltrain's future is arriving quickly. In the decade prior to the start of the Caltrain Business Plan process, the agency made a series of transformative decisions that have determined the trajectory of the railroad, such as the introduction of Baby Bullet express service, advancing electrification of the corridor, and the decision to partner with California High-Speed Rail to create a blended system.

Once its electrification is complete, Caltrain will be at the forefront of modern rail in California. This impending transformation has prompted Caltrain to think hard about its future as a rail service provider, a corridor manager, and an organization. The Business Plan process has provided a venue for Caltrain to consider how the railroad should grow, how it delivers public value through its projects and services, and how its future relates the plans and ambitions of its partner agencies and surrounding communities. Ultimately transportation is a means to an end and the measure of Caltrain's success is how many people use the service and the degree to which it supports livability in the corridor and the region.

The Caltrain Business Plan centers on a core question: how should the railroad grow? Answering this question requires understanding how many people want to ride the train; how many trains might serve the corridor; what their frequencies and stopping patterns could be; the types of infrastructure that would be required to support different levels of service; the cost

of providing that infrastructure and service; and, the outcomes for adjacent communities, ridership, mobility, the economy, and Caltrain's finances. The Long Range Service Vision developed through the Business Plan addresses these issues and provides a complete picture of what Caltrain will one day become.

The Caltrain Business Plan is rooted in thorough analysis which integrates existing policy commitments in the corridor as well as ongoing regional projects and plans. The Long Range Service Vision that has been developed through the Business Plan is not a project; it is an aspirational end-state for the corridor that helps the railroad understand and plan for its future as incremental decisions, plans, and projects take shape over the coming decades. While the Vision has enough detail to guide and inform decision-making for many years; it is also designed to be sufficiently flexible to enable Caltrain to adapt and respond as plans or projects change, become delayed, or accelerate.

CONTEXT: WHAT'S HAPPENING IN THE CORRIDOR, REGION, AND STATE

Several trends and forces are shaping the Bay Area's cities, economy, and policies in ways that are intensifying the long-term demand for travel, particularly by transit, in the Caltrain corridor.

GROWTH THROUGHOUT THE CALTRAIN CORRIDOR



To accommodate economic growth, MTC's Plan Bay Area forecasts that commercial and residential space will grow by 130% within two miles of the corridor in the next 20 years, with higher concentrations of growth expected within a half-mile of stations. Recent household and employment growth patterns demonstrate the premium of locations near Caltrain, especially to major employers who wish to provide non-driving commute options to their employees.

According to the US Census American Community Survey, as of 2016, 18% of households in all three Caltrain counties are located within a half-mile of a Caltrain station and 32% of new household growth between 2000

and 2016 occurred within a half-mile of a Caltrain station. New building in the Caltrain corridor, both near and removed from train stations, is generally taking place in the form of densification of existing development, rather than greenfield development. Formerly single-use or low-density office spaces are being redeveloped into high-density or mixed-use developments, which come with vastly different infrastructure needs to support people getting to and from those places.

NEW CONNECTIONS TO TRANSIT

Increased connectivity is expanding the reach of Caltrain and attracting riders from further afield. Future



connections include the Downtown Extension, which will connect Caltrain to the Salesforce Transit Center in San Francisco (a major local, regional, and long-distance intermodal station close to BART's Embarcadero Station); new transit lines, such as the Muni Central Subway, which will connect to the San Francisco 4th and King Caltrain station; the BART connection to San José/Caltrain (projected to open around 2030); a potential Dumbarton Corridor connection at Redwood City; increased levels of ACE and Capitol Corridor service (connecting at Diridon Station); and the proliferation of connector shuttles. The availability of on-demand rides (e.g., Uber and Lyft) and shared mobility such as scooters and bikeshare is also growing, giving people more options to access Caltrain.



HIGH HOUSING COSTS

Sustained growth within three economic sectors: professional & business services, education & health services, and leisure & hospitality, has fueled significant job growth throughout the San Francisco Bay Area, and much of that growth is occurring along the Caltrain corridor. This surge in employment has far outpaced housing development, particularly within San Francisco, San Mateo, and Santa Clara counties, and exacerbated the housing shortage along the Peninsula. As a result, housing costs have increased by an average of 70% in the Bay Area in a 7-year period. High housing costs are also changing the demographics of

who lives in the corridor, who travels to the corridor, and when they travel – for instance, many corridor households are becoming wealthier and own more cars than in the past.

LENGTHY COMMUTES

More and more people who are employed in the Caltrain service area are starting their trips at the edges or outside of the nine-county Bay Area, where they must use constrained highway, arterial, and rail corridors to connect to jobs. The increase in housing costs has pushed many people to live further away from their places of employment, education or other destinations and communities,



which in turn has resulted in longer trips. Many of these residences are in auto-oriented neighborhoods. Increased travel distances and times impact individuals negatively: heavy traffic volumes and congestion on freeways require people to leave their homes earlier in the morning to beat the rush or spend more time in traffic to get to and from work, which cuts down on personal time and time with friends and family. The Caltrain corridor is particularly crowded: The Metropolitan Transportation Commission (MTC) named sections of US-101 as the worst and third-worst congested segments in the region in 2018. While the commute period experiences the worst freeway delays, these conditions have increasingly expanded to off-peak hours and weekends.

CONSTRAINED AUTO INFRASTRUCTURE

Excessive traffic delays are the result of a freeway system that is overwhelmed by a level of demand that far exceeds its free-flow capacity. However, building additional freeway and road capacity by widening roads is not a practical or desirable solution due to environmental, community, and quality-of-life impacts. Although some roadway capacity improvements can be realized through better management of existing roadway facilities (e.g., "High-Occupancy Toll," or "HOT," lanes, ramp metering, and other operational improvements), these capacity gains are limited by policies that retain most freeway capacity for single occupant vehicles. Furthermore, the benefits for existing drivers are diminished by the new demand spurred by the increase in capacity.



POLICIES FOCUSING GROWTH NEAR TRANSIT

In response to environmental and equity concerns, state, regional, and local policymakers have enacted policies and programs to direct growth toward areas that provide high-capacity transit, such as near Caltrain stations. These programs also focus on improving or expanding transit service in areas with strong transit markets.

Major mandates and initiatives at the state level include the California State Rail Plan (2018), which envisions one integrated and coordinated statewide rail system. The State Rail Plan specifically identifies the

electrification of Caltrain and the Silicon Valley segment of High-Speed Rail as implementation highlights. California Assembly Bill (AB) 32 - California Global Warming Solutions Act (2006) requires California to

reduce its GHG emissions to 1990 levels by 2020, a reduction of approximately 15% below emissions expected under a business-as-usual scenario. The state met the 2020 AB 32 target in 2016 and subsequently passed SB 32, which set a 2030 target of 40% below 1990 emissions levels. AB 32 also requires California to reduce its GHG emissions to 80% below 1990 emissions levels by 2050. There continues to be discussion

about further state level legislation to encourage densification of uses around transit. At the regional level, Plan Bay Area implements AB 32 by using the regional transportation planning process to reduce vehicle miles traveled (VMT) and encourage more compact, complete, and efficient communities. Plan Bay Area 2050, due for adoption in 2021, will produce

an updated blueprint for the region. Nearly every city along the corridor has developed local plans to focus new housing and jobs near Caltrain stations, by investing in public facilities and amenities or changing zoning. Recent examples include the South San Francisco Downtown Station Area Specific Plan, Belmont Village Specific Plan, and Lawrence Station Area Plan in Sunnyvale.

MAJOR CALTRAIN TRANSIT CONNECTIONS





1863 – 1950s

EARLY DEVELOPMENT OF PASSENGER RAIL

The Railroad between San Francisco and San José was completed by an independent operator providing passenger and freight service. This operator was folded into Southern Pacific in 1870. Plans to eliminate all at-grade crossings were announced in 1909 but not completed. Electrification was studied in 1921 but was deemed impractical at the time due to post-war inflation, taxation, and competition from publicly-funded highways. The railroad achieved 50% mode share for commuters traveling through Brisbane in 1954, though this declined in the following decades as Peninsula roads were improved.



1950s – 1970s

EVOLUTION TO STATE-OPERATED PUBLIC TRANSPORTATION

The railroad lost half of its ridership between 1954 and 1977. Between ridership losses and the erosion of fare value due to high inflation in the 1970s, the line became unprofitable, and Southern Pacific petitioned the State to discontinue the service in 1977. The State chose to assume financial responsibility starting in 1980 and began to subsidize passenger service, with operations contracted out to Southern Pacific. In 1985, Caltrans purchased new locomotives and rolling stock, upgraded stations, and introduced shuttles to employment centers. The line was renamed "CalTrain". The State takeover of the railroad in the 1980s ushered in the beginning of the service we now call Caltrain.



1980s

FORMATION OF TODAY'S CALTRAIN

The early period of Caltrain introduced some important governance structures still in operation today. The State decided that regional control was a more appropriate governance structure for Caltrain due to its regional focus. Three county agencies; Santa Clara VTA, City and County of San Francisco, and SamTrans; together control the Joint Powers Authority that established the Peninsula Corridor Joint Powers Board in 1987 to manage the corridor. In 1991, the Joint Powers Board purchased the right-of-way in the corridor between San Francisco and San José Tamien Station from Southern Pacific. The Joint Powers Board agreed to assume operating responsibilities for Caltrain starting in 1992, and to shoulder 100% of the operating subsidy a year later. The Joint Powers Authority designated SamTrans as the managing agency for the railroad, a position that manages all functions of the railroad and selects its CEO. This governance structure gives the Joint Powers Board complete discretion in controlling the service delivery model.



1990s

DOT-COM BOOM RESHAPES CALTRAIN MARKETS

The 1990s saw the Bay Area, and particularly the area served by Caltrain, emerge as a center of economic dynamism, and Caltrain's financial position stabilized. Employment notably surged in Silicon Valley, creating a level of "bi-directional" passenger flows unique among railroads traditionally thought of as providing peak-direction "commuter" service. Caltrain ridership grew substantially over this period, helped by a doubling of weekday trains from 40 to 80. Increased ridership improved financial stability, allowing Caltrain to operate with lower rider subsidies than most equivalent services.

150 YEARS OF PASSENGER RAIL

Passenger rail has operated on the Caltrain corridor for over 150 years, primarily in private ownership. The railroad was built before there was much development between San Francisco and San José. Many towns on the Peninsula were incorporated around the start of the service and the railroad facilitated their development by connecting them to the larger cities. As the population of the Peninsula boomed in the first half of the 20th century, the railroad provided a critical connection between communities.



2000s – Today

MODERNIZING CALTRAIN

Caltrain in the 21st century has focused on continuing to improve service to meet the changing needs of the corridor. Key developments this century include:

BABY BULLET SERVICE Caltrain completed the Caltrain Express project starting in 2002, leading to the introduction of the Baby Bullet express service in 2004, which significantly shortened travel times between the most popular stations. Ridership increased dramatically after its introduction, with a 12% gain the following year and more than doubled ridership 10 years later.



ELECTRIFICATION Over 70 years after the 1921 decision to forego electrifying the corridor, Caltrans conducted a feasibility study for electrification in 1992. The project continued to be part of Caltrain's long range plans for another 20 years but did not substantially advance until the California High-Speed Rail Authority agreed in 2013 to partially fund the project to facilitate their future use of the corridor. The electrification project is now in construction and is anticipated to be completed in 2024.

HIGH-SPEED RAIL The latest schedule updates for High-Speed Rail estimate a completion date of 2033, though there has been some political uncertainty around the project. If and when High-Speed Rail service reaches the Bay Area, both Caltrain trains and High-Speed Rail trains would run on the same tracks along the Caltrain corridor (i.e., the "blended service" concept).

CONTEXT: WHAT'S HAPPENING GLOBALLY

Caltrain exists within a global context, which informs and shapes both the goals and plans of the railroad as well as the approaches and technologies used to achieve them.

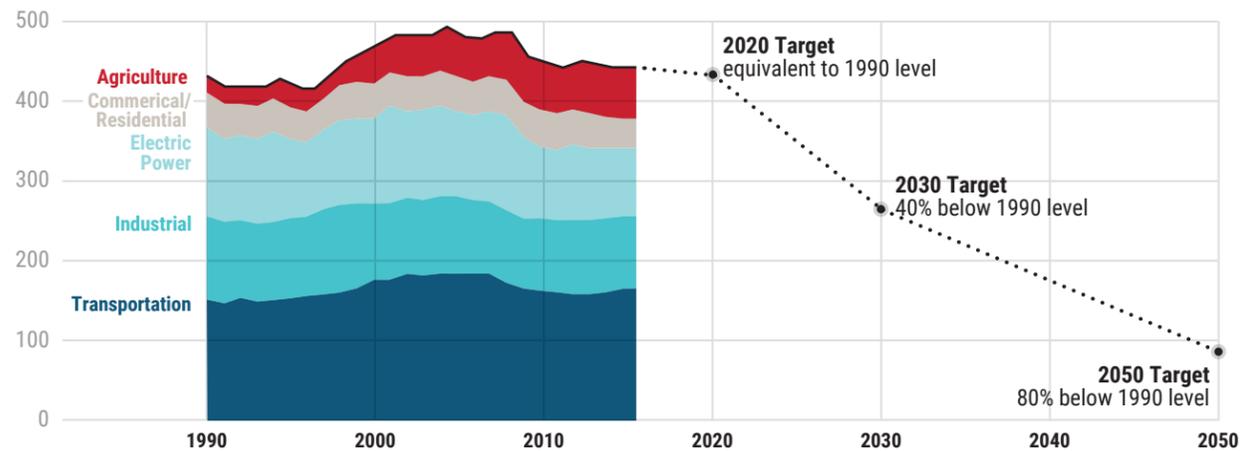


CLIMATE CHANGE

Climate change is a critical, growing global issue. The California Air Resources Board states that about 40% of greenhouse gas emissions in the state are due to transportation, primarily from automobile travel. While emissions from most other sectors, such as power generation, are decreasing, emissions from transportation continue to increase in the State. Rail systems are responding to climate change by electrifying systems, retrofitting stations, managing first- and last-mile trips to and from stations to be as low carbon-intensive as possible, and improving service to elicit mode shift from more carbon-intensive modes.

TRANSPORTATION IS A PRIMARY CONTRIBUTOR TO GREENHOUSE EMISSIONS GLOBALLY AND IN CALIFORNIA

California greenhouse gas emissions by sector (1990-2015) and targets through 2050
million tons carbon dioxide (CO₂) equivalent



US Energy Information Administration, Based on California Air Resources Board Data

TECHNOLOGICAL SHIFTS

Technological shifts in the form of expanded and enhanced internet access, smartphone proliferation, and related applications have freed many employees from typical work schedules, thus spreading travel more evenly throughout the day. The widespread use of smartphones and GPS has also provided cities and transit operators access to much more data about how their services are performing and utilized by customers. Using this data, agencies are better able to optimize service, monitor assets more efficiently, and improve maintenance practices. It has also unleashed a variety of new ways to travel around urban areas: automobile-based services like Uber and Lyft, microtransit like AC Transit's Flex, shared car services like Getaround, or micromobility services like bike sharing or e-scooters.

Rail technologies are also evolving. Modern train signaling and communication systems allow trains to safely and seamlessly operate closer

together and with higher frequencies by improving precision of train location and stop detection. Electrification allows for faster acceleration and quicker service, as well as emission

reduction. There has also been incremental advancement in vehicle technologies and design that allow for a more comfortable ride, more efficient use of space, and enhanced control.



URBANIZATION

The global urbanization trend is expected to speed up over the coming decades. According to the United Nations and Statista; over two-thirds of the world's population and 90% of the US population is expected to live in cities by 2050. Over the past 30 years, some cities and city centers like San Francisco, Seattle, and New York City have not only stemmed population losses, but also set new population records. With increasing congestion and competition for parking, these urban cores have reduced automobile use and increased transit use. However, government investment in the types of transit infrastructure required to efficiently transport people in dense areas has not kept up with demand.

MARKET FORCES IN THE PASSENGER RAIL INDUSTRY

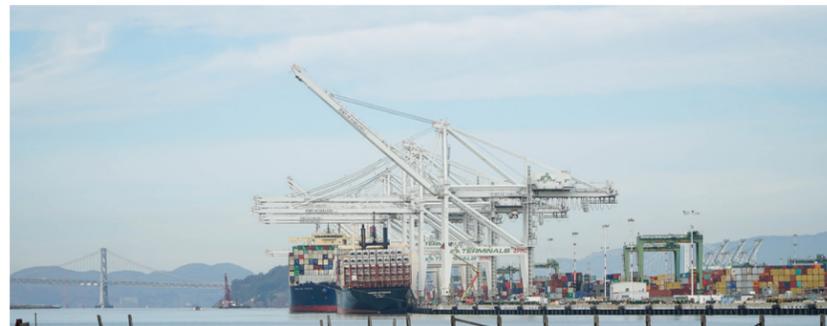
The past several decades have seen the renewed insertion of market forces in the rail industry through privatization, new ventures, and public-private partnerships. This has led to proliferation of best practices and technologies as major rail firms seek profit globally and existing rail operators share or import expertise. Some of this market-based influence has been a result of the restructuring of national rail operators into semi-private, quasi-governmental companies such as Deutsche Bahn in Germany, JR Central in Japan, and SNCF in France. In other countries, such as the United Kingdom, national rail operators have been fully privatized in recent decades. The re-commercialization of the passenger rail industry has resulted in new private rail ventures in the United States, such as Virgin Trains USA in Florida (formerly Brightline) and Texas Central Railway (in partnership with JR Central).



GOVERNMENT INVESTMENTS

Governments around the world continue major investment in modern rail technology for climate benefits, economic competitiveness, and for improved urban transportation. China has famously built over 18,000 miles of High-Speed Rail since 2008, and other countries, including developed-world peers like France, Spain, and Japan, have also been rapidly expanding their rail networks. Major subway expansions have recently occurred in many western cities like Paris and London, as well as across the developing world. Many of these projects include driverless rail technology.

In the United States, government investment in rail transit over the past decade has mostly supported local and regional rail, funded primarily by local and state governments with assistance from federal grants. Overall, United States government spending on transit has been flat (adjusted for inflation and population growth) for 20 years and is substantially lower than during the rail-building boom of the late 1970s and early 1980s.



GLOBALIZATION OF IDEAS AND EXPERTISE

The world has become increasingly integrated and interconnected in terms of supply chains and the flow of people and information. Cheaper and higher-quality communication and transportation technologies have allowed for instantaneous connections and easier collaborations between people across the globe. Notably, the globalization of rail companies (and their local imitators) has resulted in much wider and quicker spread of technological and business process innovations.

AUTOMATED VEHICLES

Automated vehicles (sometimes referred to as "self-driving cars") are being developed by several major companies and represent a potentially huge change to urban transportation systems. Nevertheless, commercial application of fully-automated vehicles (as opposed to driver-assist technologies) remains far off, and widespread adoption of automated vehicles is likely many decades away, according to most industry analysts. Research into this area has generally indicated that congestion and driving is likely to increase, not decrease, with automated vehicles, as has been the case with all previous improvements to the convenience of driving. This makes high-quality transit as important as ever in facilitating travel options and supporting growth in urban regions.



INNOVATION IN SERVICE DELIVERY

Public rail operators have increasingly adopted more of a business orientation, with a renewed focus on meeting customer needs through innovation in service delivery. Some of these innovations have come in the form of external public-private

partnerships to address, for instance, getting to and from rail stations. Agencies have begun providing real-time arrival information and app-based payment systems to help provide a seamless journey and easier integration with other modes.

Rail operators have also been innovating in their physical offerings, such as overhauling key stations to better accommodate riders and dramatically altering service patterns to better serve demand.



1.1 WHY THE CALTRAIN BUSINESS PLAN

The Business Plan explores the value of investing in expanded service to make life easier for people in the corridor.

Given how Caltrain, the corridor, the Bay Area, and the global rail industry are changing, Caltrain has a responsibility and opportunity to fully harness its potential to solve local and regional problems. Other public agencies have an equally important role as supportive partners in this effort. The Caltrain Business Plan is a joint effort with agency partners and communities along the corridor to plan for growth. The Business Plan knits together the many pre-existing plans, projects and aspirations in the corridor into a vision for change.

The way in which the Caltrain organization and its stakeholders implement this plan will shape the corridor, the region, and the state. More importantly, implementation will allow the people who use Caltrain's services to live their lives in a more convenient and more sustainable manner for decades to come.

1.2 PURPOSE AND ORGANIZATION

The Business Plan provides a complete overview of Caltrain's 2040 Service Vision.

This Business Plan details the service vision and its implications for Caltrain riders, the surrounding community, and the greater region. Leading up to the description of the Service Vision, Chapters 2 and 3 provide an overview of the process the Business Plan team undertook to ultimately develop, evaluate, and recommend a Service Vision, as well as provide context on the current and future riders that Caltrain serves. Following the details of the Service Vision in Chapter 4 and its implications in Chapter 5, the

remaining chapters describe what the Service Vision will cost to build, buy, and operate, how Caltrain will pay for it, and what organizational change will need to be made for Caltrain to fulfill its goals.

ASKING BIG QUESTIONS

In developing the plan, Caltrain asked the following critical questions:



What is the best service Caltrain can provide to meet the needs of customers and corridor communities?



Why should we choose one Service Vision over another?



How much will the service cost to build and operate? How will we fund it?



What is the financial business case for making a transformative investment in Caltrain over the next 20 years?



What are the benefits and impacts of increasing service in the corridor to adjacent communities?



What is the best organizational structure for overseeing and growing Caltrain service in the future?





02

PROCESS & METHODOLOGY

2.1 THE APPROACH

The Business Plan project was a significant undertaking for Caltrain. It required a unique approach to transit planning from what had previously been done by Caltrain and other agencies along the corridor. The project was also a departure from conventional infrastructure or agency planning processes throughout the United States. The two distinct attributes of the Caltrain Business Plan are detailed service alternatives and a robust business case evaluation, which were closely integrated to ensure a responsive evaluation of options. In its totality, the Business Plan seeks to help policymakers decide on the best course of future growth and development for Caltrain.



2.1.1. PRE-WORK & PARTNERSHIP WITH STANFORD

The scope of this Business Plan is more comprehensive than any previous Caltrain planning effort and was developed over the course of 2017 and 2018 to be highly responsive to the needs of both the agency and its many different stakeholders. Significant initial work for the Business Plan commenced in 2017, with a major workshop and educational event that brought together local elected officials, staff from regional and state agencies, private sector representatives, advocates, and industry experts to discuss the future of Caltrain and to identify shared interests and concerns.

Caltrain and Stanford University forged a critical partnership early in the Business Plan process. Stanford generously agreed to lead private fundraising efforts to support the business plan and contributed contract capacity and expertise to bring in outside resources to support the planning process. The partnership with Stanford has been instrumental to the Business Plan development.

2.2 PROCESS OVERVIEW

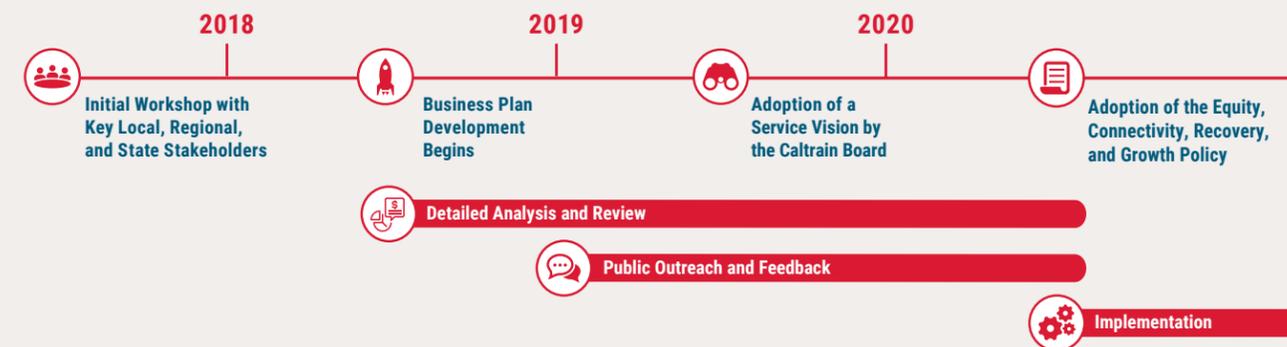
The Business Plan process began in 2017 with initial stakeholder workshops during the pre-work phase. The process culminated with the Caltrain Board adoption of the Long Range Service Vision in 2019 and the Equity, Connectivity, Recovery, and Growth Policy in 2020.

The Business Plan process included four major elements: Service Planning, a Business Case Evaluation, Community Engagement, and an Organizational Assessment. The project began with an extensive **service planning analysis** that included the development of multiple service concepts and a comparison and evaluation of their outcomes. The service planning effort was followed by a **business case evaluation**

of three Year 2040 service growth scenarios: Baseline, Moderate Growth, and High Growth. The evaluation of growth scenarios involved a complex set of technical tasks including ridership forecasting, cost modeling, property value projections, and a cost benefit analysis. As explained in Chapter 4, the Moderate Growth scenario was ultimately selected as Caltrain's 2040 Service Vision. **Community engagement** and

the organizational assessment occurred in parallel to the technical analyses. Community engagement included extensive outreach with cities, employers, and community members along the corridor. The **organizational assessment** looked at Caltrain's current service delivery, internal organization, and governance structure and determined organizational approaches to support future service.

CALTRAIN BUSINESS PLAN PROJECT TIMELINE



BUSINESS PLAN PROCESS OVERVIEW

The Business Plan process is illustrated in the figure below, showing all steps from project initiation to the business case evaluation of the growth scenarios, the final technical step before the selection of a Service Vision.



SERVICE PLANNING ANALYSIS

Development of multiple service concepts and a comparison and evaluation of their outcomes.



BUSINESS CASE EVALUATION

A decision-making framework to objectively assess whether an investment provides long term value to the public. The Caltrain Business Case Evaluation considered the following areas:

Service Does the investment improve service and reliability?

Financial Is the investment within current and future funding constraints?

Economic Are the benefits of the investments worth the cost?

Regional Does the investment benefit the broader region?



2020 SERVICE VISION

A roadmap for how the railroad can grow to meet the needs of the region in the future, with a clearly articulated goal for the quantity and type of service that Caltrain aspires to provide.



COMMUNITY ENGAGEMENT

Extensive outreach with cities, employers, and community members along the corridor.



ORGANIZATIONAL ASSESSMENT

Examining Caltrain's current service delivery, internal organization, and governance structure and determined organizational approaches to support future service.



CALTRAIN BUSINESS PLAN

The 2040 Service Vision is a roadmap for how the railroad can grow to meet the needs of the region in the future, with a clearly articulated goal for the quantity and type of service that Caltrain aspires to provide.

Once the Service Vision was adopted, the project team used this framework to work backwards from 2040 to develop a near-term plan for phasing and implementation. The near-term analysis included additional service plan development for growth through the 2020s, financial projections and a 10-year funding plan, and identification of key planning, policy and organizational next steps.

The Caltrain team also rounded out the adopted Service Vision with some additional technical analysis of station access improvements, equity considerations, and a review of funding and revenue options to support the vision. This work culminated in the adoption of the Equity, Connectivity, Recovery and Growth Policy in fall of 2020, at the height of the COVID-19 Pandemic.



CALTRAIN BUSINESS PLAN CONSULTANT TEAM ORGANIZATION

The project team, depicted in the organizational chart shown below, was led by Sebastian Petty, Caltrain Director of Policy Development. The nine-firm consultant team was funded through Caltrain's planning on-call contracts and a unique opportunity to partner with Stanford University.



SEBASTIAN PETTY
PROJECT MANAGER
Caltrain

CASEY FROMSON, MELISSA JONES, & MELISSA REGGIARDO
DEPUTY PROJECT MANAGERS
Caltrain

●
Caltrain employee

○
Contracted directly
through Stanford
University

○
Contracted under
Fehr & Peers;
procured through
planning on-call

NATE CONABLE
PROJECT MANAGER
Fehr & Peers

AIDAN HUGHES
STRATEGIC ADVISOR
Arup

BUSINESS CASE
First Class
Partnerships

**ORGANIZATIONAL
ASSESSMENT &
PROJECT DIRECTION**
Permut LLC

**OPERATIONS
ANALYSIS**
DB Engineering
and Consulting

**EDUCATION &
OUTREACH**
Fehr & Peers

**COMMUNITY
OUTREACH**
EnviroIssues

**MEDIA & WEB
ENGAGEMENT**
Convey

**TRANSPORTATION
PLANNING**
Fehr & Peers

**JOINT DEVELOPMENT
& ECONOMICS**
Strategic Economics

**ECONOMIC IMPACT
ANALYSIS**
HDR

**FUNDING &
ENGINEERING**
Arup

2.3 TECHNICAL TASKS PROCESS

This section describes each major technical task and how they fit together within the overall Business Plan process. The tasks answer different facets of the following key questions:



How many people will ride Caltrain?



How many trains can the railroad operate?



How much would certain plans cost to build and operate?



What would the broader effects be on property values and the economy?

2.3.1. MARKET ANALYSIS AND RIDERSHIP FORECASTS

The market analysis first looked at who currently rides Caltrain and how that aligns with where people live and work in the corridor. That information was then used to estimate how the demand for Caltrain would change in the future, from 2018 through 2040.

Importantly, the estimates were modified based on how many trains per hour were assumed in each 2040 growth scenario and which stations they stopped at along the corridor.

MARKET ANALYSIS Who Currently Rides Caltrain?

This analysis looks at land use patterns, transportation networks, locations where people begin and end their trips, locations where people live and work, and other factors to determine who, when, where, and why people are using Caltrain. This analysis was performed using Caltrain data, Plan Bay Area 2040 estimates, and recently approved plans by cities and agencies.

RIDERSHIP FORECAST Who Will Ride Caltrain in the Future?

The Caltrain ridership model estimates how many people will ride Caltrain in the future given changes to regional transportation, land use, and Caltrain service patterns over time. Using

the San Mateo/Santa Clara County travel demand model as a base, the Caltrain ridership model considers factors that directly affect Caltrain ridership, including: socioeconomic characteristics, the number of trains that stop at each station, land use near each station, and how people access stations to predict future ridership. The ridership model also considers how California High-Speed Rail service will change the way people travel and constrains ridership forecasts to assume a comfortable level of crowding on-board each train appropriate for business planning.

Both the market analysis and ridership forecasts provided input to most other technical tasks: service planning, the integrated business model, estimating capital costs, economic analyses, and the business case evaluation of the growth scenarios.

¹ Plan Bay Area 2040 is the long-range planning and funding plan for the 9-County Bay Area adopted by the Metropolitan Transportation Commission in 2017. http://2040.planbayarea.org/sites/default/files/2017-07/Plan%20Bay%20Area%202040_Adopted_07.26.17.pdf (Accessed January 29, 2020)

² The San Mateo County City/County Association of Governments (C/CAG) and Valley Transportation Authority (VTA) Travel Demand Model is a trip-based regional travel model which takes into account regional land use patterns, highway congestion, as well as both Caltrain and connecting service. The model includes a 2013 base year and 2020, 2030, and 2040 horizon years.



TECHNICAL PROCESS OVERVIEW

The Business Plan process is illustrated in the figure below, showing all steps from market analysis to the business case evaluation of the growth scenarios, the final technical step before the selection of a Service Vision.



2.3.2. SERVICE PLANNING

Through the service planning process, the team looked at how many trains would stop at each station throughout the day.

The Business Plan service planning process developed and analyzed numerous service concepts for the year 2040. Service concept development was informed by two findings from the travel market analysis. First, with major population and employment hubs dispersed throughout the corridor and at either end, people will need to ride Caltrain in both directions at various times throughout the day, and will board the train at multiple locations along the corridor. This geographic distribution of trips suggests the need for a corridor-wide service structure that maximizes connectivity between various types of destinations. Second, demand would remain different at each station, as riders will continue to use Caltrain for various purposes and in different locations throughout the corridor. A "one size fits all" approach would not meet the travel needs along this corridor.

The service planning process involved an interagency stakeholder engagement process that gathered input from transit operators, cities, and members of the public. Service plans were developed by an interagency working group of Caltrain and California High-Speed Rail staff, with involvement by staff from the City/County of San Francisco, City of San José, Capitol Corridor, and Altamont Commuter Express (ACE). The goals,



concepts, evaluation, and illustrative service plans were also presented at various stakeholder meetings and the Caltrain Board of Directors.

The service planning analysis helped inform the integrated business model and the ridership model, and supported the service section of the Business Case evaluation of growth scenarios.

2.3.3. CAPITAL COST ESTIMATION

This task estimated the price of infrastructure improvements and new trains required to support the proposed service changes.

Capital costs for the Service Vision were estimated using a cost model developed specifically for this effort. The key outputs from the cost model were capital cost estimates for each of the three growth scenarios. There is a single cost associated with each

growth scenario and that cost is the best estimate of all the infrastructure and fleet investment needed in the corridor to support each scenario. This includes infrastructure under development by cities and Caltrain partners along the corridor. The investments include transportation projects serving a range of economic development, transportation, and community objectives beyond the core mission of Caltrain. The cost estimates in the model therefore go beyond what Caltrain as an agency is directly responsible for funding and delivering but, together, they illustrate the full amount of funding required to deliver the key investments associated with the Caltrain corridor from a broader stakeholder perspective.

Inputs to the capital cost estimates included ridership forecasts, assumptions for new infrastructure needed along the corridor, and fleet, storage and maintenance yard information. The capital cost estimates were used to develop the integrated business model and supported the financial section of the Business Case Evaluation.

2.3.4. BUSINESS MODELING

The team projected Caltrain's future economic and financial performance based on how much train service Caltrain provides, the way it provides the service, and the capital investments it makes to support the service. This helped determine the most cost-effective packaging and phasing of investments and service upgrades.

A Caltrain integrated business model (IBM) was developed to help Caltrain understand the relationship between different parts of the system in influencing cost and performance. These different parts include the railroad network, fleet, current and future operations costs and revenues, ridership demand, finances, policy assumptions, and infrastructure investments.



2.3.5. BENEFIT COST ANALYSIS

The team used a benefit-cost analysis (BCA) to estimate whether the benefits of implementing a growth scenario would exceed the costs of building and maintaining it.

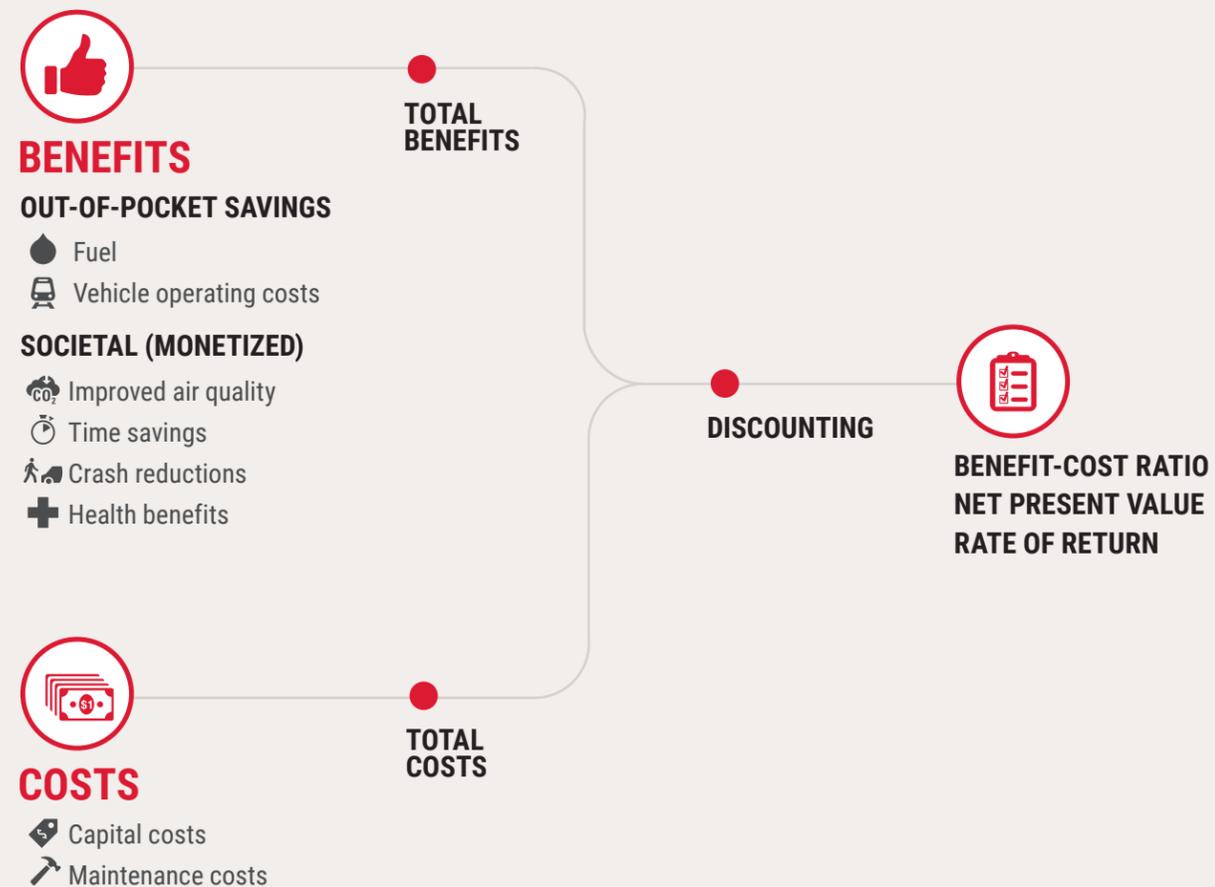
The benefits of the Business Plan were compared to the costs of implementing the Service Vision, resulting in a benefit-cost ratio. Benefits to people, such as time savings and health benefits, were calculated, monetized, and summed across the whole corridor over a timeframe from 2018 until 2070 – 30 years after the Service Vision is implemented. The costs were a sum of capital and maintenance costs

incurred by Caltrain over the same timeframe.

Caltrain compared the benefit-cost ratio across the three growth scenarios to help select its preferred growth scenario. The BCA process is summarized in the figure below.

The BCA analysis was an input to the economic section of Business Case Evaluation.

BENEFIT-COST ANALYSIS PROCESS



2.3.6. ECONOMIC IMPACT ANALYSIS

The economic impact analysis (EIA) determined the changes in regional economic activity due to the investments in Caltrain service.

Passenger rail service expansion and investment impacts the regional economy in several ways. The earliest-felt effects are economic impacts directly related to Caltrain's construction, operation, maintenance, and usage. These investments could be modifications to the existing rail system, or future expansions. These direct expenditures generate "spin-off" effects through additional rounds of spending spurred by the initial, direct investment. To estimate the total economic and fiscal impacts generated by the existing Caltrain service and future service scenarios, the project team used spending information related to Caltrain's current rehabilitation, expansion, operations and maintenance activities and then applied a multiplier to account for future increases.

The economic impact analysis was included as part of the regional section of the Business Case Evaluation

2.3.7. PROPERTY VALUE IMPACT ESTIMATION

The property value assessment quantified future property values surrounding Caltrain stations in comparison to today's property values.

Transit access provides a wide range of direct and indirect economic benefits to neighboring residents and employers, which can often result in higher property values near transit stations. This task measured the regional benefits of improved transit service, which include higher property tax receipts – an effect of increased property values – for local governments along the corridor. Two types of analyses were conducted to estimate the property value impacts along the corridor: an analysis of assessed property values near Caltrain stations and an analysis of the property value benefits of Caltrain, focusing on for-sale residential, rental apartments, and office properties.

The analysis of property value benefits was a standalone assessment that was summarized as part of the regional section of the Business Case Evaluation.



BUSINESS CASE EVALUATION

A Business Case Evaluation is a decision-making framework intended to objectively assess whether an investment provides long term value to the public. Business cases are commonly used throughout the world to evaluate rail projects and other public investments – particularly in the United Kingdom and commonwealth countries such as Canada and Australia. The Caltrain Business Case Evaluation considered the following areas:



SERVICE

Does the investment improve service and reliability?



FINANCIAL

Is the investment financially sustainable (i.e., affordable within current/future funding constraints)?



ECONOMIC

Are the benefits of the investments worth the cost (as illustrated by the benefit-cost ratio)?



REGIONAL

Does the investment benefit the broader region (measured by congestion, air quality, connectivity, land value, and economic output)?



2.3.8. EQUITY ASSESSMENT

As part of the Business Plan, we assessed the fairness and accessibility of Caltrain’s service, particularly for disadvantaged communities.

The equity assessment focused on understanding the impacts of the Service Vision on equity, compared with Caltrain’s current service. The assessment focused on Communities of Concern located along the Caltrain corridor; Communities of Concern are disadvantaged communities formally defined by the Metropolitan Transportation Commission based on a variety of socioeconomic and demographic factors. The equity

impacts of the Service Vision were evaluated based on the amount of Caltrain service provided, accessibility, environmental impacts to surrounding communities, transit fares and policies, and other factors. Based on the outcomes of the assessment, a set of recommendations for future planning and policy work were crafted to address any additional barriers to Caltrain with the goal of capturing the corridor’s underserved market.

2.3.9. STATION ACCESS ANALYSIS

The team assessed connections to and from Caltrain stations, giving particular focus to the first- and last-mile segments of a connection.

This task refined the scale, approach and capital costs of station access enhancements that are identified for the Service Vision. It also provides direction for future planning efforts related to station access that would be considered after the Business Plan is adopted. The analysis took a more detailed look at the station access needs of the 2040 Service Vision and the build-up of those investments over time. It also supported a more

detailed funding and implementation plan as part of this Business Plan by identifying access improvements that would be needed at each station for electrification service and subsequent service improvements within the next decade.

2.3.10. FUNDING ANALYSIS

The funding analysis determined revenue needs for Caltrain to implement the Service Vision over the next decade and through 2040.

The funding analysis summarized Caltrain’s existing funding sources, shared-funding arrangements, and funding gaps to determine which funding and revenue sources Caltrain could use going forward. Both a ten-year and longer-term funding strategy were developed to identify the projected costs and the portfolio of funding sources that would address Caltrain’s needs over the near- and long-term to implement the Service Vision.

KEY PLANNED & PROGRAMMED PROJECTS

The Caltrain corridor is a key regional transportation asset and Caltrain's partner cities and agencies have major commitments or planned investments in the corridor. The following major projects are currently underway or are planned by partner agencies. This set of projects was incorporated into each technical task described in this section as an assumed project.

CALTRAIN PROJECTS UNDERWAY

Caltrain Electrification



Caltrain electrification is a key component of the Caltrain Modernization (CalMod) program. The project will electrify the corridor from San Francisco to San José, replacing diesel service with an electric fleet.

San Francisco to San José will "blend" with Caltrain service by sharing tracks within the existing corridor in what is termed the Caltrain/HSR blended system. Additionally, on the way to building HSR from San José to Bakersfield, Caltrain proposes to electrify the tracks from San José to Gilroy to provide faster service in the near-term for the five Caltrain stations along this segment.



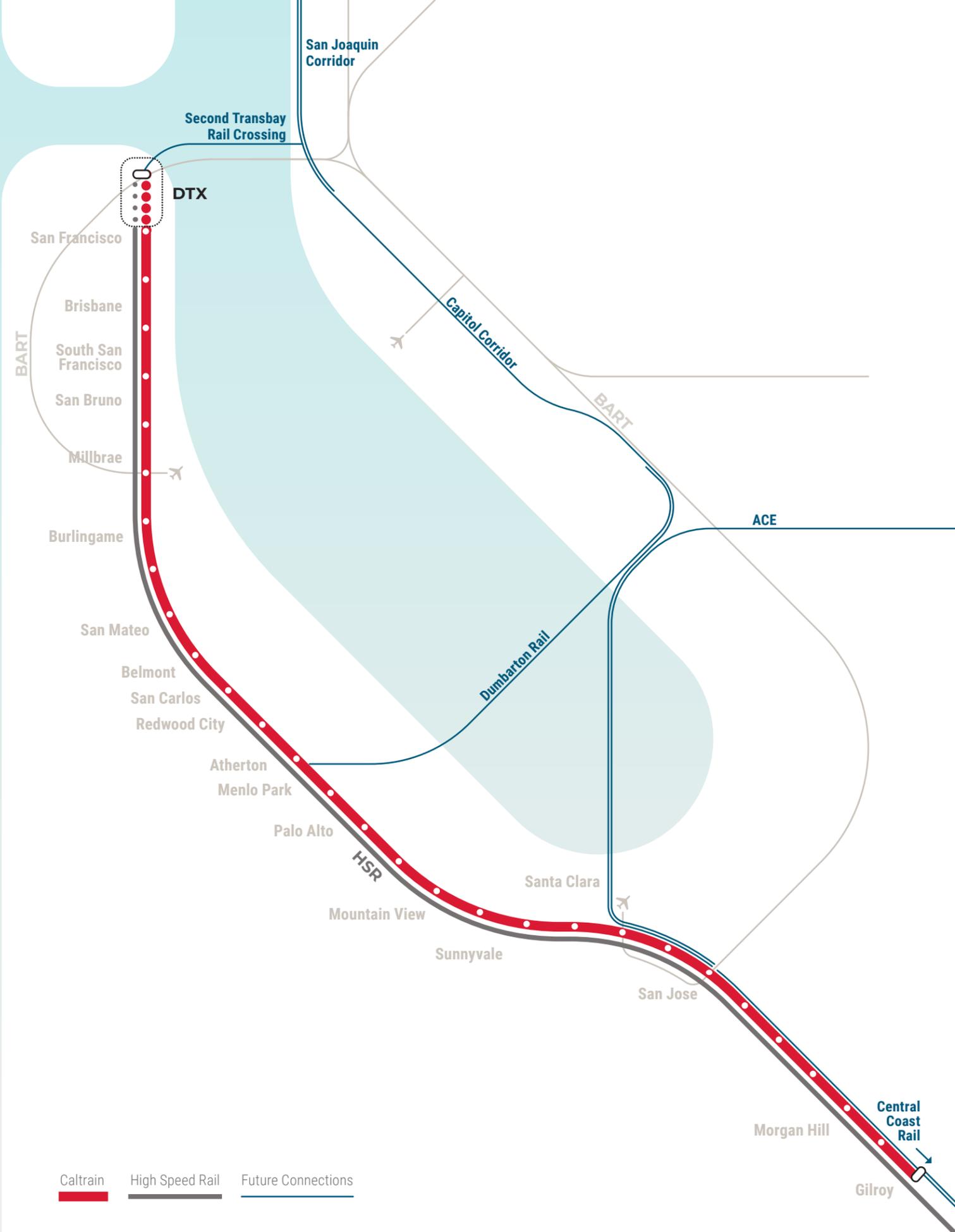
Currently, the California High-Speed Rail Authority (CHSRA) is facilitating a planning/environmental process to further define the blended system. Additional High-Speed Rail facilities which need to be defined include stations, passing tracks that can be used by HSR trains to bypass the Caltrain trains that need to stop more frequently, at-grade crossing improvements, and system upgrades

to support higher train speeds. Grade separations, a storage/maintenance facility, and other system elements will also be considered

Downtown Extension (DTX) Redevelopment and Relocation of the 4th & King Railyard, and Pennsylvania Avenue Tunnel



The Downtown Rail Extension (DTX) will extend Caltrain commuter rail from its current San Francisco terminus at 4th and King streets to the new Salesforce Transit Center. It will also deliver the California High-Speed Rail Authority's future High-Speed Rail service to the Transit Center. DTX will reshape Caltrain's interface with San Francisco and the region's transit network by enabling a direct connection with downtown San Francisco and more efficient transit connections to the East Bay and North Bay. The 4th and King Station and Railyard is located between the SoMa and Mission Bay neighborhoods in San Francisco, both of which have experienced explosive growth and development in recent years. The 4th and King Railyard would be moved to



an area near San Francisco, alleviating the need to store additional trains proposed under the Service Vision at the Salesforce Transit Center. The Pennsylvania Avenue Tunnel project is an extended tunnel under Pennsylvania Avenue that would continue the DTX tunnel further south, avoiding significant at grade crossings in Mission Bay.

Diridon Station
Surrounding Rail Infrastructure, and Relocation of Central Equipment, Maintenance and Operations Facility (CEMOF)



The San José Diridon terminal station is currently in the planning phase to modernize and renovate the station and surrounding rail infrastructure in order to improve transit, driving, walking, and bike access to the station, provide improved Caltrain service, and provide better connections to other bus and rail services. Caltrain's Centralized Equipment Maintenance and Operations Facility (CEMOF) accommodates inspections, maintenance, repairs, train washing and storage and is the "nerve center" of Caltrain, where dispatchers direct and monitor train traffic between San Francisco and Gilroy. Moving CEMOF south of Tamien enables a larger volume of trains to stop at Diridon and will expand the facility to meet the fleet storage and maintenance needs of the Service Vision.

FUTURE CONNECTIONS

This section briefly describes projects that were in their early stages in the planning process or political uncertainty at the time the Business Plan was developed. These plans and projects were explored as potential variations to the Service Vision.

Second Transbay Rail Crossing



A Second Transbay Rail Crossing would provide a second underground rail connection across the San Francisco Bay to serve travel demand between the Caltrain Corridor, the East Bay, Sacramento, and the Central Valley via conventional rail service.

Dumbarton Rail



Ongoing studies of the Dumbarton Rail corridor are considering a range of service options spanning the Dumbarton Bridge (Highway 84) between the Peninsula and East Bay. The studies seek to address solutions to congestion along the bridge by improving transit connections and repurposing the Dumbarton rail bridge located just south of the freeway bridge.

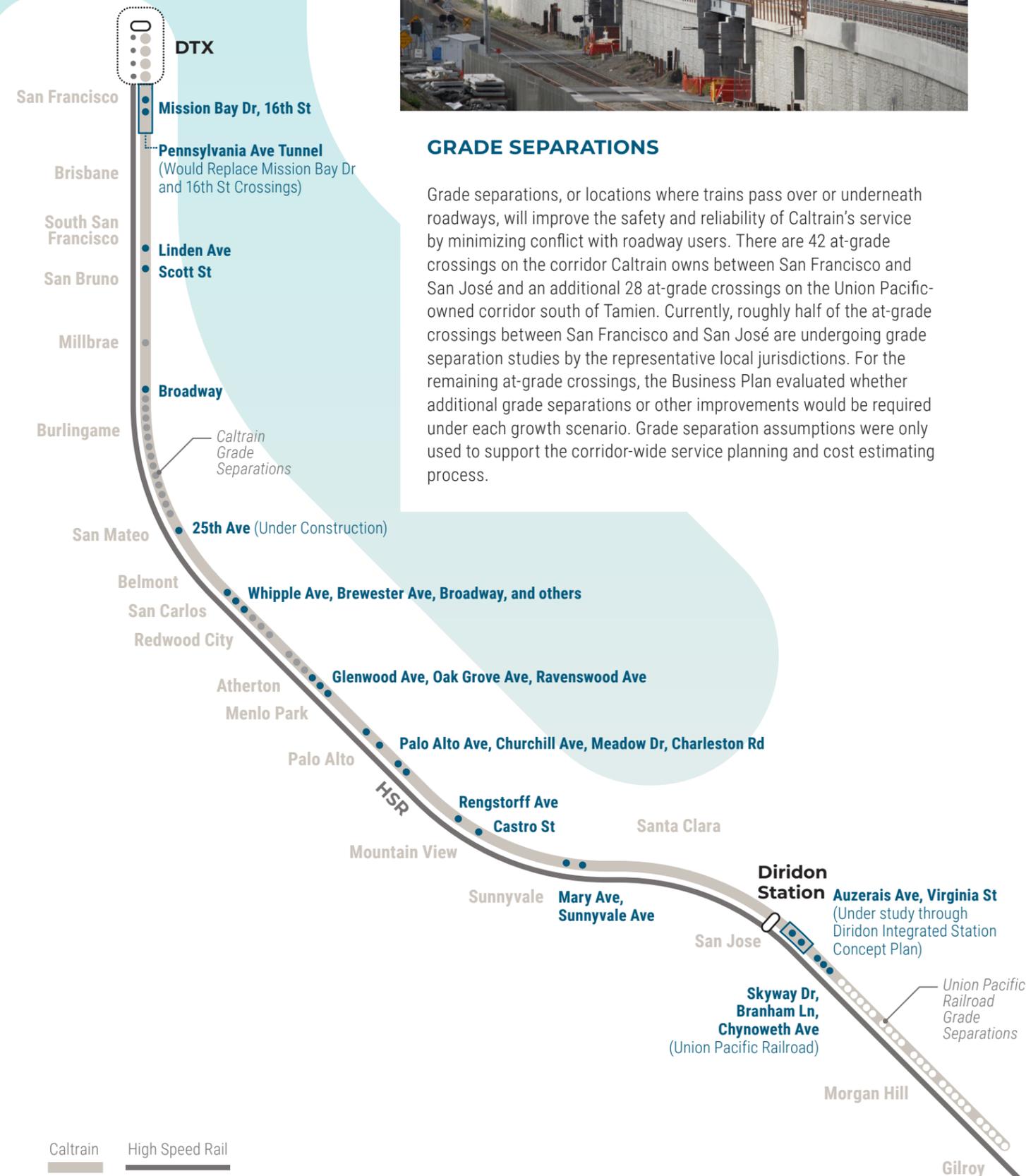
Altamont Commuter Express (ACE) and Capitol Corridor



The ACE and Capitol Corridor intercity passenger rail services share some infrastructure and some passengers with Caltrain. Both ACE and Capitol Corridor plan to double the amount of trains operating over the next two decades. Capitol Corridor's service would shift to the Coast Subdivision in the East Bay, serving a new Fremont/Newark station near the Dumbarton Bridge. The ACE Forward Plan service would be extended to Modesto and Merced.

Central Coast Rail

The State Rail Plan calls for expanded intercity rail service to the Central Coast region. Service would be provided between Los Angeles and Gilroy and would connect to Caltrain at Gilroy Station. The Transportation Agency for Monterey County has proposed expanding passenger rail service from San José to Salinas with stations in Pajaro, Castroville, and Salinas in the near term.



GRADE SEPARATIONS

Grade separations, or locations where trains pass over or underneath roadways, will improve the safety and reliability of Caltrain's service by minimizing conflict with roadway users. There are 42 at-grade crossings on the corridor Caltrain owns between San Francisco and San José and an additional 28 at-grade crossings on the Union Pacific-owned corridor south of Tamien. Currently, roughly half of the at-grade crossings between San Francisco and San José are undergoing grade separation studies by the representative local jurisdictions. For the remaining at-grade crossings, the Business Plan evaluated whether additional grade separations or other improvements would be required under each growth scenario. Grade separation assumptions were only used to support the corridor-wide service planning and cost estimating process.

2.4 OUTREACH PROCESS



The Business Plan touches on issues of wide interest to Caltrain's customers, as well as to a range of stakeholders within and beyond the Caltrain corridor.

To ensure that it was comprehensive, inclusive, and representative, The Business Plan included an extensive outreach component. Caltrain educated, informed, and solicited feedback from city staff, policy makers, elected officials, riders, neighbors, and the general public throughout the Business Plan process.

There were two distinct outreach tasks: stakeholder outreach and city/county outreach.

OUTREACH PROCESS



ELECTED OFFICIALS & FUNDING PARTNERS



Elected Officials



Public Agencies



Stanford Partners Group



COMMUNITY PARTNERS



Employers



Advocates



PUBLIC



Riders



Corridor Neighbors



General Public



STAKEHOLDER MEETINGS

- City/County Stakeholder Coordinating Group | Local Policy Makers Group
- Project Partner Committee | Join Powers Board | Citizen Advisory Committee
- Partner General Managers | San Francisco International Airport
- Stakeholder Advisory Group | Employers
- All groups



COMMUNITY MEETINGS

- Riders | Neighbors | General Public



PROJECT WEBSITE

- Riders | Neighbors | General Public



PUBLIC SURVEYS

- Riders | Neighbors | General Public



RIDER ENGAGEMENT EVENTS

- Riders | Neighbors | General Public



ONLINE ENGAGEMENT EVENTS

- Riders | Neighbors | General Public



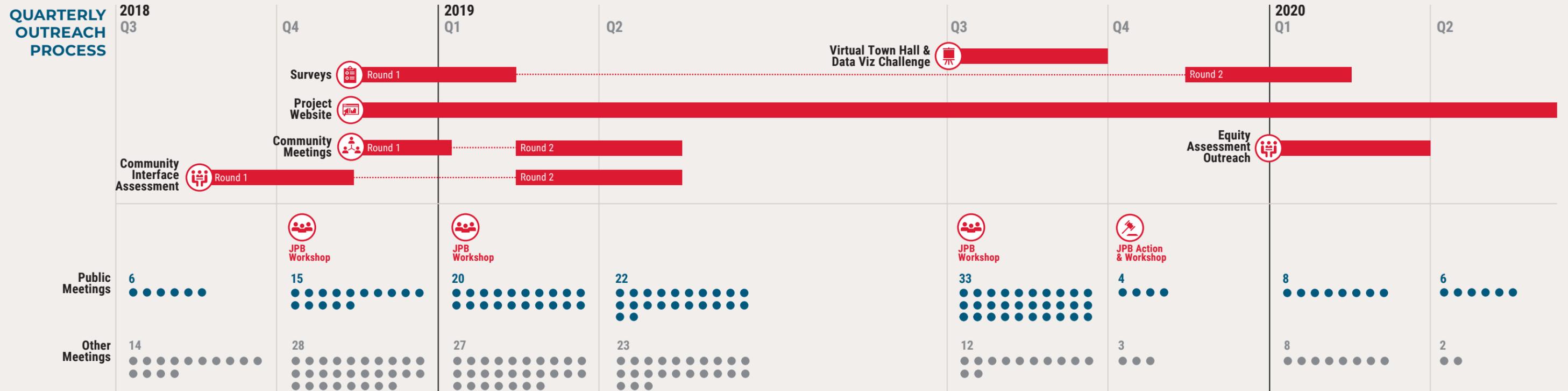
INFORMED JPB ACTION ON BUSINESS PLAN



Clear Consensus around next steps



Broad, Inclusive Participation from All Interested Parties



2.4.1. STAKEHOLDER OUTREACH

While engagement with key stakeholders and the general public took on different forms, they were both important elements of a successful and comprehensive outreach process.

Stakeholder Meetings

The project team engaged with existing stakeholder committees regularly throughout the Business Plan development and convened new committees to focus specifically on the Business Plan. The committees included elected officials, public agency staff, institutions, employers, and community partners.

Community Meetings

Two rounds of community meetings were held, and each round included three community meetings, one in each county. The first community

meetings introduced the purpose of and process for developing the Caltrain Business Plan and promoted the project website, survey, and other ways the public can be involved in the process. The second community meeting presented a summary of the final Board presentation and was used as outreach to riders to promote engagement in the online survey.

Project Website

The project website detailed the work of the Business Plan in a format that was engaging to a wide audience and helped facilitate meaningful, informed discussion of the policy issues under consideration. As the Business Plan progressed, the website was regularly updated with information about progress made, presentations given, supporting documentation, and upcoming meeting information. The website served as a receptacle of information previously presented in the public realm.

Public Surveys

Multiple public outreach surveys were developed and employed to gather general feedback from the community. The first survey asked the community to provide feedback on Caltrain service and their personal trip behaviors, which was integrated into the website and remained live through the first phase of public engagement. The survey was used to further understand the opportunities and challenges that Caltrain presents to communities. The second survey was used to share information and gather targeted feedback on the Service Vision prior to Board adoption. The survey was available through the project website and allowed visitors to step through key facets of the Service Vision and provide feedback.

Rider Engagement Events

Two rounds of rider engagement events were held, and each round

included a station pop-up in each county along the corridor. The first round of rider engagement events introduced the purpose of and process for developing the Caltrain Business Plan and promoted the project website, survey, and other ways the public can be involved in the process. The second round of events distributed a Project Factsheet summarizing the Service Vision recommendation to Caltrain riders, both at stations and as an on-board handout, and promoted engagement in the upcoming Online Open House.

Online Engagement Events

Virtual Town Hall

A Virtual Town Hall replicates traditional in-person town hall meetings but with more flexibility by offering interested listeners an opportunity to join online from anywhere they choose. Caltrain hosted a Virtual Town Hall meeting on YouTube prior to the Board's

adoption of the Service Vision. During the town hall, they presented a detailed summary of the of the Business Plan Evaluation and the staff recommendation for the Service Vision. Viewers were able to provide feedback and ask questions during the town hall presentation via the YouTube platform.

Data Visualization Challenge

The Caltrain Data Visualization Challenge was issued as a way to share Caltrain data and invite coders, programmers, designers and train enthusiasts to develop visualizations showing how Caltrain can meet the mobility needs of the Bay Area. Caltrain requested submissions to a virtual competition where entrants could use a downloadable set of data to develop a visualization, simulation tool, animation, map, or infographic to illustrate how people will use Caltrain in the future. The dataset included Caltrain's existing service, the

corridor land use and geography, 2040 service plans for each of the three growth scenarios, and ridership forecasts. The goal was for entrants to develop a visually appealing data-driven way to tell a story about Caltrain and was open to anyone to enter, individually or as a group. The winning entry received Caltrain paraphernalia, a tour of a Caltrain maintenance facility, and a feature on the Business Plan website.

Reddit Ask Me Anything

Caltrain Business Plan staff participated in a live question and answer session on Reddit's Ask Me Anything (AMA) platform. Members of the public were able to join and submit questions about the Business Plan on the Reddit thread and get immediate responses. The Caltrain team answered approximately 30 questions during a one-hour session.

2.4.2. CITY/COUNTY OUTREACH

A jurisdiction-specific booklet was prepared for each of the in-person meetings to illustrate the local changes – including travel times, service levels, ridership, and gate down-times – associated with each of the service concepts options. All booklets were made available on the project website following these meetings.

Caltrain and the project team held one-on-one meetings with each individual jurisdiction (i.e., city or county) along the corridor to discuss the Business Plan and understand the specific relationship between each jurisdiction and Caltrain service. These meetings were part of the larger Community Interface Assessment effort to identify and define a holistic set of projects, plans, opportunities, and challenges that directly relate to the interface of Caltrain service with each community. Interface categories included safety, station amenities, environmental effects, track-crossings, and structures. The team met with city and county representatives from each of the jurisdictions in a series of two rounds.

Round 1 focused on explaining the Business Plan's overall scope and purpose. These meetings presented an opportunity to verify data and begin framing the discussion of community interface opportunities and concerns unique to each city.

Round 2 focused on bringing cities up to speed on Business Plan progress, highlighting the upcoming Board decision on the corridor Service Vision, and building support and consensus around the findings of the Community Interface Assessment.

Click on the '+' signs on the map below to download the [community interface booklet](#) for that jurisdiction.

Atherton	San Carlos
Belmont	San Francisco
Brisbane	San Jose
Burlingame	San Mateo
Gilroy	Santa Clara
Menlo Park	South San Francisco
Millbrae	Sunnyvale
Morgan Hill	
Mountain View	
Palo Alto	
Redwood City	
San Bruno	

SAMPLE PAGES FROM CITY FACTSHEETS

CALTRAIN BUSINESS PLAN
A 2040 VISION FOR THE CORRIDOR

Caltrain is one of the busiest commuter rail systems in the country and demand for our service is growing.

The Caltrain Business Plan is a joint effort with agency partners and communities along the corridor to plan for this growth. The Business Plan will help us develop a better understanding of the region's future transportation needs and will identify opportunities and strategies for how the Caltrain system can help.

WHY THINK ABOUT THE FUTURE OF THE CORRIDOR?
The Bay Area population and economy have continued to grow, leading to:

- Traffic congestion and longer, unreliable commutes
- Over-crowded trains
- Increased cost of transportation and housing

Caltrain provides a cost effective, convenient alternative to driving and connects jobs and housing, but the system will need to grow to meet current and future demand.

Electrification of the Caltrain corridor is already underway and will allow Caltrain to run faster, more frequent service while reducing noise and emissions.

Electrification also creates the potential for expanded Caltrain service that will meet the current and future needs of our region. The Business Plan will identify the best strategies for maximizing this potential by developing a long-term service vision for the corridor, defining the infrastructure needed to support that service vision, and identifying opportunities to fund the implementation of these improvements.

WHAT IS THE CALTRAIN BUSINESS PLAN?
The Caltrain Business Plan includes four major focus areas that address key questions shaping the future of the railroad:

- SERVICE**
What is the best service Caltrain can provide to meet the needs of our customers and the communities we serve? How many trains should we run? How do we best match service to riders' needs? What infrastructure improvements will be needed to provide the service? How can Caltrain effectively connect to other transit services?
- COMMUNITY INTERFACE**
What are the benefits and impacts of increasing service on the corridor to each community? How can we work together to grow the railroad in a way that balances the needs of all communities along the corridor with the need to expand service and operate a safe and efficient railroad? How can we ensure this planning process and the outcomes are equitable?
- BUSINESS CASE**
Why should we choose one service vision over another? How can we maximize the value of current and future investments in the Caltrain corridor? How much will the service cost to operate? How will we fund it?
- ORGANIZATION**
What is the best organizational structure for overseeing and growing Caltrain service in the future?

62,000 Daily Riders
21 Local Jurisdictions

WHO IS INVOLVED?
The Caltrain Business Plan is a collaborative effort led by Caltrain with funding and participation from Stanford University and other organizations. We understand that each of the local jurisdictions we serve has a unique set of priorities, projects, and plans for growth. We are working closely with policymakers, stakeholders, Caltrain riders, and community members to make sure the Caltrain Business Plan considers everyone's needs.

WHEN IS IT HAPPENING?

2018	2019	2020
Initial Workshop with Key Local, Regional, and State Stakeholders	Business Plan Development Begins	Adoption of the Full Business Plan by the Caltrain Board
Detailed Analysis and Review		Implementation
Public Outreach and Feedback		
Adoption of a Service Vision by the Caltrain Board		

FOR MORE INFORMATION
We recognize that Caltrain is woven into the diverse communities we serve and want to hear from you about your needs and what you'd like Caltrain service to look like in the future.

Check the project website for ways to get involved, regular project updates, and a calendar of events.

Caltrain2040.org | 650.508.6499 | BusinessPlan@Caltrain.com

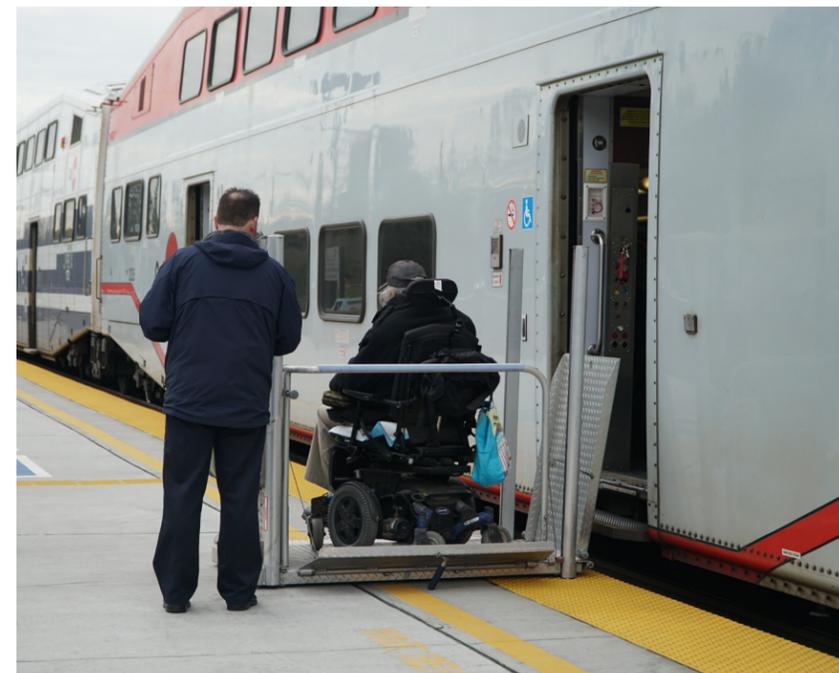
2.5 COMMUNITY INTERFACE ASSESSMENT PROCESS

Passenger rail service on the Peninsula corridor has become a vital part of the urban fabric of the many communities it serves – and there are many ways in which the railroad and communities interface. There were two main tasks as part of the Business Plan Community Interface Assessment: defining Caltrain’s railroad-community interface and summarizing examples of how other rail-community interfaces have been successfully managed around the world.

2.5.1. DEFINING THE RAILROAD-COMMUNITY INTERFACE

This task established a shared language and basis of knowledge for Caltrain and its partner communities to use. This shared foundation is intended to help everyone understand the opportunities and challenges

associated with increasing travel needs, maintaining safe and reliable service, and managing land use development along the rail corridor in the future. The task defined terms related to Caltrain commuter rail along the San Francisco Peninsula, and identified priorities that should be considered as strategies and plans for managing and implementing



growth in train service are developed and solidified in the coming years by Caltrain and the communities it serves.

2.5.2. CASE STUDIES

The Caltrain corridor is not unique in that, for as long as there have been railroads, there have been interfaces and interactions between railroads and the communities surrounding the rail corridors. Across the world, there are numerous examples of situations in which railroads and communities have improved railroad-community interfaces and successfully resolved common issues for the mutual benefit of the railroads and the communities. This task provided an initial examination of some of these success stories from around the world, drawing from over 40 different examples. The examples highlight and summarize the wide range of approaches and solutions used to improve railroad-community interfaces around the world. These examples are intended to provide a source of ideas and topics for further inquiry for Caltrain and the communities that interface with its corridor.

2.6 ORGANIZATIONAL ASSESSMENT PROCESS

Caltrain's current organizational structure has evolved in tandem with its complicated history. However, the series of major upgrades and transformations to come will require a forward-looking organization that can deliver and manage these improvements in an effective manner.

An organizational assessment was conducted in parallel with the Business Plan technical tasks, community interface, and outreach. The assessment examined three areas:

1. **Service Delivery:** How Caltrain operates and delivers its service, with a focus on train service delivery and contracting mechanism.
2. **Internal Organization:** How Caltrain organizes itself, with a focus on resources, functionality, shared services.
3. **Governance:** How Caltrain is overseen by a governing body, with a focus on options for self-directed change, regional integration, and certain parallel considerations.

For each of these three areas, the assessment asked:

- **Timing:** Is this the right time to be having this discussion? What are the implications if no decisions are reached?
- **Recommendations and Focus Areas:** What are the recommendations or key focus areas?
- **Implementation:** What additional work is needed?

ORGANIZATIONAL ASSESSMENT PROCESS

Multiple research and analysis steps were used to develop recommendations.



INITIAL ASSESSMENT

Conduct over 50 interviews and review documents and reports, codifying key observations and areas requiring organizational focus.



DEFINING RAILROAD FUNCTIONS & MAPPING THE CURRENT CALTRAIN ORGANIZATION

Outline basic functions necessary to plan, operate, and maintain a major regional railroad and analyze how Caltrain currently completes this work.



COMPARISON TO OTHER US AND INTERNATIONAL RAILROADS

Review how other agencies are governed, organized, and deliver service.



DETAILED ORGANIZATIONAL ANALYSIS

Detailed analysis to identify options and focus areas related to service delivery, internal organization, and governance.



RECOMMENDATIONS

Identify specific recommendations and implementation steps.



03

WHO CALTRAIN CONNECTS TODAY AND IN THE FUTURE

3.1 HOW PEOPLE USE CALTRAIN TODAY

Several different data sources shed light on who, when, where, and why people are using Caltrain today. Those patterns are presented in this section.

3.1.1. RIDERSHIP TRENDS

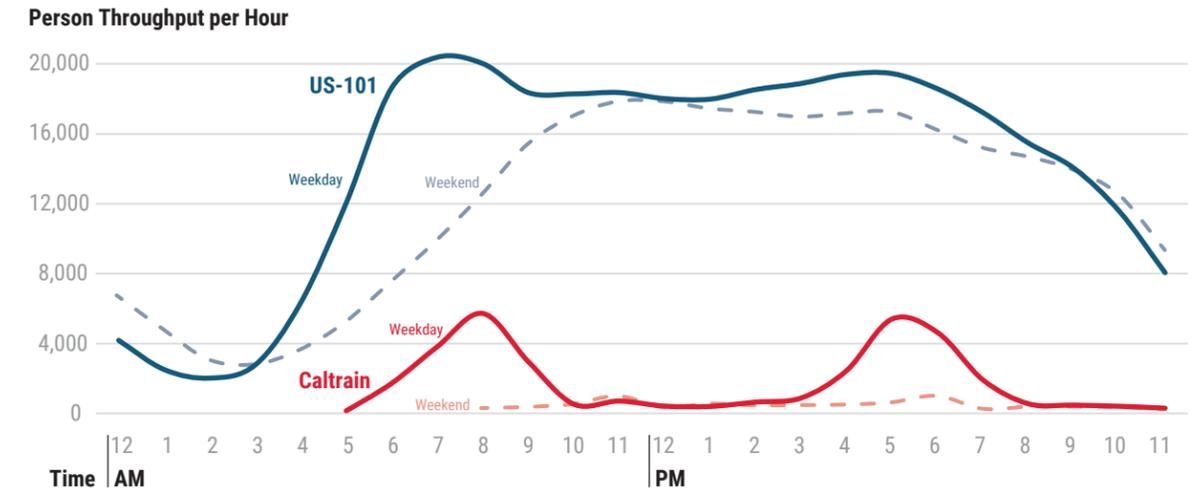
Caltrain serves as the primary north-south transit connection between San Francisco and San José. On weekdays, about 80% of Caltrain ridership occurs during peak commuting periods when service levels are highest and regional traffic congestion is at its worst. US-101 experiences high traffic volumes, varying levels of traffic congestion throughout the day, and longer and longer peak hours; Caltrain experiences two distinct peak periods in the morning and evening. During peak periods, Caltrain carries around ten% of all people traveling through the mid-peninsula – including US-101 and I-280, or the equivalent of about two-and-one-half lanes of freeway traffic in the peak direction. During off-peak and weekend periods, Caltrain's share drops to around one to two%.

CALTRAIN: PARALLEL TO US 101 & I-280 AND CONNECTING CITIES ALONG THE CORRIDOR



CALTRAIN USE COMPARED WITH HIGHWAY 101 BY TIME OF DAY

This figure depicts weekday and weekend travel volumes along the Caltrain corridor crossing the San Francisco County line for Caltrain and US-101.



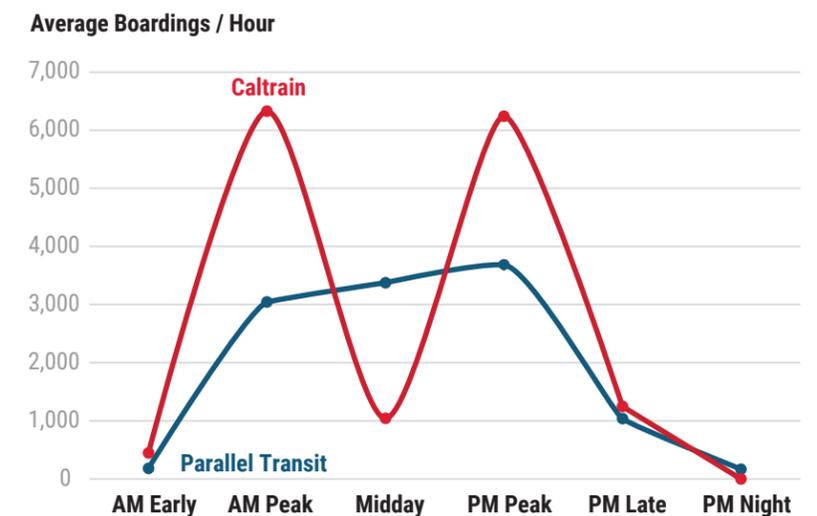
Caltrain (2018), Caltrans (2018)

WEEKDAY RIDERSHIP ON CALTRAIN COMPARED TO PARALLEL TRANSIT ROUTES BY TIME OF DAY

SFMTA, SamTrans, and VTA each operate a handful of long-haul routes that parallel the Caltrain corridor.

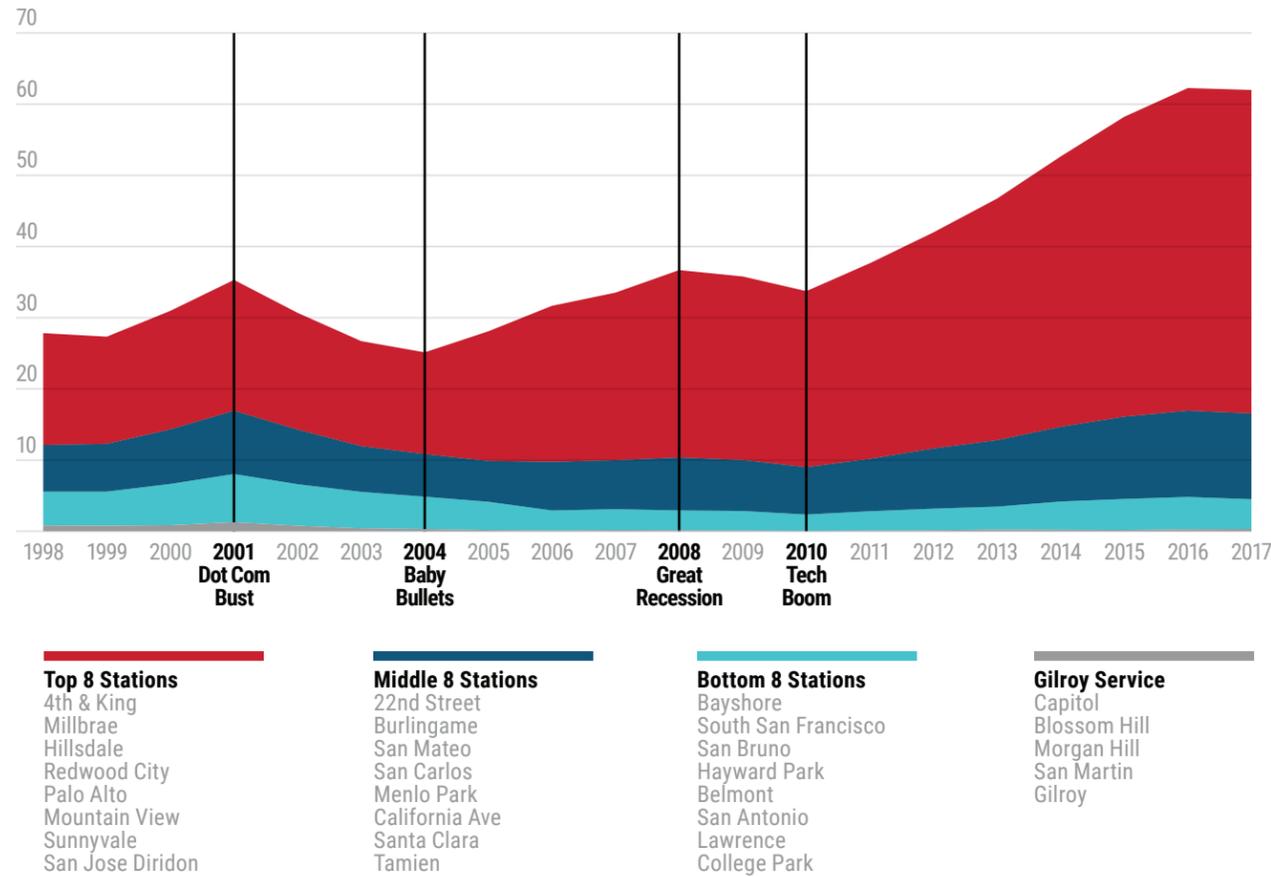
These routes provide consistent service levels starting in the morning and ending in the early evening with no dip in the midday period.

These parallel services also maintain ridership levels through the midday period indicating that demand exists for long-haul transit service during Caltrain's off-peak periods.



Caltrain (2018), Caltrans (2018)

CHANGE IN DAILY RIDERSHIP (THOUSANDS), 1998-2017



Caltrain has experienced substantial ridership growth over the past two decades – nearly tripling its ridership since the mid-1990s and doubling since the Great Recession in 2010. In 2018, Caltrain served over 65,000 riders on weekdays and nearly 12,000 riders on weekends, translating to approximately 18 million passengers per year. Caltrain's ridership growth was fueled by a combination of service improvements (e.g., the introduction of Baby Bullet trains in 2004), access improvements (e.g., the BART to Millbrae connection in 2003), and regional economic growth (especially employment growth in the technology

sector and transit-oriented development near stations).

3.1.2. RIDER ORIGINS AND DESTINATIONS

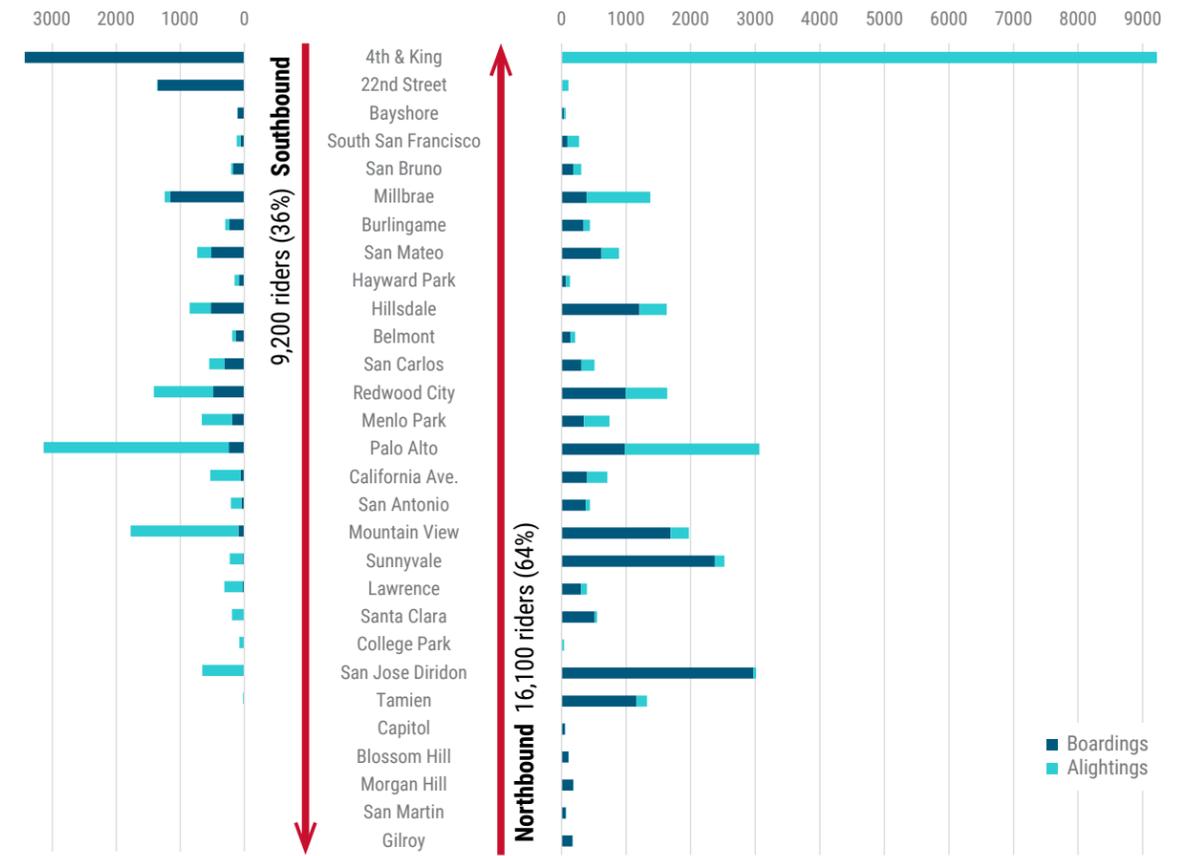
Unlike traditional commuter railroads, Caltrain serves a polycentric corridor with strong travel markets in both directions. During the AM peak period, 64% of riders travel northbound to employment hubs primarily in San Francisco, San Mateo, Redwood City, and Palo Alto. In the southbound direction, 36% of riders travel to employment hubs mostly in San Mateo, Redwood City, Palo Alto,

Mountain View, and San José. The figure above shows AM peak boardings and direction of travel, by station.

Caltrain's riders use a few stations heavily -- those with the highest service levels, fastest travel times, and which are close to population and job hubs. Consequently, one in four Caltrain riders do not use the station closest to their origin or destination to access the train service. Caltrain stations can be categorized into the following three tiers:

The busiest tier of eight stations accounts for 73% of daily

AM PEAK PERIOD BOARDINGS AND ALIGHTINGS BY STATION, 2017



boardings and these stations are where 85% of ridership growth was over the past 20 years. There are two Caltrain stations that have more than 5,000 boardings per day: 4th & King and Palo Alto.

The middle tier of eight stations accounts for about 19% of daily boardings and the remaining 15% of historical growth.

The bottom tier of eight stations accounts for about 7% of daily boardings and has lost about 1,000 boardings over the past 20 years. This group includes the five stations south of Tamien which account for about 1% of daily boardings.

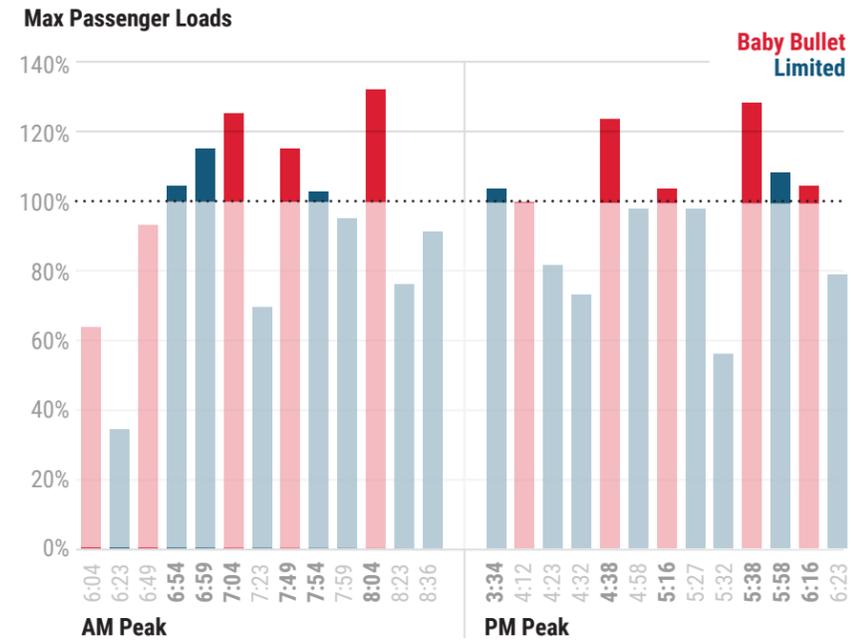


3.1.3. TRAIN CROWDING

As ridership has grown, Caltrain riders experience crowding in both directions. Ridership typically exceeds the number of seats on about half of trains during peak periods. Baby Bullet trains usually operate beyond their seated capacity (up to 140% above seated capacity) while Limited trains are typically near capacity (80 to 100% occupancy). Train crowding indicates there may be latent demand for increased Caltrain service in the corridor among people who would ride if a more comfortable riding condition was achieved.

PEAK PERIOD PASSENGER LOADS , 1998-2017

The figure below depicts peak period, peak direction passenger loads as a measure of train crowding.

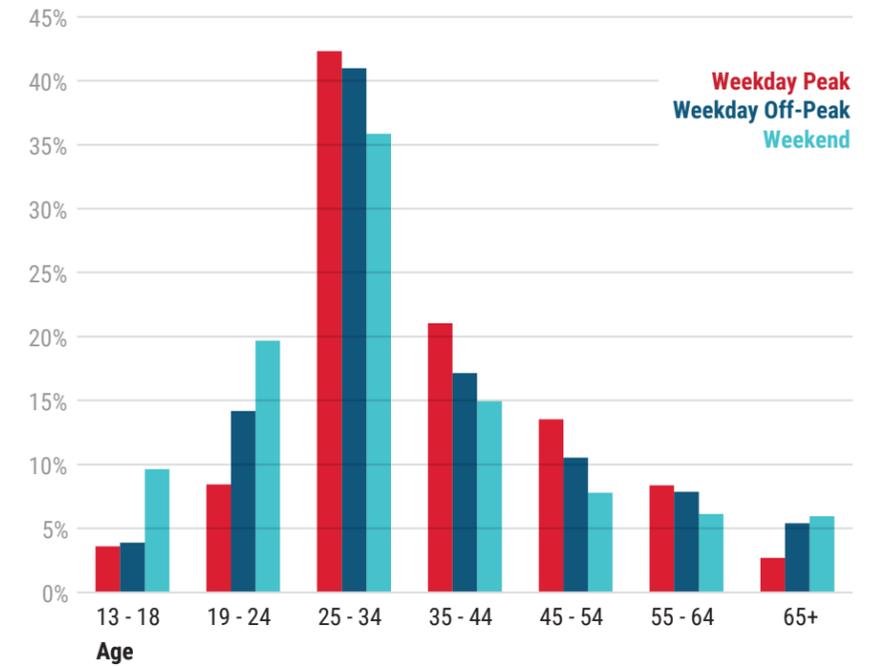


3.1.4. RIDER DEMOGRAPHICS

Caltrain ridership is primarily commuter-based – 78% of all riders are traveling to/from work. The primary trip purpose shifts on the weekend, however, when 61% of trips are for social or recreational purposes and only 17% of trips are work-related. Caltrain riders primarily live in San Francisco, San Mateo, and Santa Clara counties at 22%, 30%, and 42%, respectively. The remaining 6% of riders live outside of the three core service counties. Slightly more Caltrain riders identify as male than female: 55 to 44%. A breakdown of rider age by time period is presented in the chart at right. Weekday riders are most commonly between 25 and 44 years old and weekend riders are most commonly between 19 and 34 years old.

CHANGE IN RIDERSHIP, 1998-2017

Change in Ridership



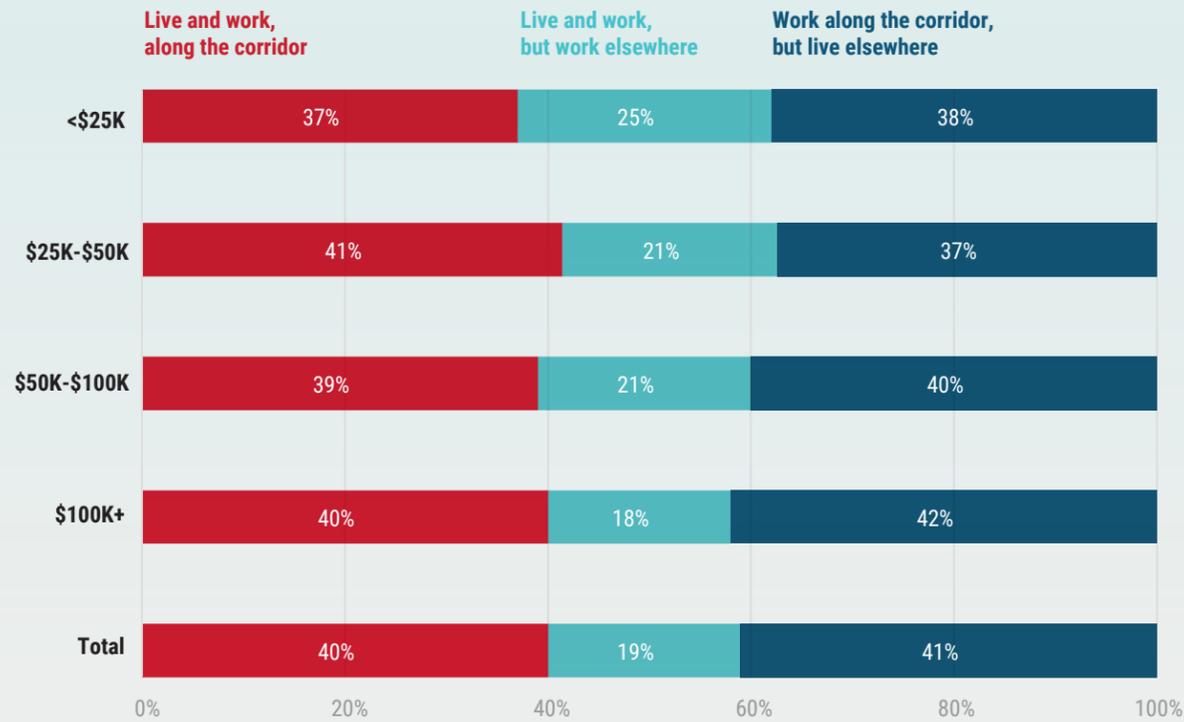
DEMOGRAPHICS & EQUITY

Today, Caltrain's ridership is generally representative of corridor commuters as a whole but is not necessarily representative of all corridor residents.

The team used Census data on commute trip origins and destinations to understand commute flows within the Caltrain corridor (2012-2015 American Community Survey 5-Year Estimates). These flows were differentiated by income level: low-income as less than \$50K, middle-income as \$50K to \$100K, and high-income as above \$100K. All commute trips with at least one trip end (home or work) within two miles of a station were included in the analysis. Many more high-income commuters (69%) make trips in the corridor than middle-income (21%)

or low-income (10%) commuters. Yet proportionally, these groups make the same percentage of their trips fully within the corridor (both their home and workplace are within two miles of a station). The figure below shows that approximately 40% of commute trips are made with both trip ends in the corridor, irrespective of income level. This means that all other factors being equal, Caltrain is equally accessible for all income-level commuters and Caltrain ridership should mirror the income distribution of commuters in the corridor.

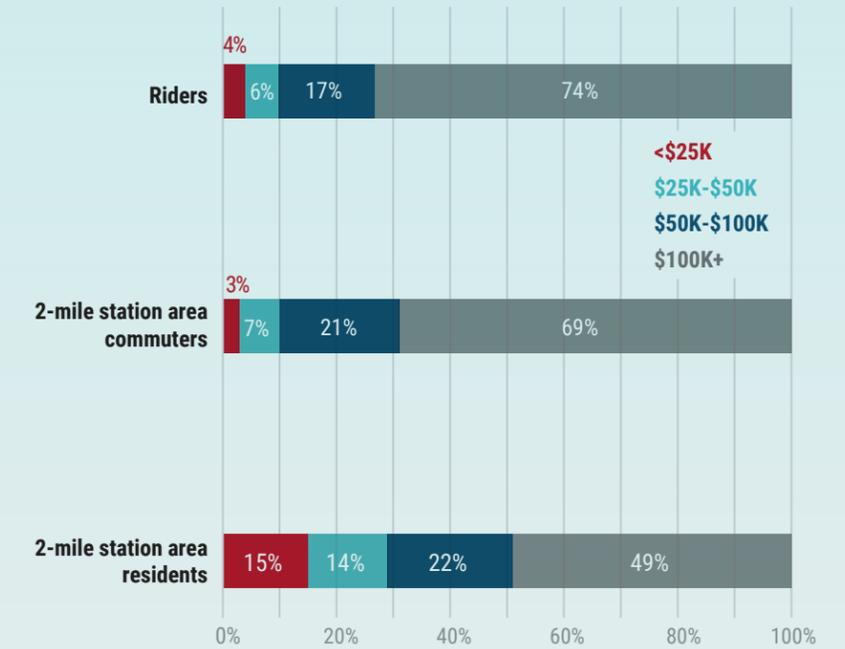
COMMUTE TRIP ORIGINS AND DESTINATIONS, 2012-2015



American Community Survey (2012-2015 5-Year Estimates)

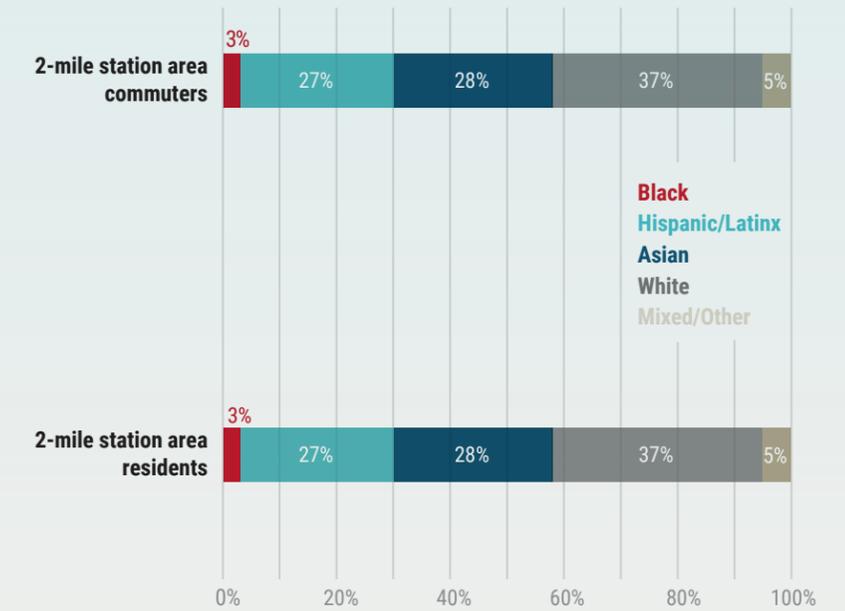
HOUSEHOLD INCOME, 2012-2015

The figure compares Caltrain ridership, corridor commuters, and corridor residents by household income. The parity in the Caltrain rider and corridor commuter distributions indicates that non-work trips are the primary trip type differentiating the distribution of corridor residents. Nearly 75% of Caltrain riders earn an annual household income greater than \$100,000, compared with only 49% of residents on the corridor. The lowest income brackets disproportionately represent older adults, students, unemployed, and undocumented workers, all of whom primarily make non-work trips. The conclusion here is that Caltrain is underserving non-work trips and in doing so, is underserving low-income corridor residents.



Ever intertwined with income demographics, Caltrain's race and ethnicity profile is also misaligned with the race and ethnicity profile of corridor residents. As shown in the figure at right, Latinx corridor residents – 27% of the overall population – are particularly underrepresented as only 9% of Caltrain riders.

RACE & ETHNICITY, 2012-2015



American Community Survey (2012-2015 5-Year Estimates)

3.2 HOW PEOPLE ACCESS CALTRAIN STATIONS

Caltrain riders travel to and from stations by a variety of means.

As shown in the figure below, more people walk to Caltrain than any other mode, while park-and-ride, transit and shuttles, bicycling, and auto pickup/drop off account for the remainder of trips to and from stations. Despite the perception that Caltrain is primarily a park-and-ride system, park-and-ride trips represent a relatively small fraction of trips at most stations except for those south of Diridon. The proportion

of rides arriving via park-and-ride and transit has decreased over time while the proportion of walking, bicycling, and getting dropped-off has increased. Caltrain riders' rate of bicycle use is also high compared to peer railroads and is especially high at stations like 4th & King, Palo Alto, Mountain View, Diridon, and Menlo Park. Access facilities for all modes are often cramped, particularly at high ridership

stations where vehicle and bicycle parking, passenger loading areas, and bus or shuttle bays are in high demand.

Of the 10% of riders who use transit to or from a station, most use Muni or VTA to access Caltrain. Transfers are provided from Caltrain to a dozen transit operators including Muni (San Francisco), BART (Millbrae), SamTrans

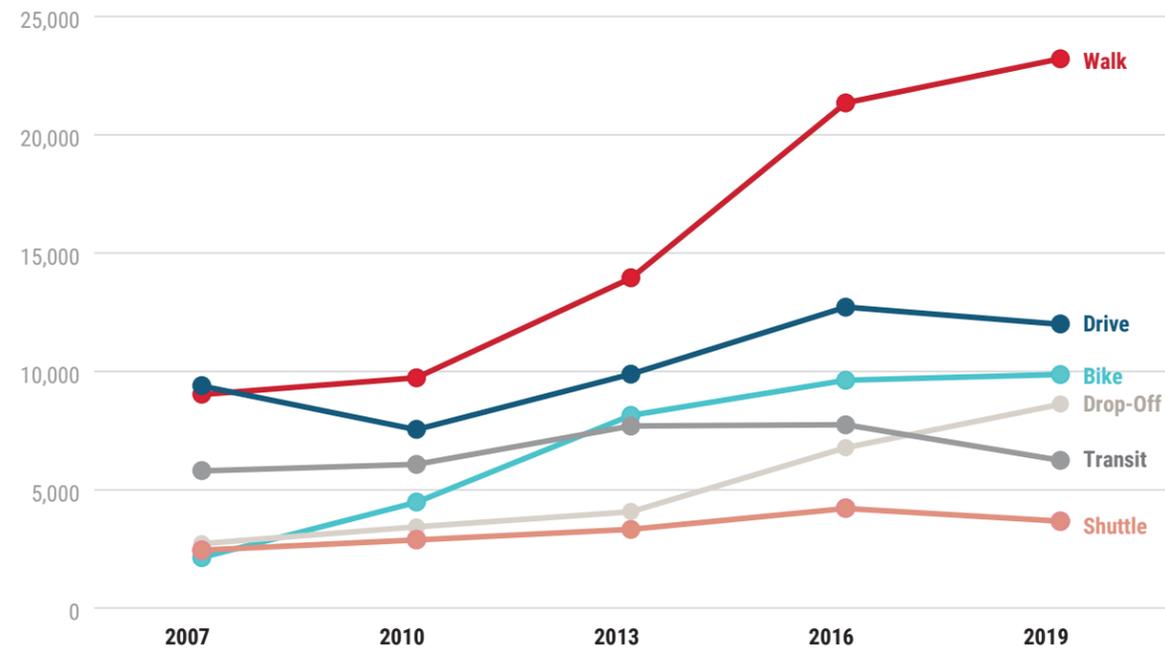
(San Mateo County), Commute.org (San Mateo County), VTA (Santa Clara County), Highway 17 Express (Santa Cruz), and County Express (San Benito County). Riders can transfer to Muni, SamTrans, Bart, and VTA using the regional Clipper Card system. Caltrain station access differs by income level. As shown in the figure below, high income riders tend to rely more on park-and-ride and biking while

low-income riders tend to rely more on transit. Today, Caltrain's highly customized schedule prevents regular coordinated transfers (~5 Minutes) with bus and rail services at most stations. This puts low-income riders at a disadvantage when trying to access stations as compared to higher income riders who are more likely to use Caltrain's subsidized parking lots and bike storage. Furthermore, Caltrain

does not offer a fare discount for transfers from another mode of transit. For transfers to Muni, SamTrans, VTA, and Dumbarton Express, free or discounted fares are only available to Caltrain Monthly Pass holders.

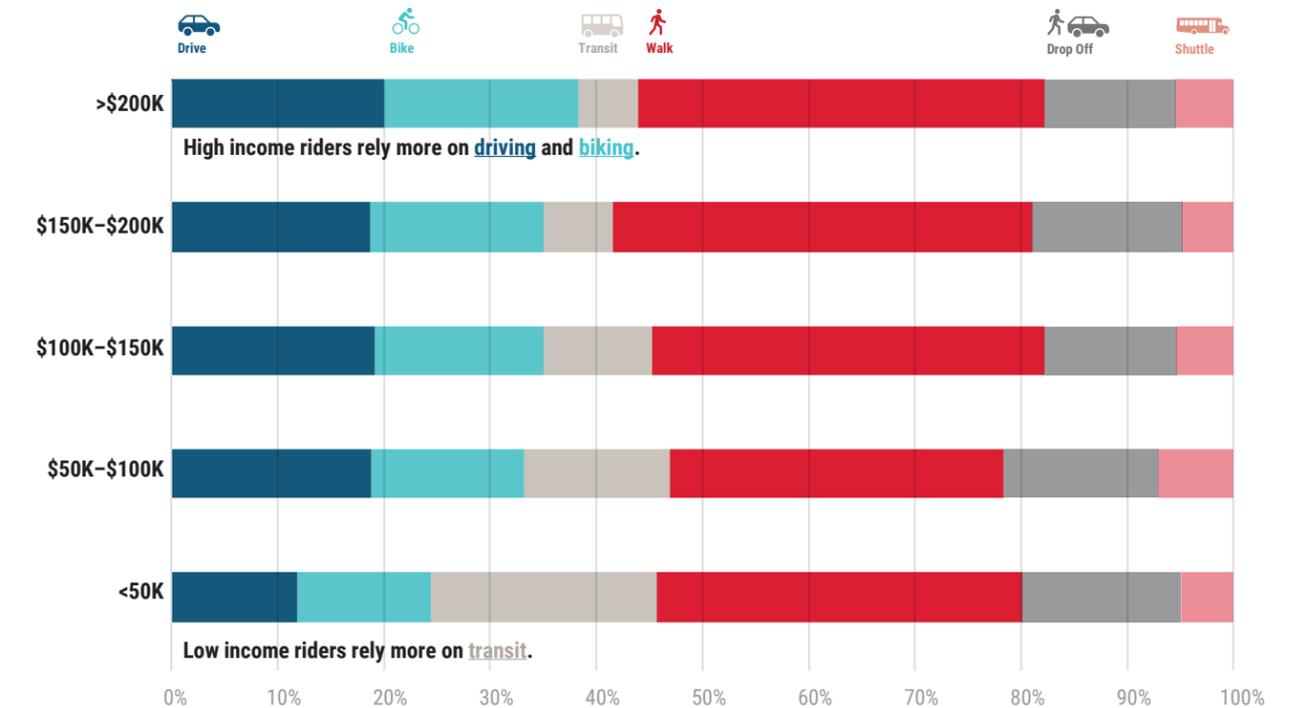
HOW PEOPLE GET TO AND FROM CALTRAIN STATIONS BY YEAR

Average Weekday Riders



Caltrain Triennial Survey (2019)

HOW PEOPLE GET TO AND FROM CALTRAIN STATIONS BY INCOME LEVEL



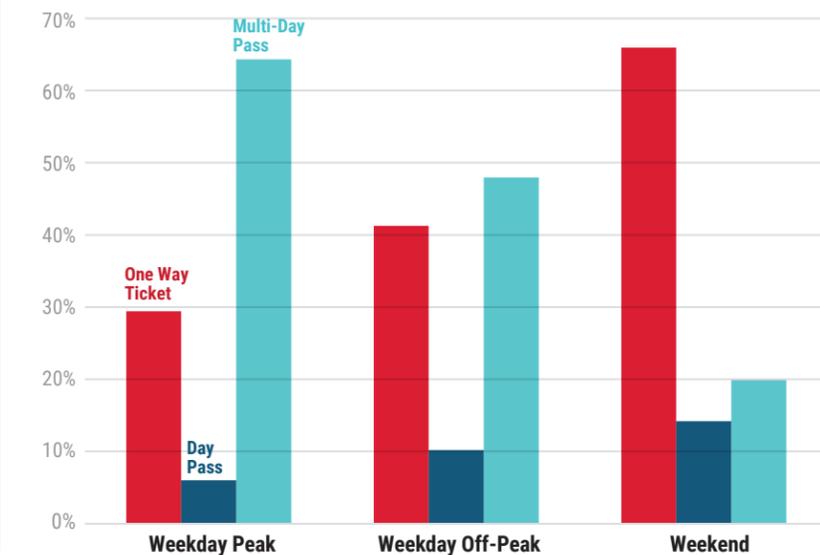
Caltrain Triennial Survey (2019)

3.3 HOW PEOPLE PAY FOR CALTRAIN

Caltrain offers several ticket types, including variations on the one-way ticket, day pass, and monthly pass.

According to Caltrain's 2019 Triennial Study, the most common overall fare types were the Monthly Pass purchased on Clipper Cards (33%) followed by Go Passes (24%) and one-time Clipper Cash payments (23%). All types of one-way tickets and day passes are more popular on the weekend and during off-peak weekday hours than during weekday peak hours when regular commuters dominate ridership.

FARE PAYMENT OPTION BY TIME PERIOD



Caltrain Triennial Survey (2019)

GO PASS HISTORY

In January 2003, Caltrain implemented the University Pass, a pilot program with Stanford University, where the university purchased annual transit passes for its employees in bulk at the beginning of the year. The pilot program was started as a strategy to increase Caltrain ridership in a time when ridership was low, and also as a critical tool to provide financial stability to the Caltrain system through predictable

annual payments. For Stanford, the unlimited-ride product offered the university a way to reduce vehicular traffic and parking demand at the university campus.

After six-months of the pilot, Caltrain started a similar program with regional companies called the Go Pass program, where employers purchased bulk transit passes for their employees. In January 2004, the University Pass got folded into the Go Pass program to create one combined program.



STANFORD AND THE GO PASS TODAY

Today, the Caltrain Go Pass program is an important part of Stanford's trip reduction strategy, and Caltrain accounts for nearly 20% of Stanford's overall commute mode share. Stanford is the largest Go Pass

participant, purchasing over 36,000 passes for the 2019 calendar year, representing over 41% of all Go Pass sales. The university purchases these passes for faculty, staff, graduate students, and post-doctoral researchers, including the employees of the Stanford University Medical Center.



The Monthly Pass and GoPass fare options are the most heavily discounted fare products available for Caltrain. In October 2016, the average Go Pass customer paid \$2.89, while the average non-Go Pass customer paid \$5.96. This becomes an equity issue when looking at a breakdown of fare payment option by income, which reveals that low-income riders are the least likely to use a Caltrain Go Pass or Monthly Pass, as shown in the figure at right. However, Caltrain is slated to test a means-based fare program starting in 2020.

In May 2018, MTC adopted Clipper START, a 12- to 18-month pilot program to offer a 20-50% fare discount to eligible low-income adults traveling with participating transit agencies. Caltrain will be participating with a 20% discount to eligible riders. To qualify, individuals must earn no more than 200% of the federal poverty level and use Clipper for fare payment.

FARE PAYMENT OPTION BY INCOME LEVEL



Caltrain Triennial Survey (2019)

3.4 WHO WILL WANT TO USE CALTRAIN IN THE FUTURE?

Transportation investments and land use changes will drive ridership growth through 2040.

3.4.1. TRANSPORTATION NETWORK CHANGES

The completion of two big infrastructure investments – electrified service in 2024, and the extension to Salesforce Transit Center after 2030 – would grow Caltrain’s use. These projects, coupled with land use development, will propel Caltrain from a commuter rail service to a regional rail service. Increasing congestion on Highway 101 would also boost the competitiveness of Caltrain.



MARKET DEMAND



Caltrain serves bidirectional and polycentric ridership demand

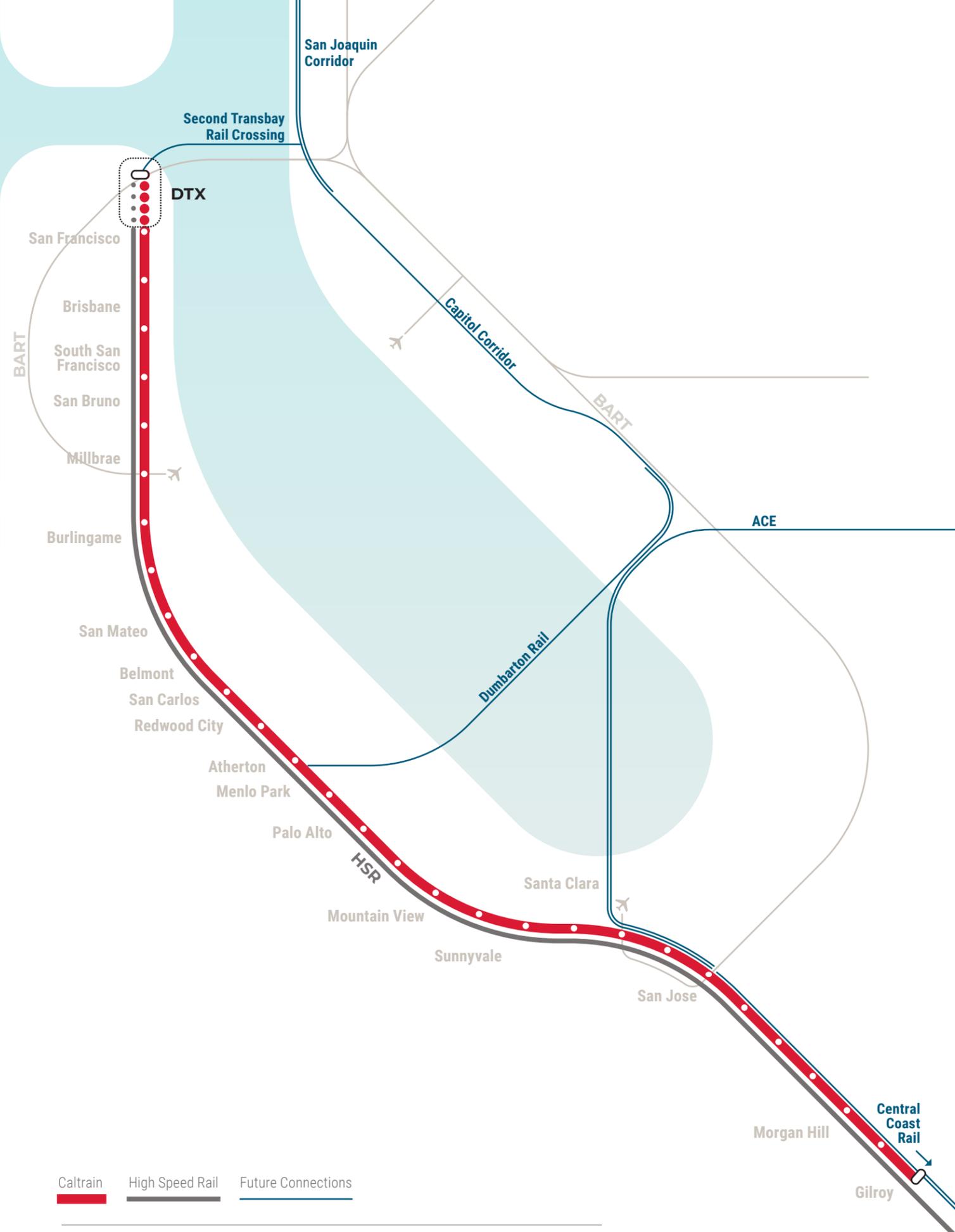
- ~60,000 daily boardings
- Highly concentrated around stations with fastest & most frequent service
- One-third of trips occur in reverse-peak direction
- Half of trips occur outside San Francisco

Caltrain has the potential to serve a market of over 200,000 daily riders

- Corridor expected to add 1.2 million people and jobs within 2 miles of Caltrain (+40%)
- Significant freeway congestion
- Major infrastructure projects further increase Caltrain demand
 - BART to Santa Clara County
 - Downtown Extension/ Pennsylvania Avenue Tunnel
 - Dumbarton Rail

And, as the map on the right illustrates, further Caltrain use will be driven by the expanded Bay Area transit network planned for 2040 which increases the number of connections to the Caltrain corridor, especially from the South and East Bay. By 2040, Caltrain would connect to a regional and statewide rail network that spans the East Bay, Central Valley, Central Coast, and Southern California. Consequently, the

market for Caltrain would expand from a Peninsula- and South Bay-focus to include a more diverse array of origins and destinations. There would be new BART riders, new Muni Riders and new VTA and Capitol Corridor riders, among others. Chapter 2 explains which of these planned regional transportation projects were included in the Caltrain Business Plan analysis.



Caltrain High Speed Rail Future Connections

¹ Based on Plan Bay Area forecasts and approved projects by individual cities.

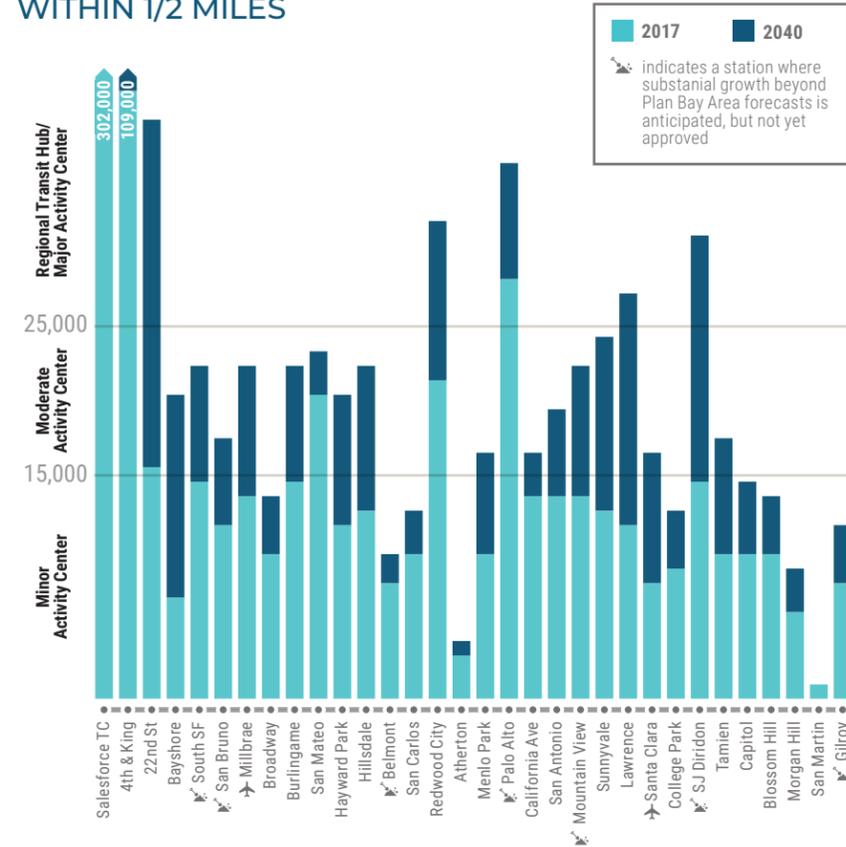
3.4.2. URBAN GROWTH IN THE CALTRAIN CORRIDOR

Today, Caltrain serves about three million people and jobs within two miles of stations and about 20% (or 600,000) of those are within a 1/2 mile of stations. The Caltrain corridor spans nearly 80 miles of urban, suburban, and rural environments. As shown in the first set of graphs below, land use densities around the immediate 1/2 mile station areas are highest in San Francisco but are also high in major Peninsula downtowns such as San Mateo, Redwood City, and Palo Alto. Within two-mile catchment areas, shown in the second set of graphs, land use densities are highest in San Francisco, and fairly high at stations in Santa Clara County, whereas closely spaced mid-Peninsula stations have smaller catchment areas and consequently serve fewer people overall.

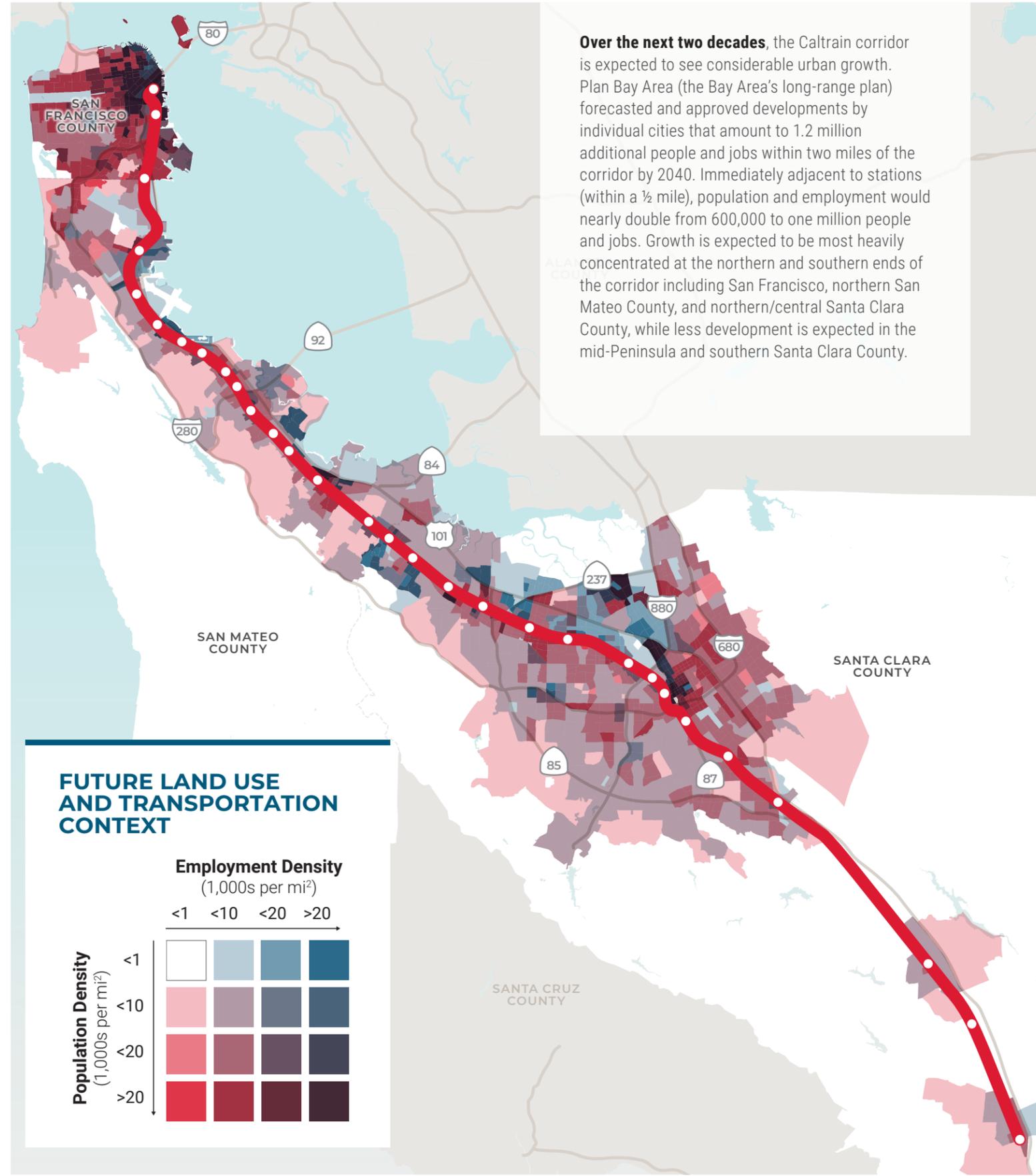
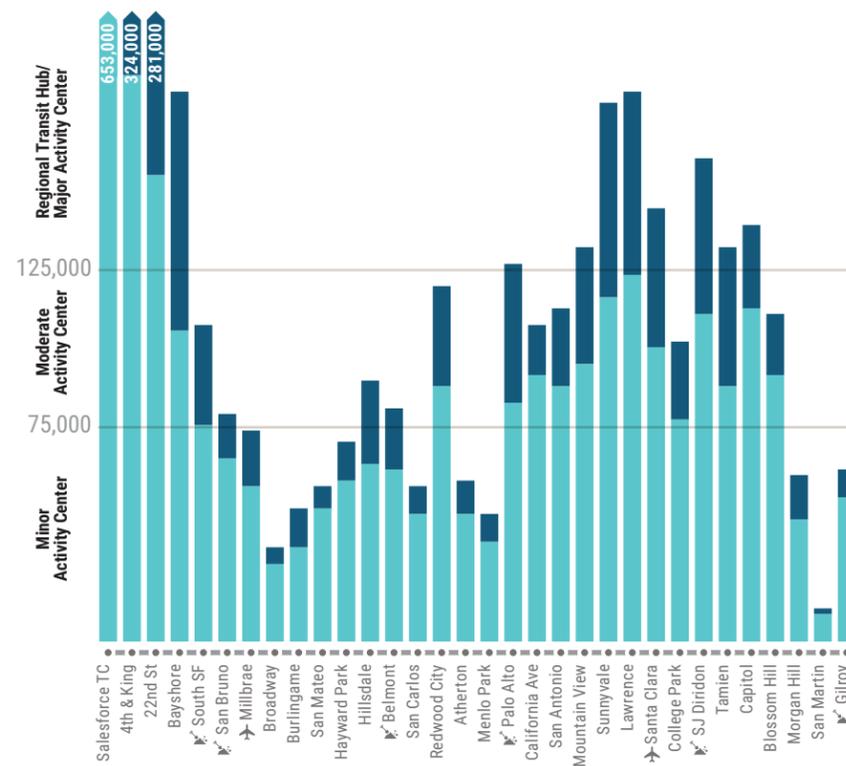
Land use density does not necessarily correlate with station ridership. Some stations like Hillsdale experience relatively high service levels and ridership with relatively low densities, while other stations like Lawrence serve a dense catchment area but experience relatively low service and ridership levels.

POPULATION AND EMPLOYMENT NEAR STATIONS

WITHIN 1/2 MILES

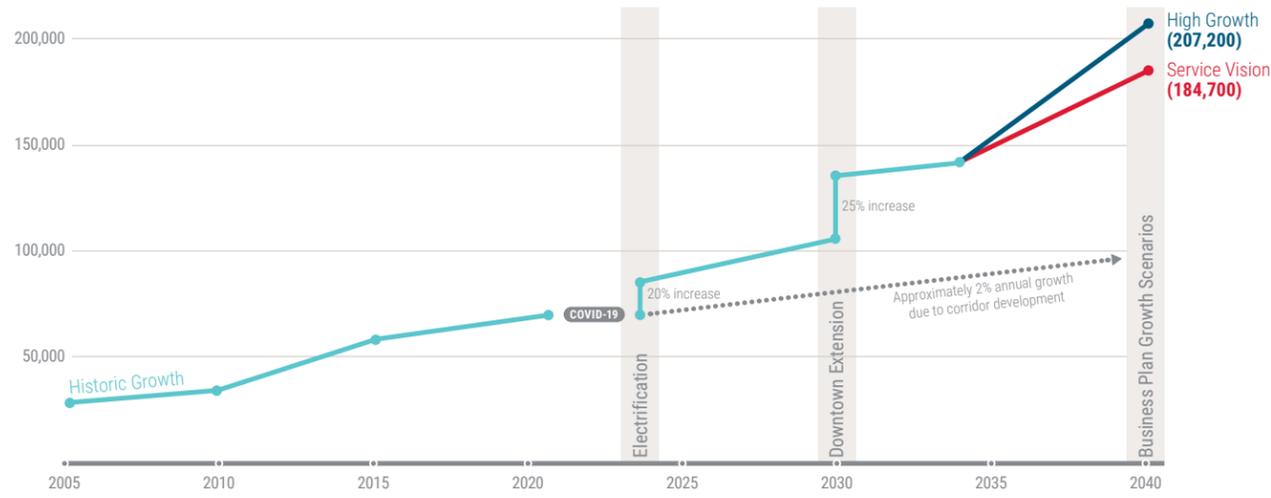


WITHIN 2 MILES



Over the next two decades, the Caltrain corridor is expected to see considerable urban growth. Plan Bay Area (the Bay Area's long-range plan) forecasted and approved developments by individual cities that amount to 1.2 million additional people and jobs within two miles of the corridor by 2040. Immediately adjacent to stations (within a 1/2 mile), population and employment would nearly double from 600,000 to one million people and jobs. Growth is expected to be most heavily concentrated at the northern and southern ends of the corridor including San Francisco, northern San Mateo County, and northern/central Santa Clara County, while less development is expected in the mid-Peninsula and southern Santa Clara County.

CHANGE IN WEEKDAY RIDERSHIP BY GROWTH SCENARIO (CROWDING-CONSTRAINED FORECASTS)



3.4.3. HOW CALTRAIN RIDERSHIP MIGHT CHANGE OVER TIME

Ridership forecasts were developed for each of the three growth scenarios, projecting growth in demand for Caltrain now through 2040. The forecasts revealed an underlying demand for Caltrain service in 2040 that ranged between 150,000 and 200,000 weekday riders (as compared to an existing demand of 60,000 daily riders), limited in many cases by Caltrain’s ability to deliver enough service to satisfy customer demand. These forecasts echo the growing calls for improved Caltrain service coming from residents, employers, and cities in the corridor.

Ridership demand would continue to be highly concentrated around key markets and distributed bi-directionally. The busiest stations would be Salesforce Transit Center, 4th & King, Palo Alto, Mountain View, and San José, with a northbound/southbound split of 57/43% during the AM peak period. Approximately 61% of trips would have an origin

or destination in San Francisco, a slight increase over existing ridership patterns.

Most stations would see ridership demand of about double or triple existing levels. In particular, Bayshore, Lawrence, South San Francisco, and Hayward Park would see substantial gains over existing levels associated with station area land use growth and improved service. In total, 11 stations would serve greater than 5,000 riders per day.

Midday and evening ridership will increase when Caltrain provides more frequent off-peak service. Improved off-peak service will capture trips that are today being completed by driving, by taking a parallel transit service, or not being made at all. As discussed in 3.1 How People use Caltrain Today, Caltrain underserves off-peak, non-work trips and in doing so, underserves low-income corridor residents and communities of color.

Parallel transit routes maintain both service levels ridership counts through the midday period indicating that

there is demand for midday long-haul transit service. These parallel transit corridors proportionally serve more low-income riders and people of color than Caltrain currently does today. While 87% of parallel transit riders have a household income under \$100,000, only 26% of Caltrain riders earn household incomes under \$100,000. Similarly, 43% of parallel transit riders are Black or Latinx compared to only 12% of Caltrain riders. Given these trends, Caltrain may serve more non-work trips and by doing so, serve more low-income riders and people of color with implementation of the Service Vision.

As mentioned earlier in this chapter, crowding is a significant issue on Caltrain, and will continue to be even with the proposed growth in service. While electrification will expand Caltrain’s passenger capacity, the opening of DTX around 2029 could push Caltrain demand to an uncomfortable level of crowding on trains during peak commute hours. In 2040, despite increasing service levels, Caltrain would still experience uncomfortable crowding conditions

3.5 CALTRAIN CITIES AND COMMUNITIES

To gain a better understanding of existing barriers to Caltrain, Business Plan staff reviewed existing transportation plans along the corridor and conducted outreach with city staff, elected officials, and community-based organizations in the corridor.

on express trains under the Moderate Growth Scenario, or Service Vision, while the High Growth Scenario would comfortably serve 2040 demand within its seated capacity. However, potential future changes to Caltrain’s fare structure and uncertainties around the second Transbay tube, Dumbarton Rail, and intra-San Francisco travel demand may further increase ridership and crowding conditions over time.

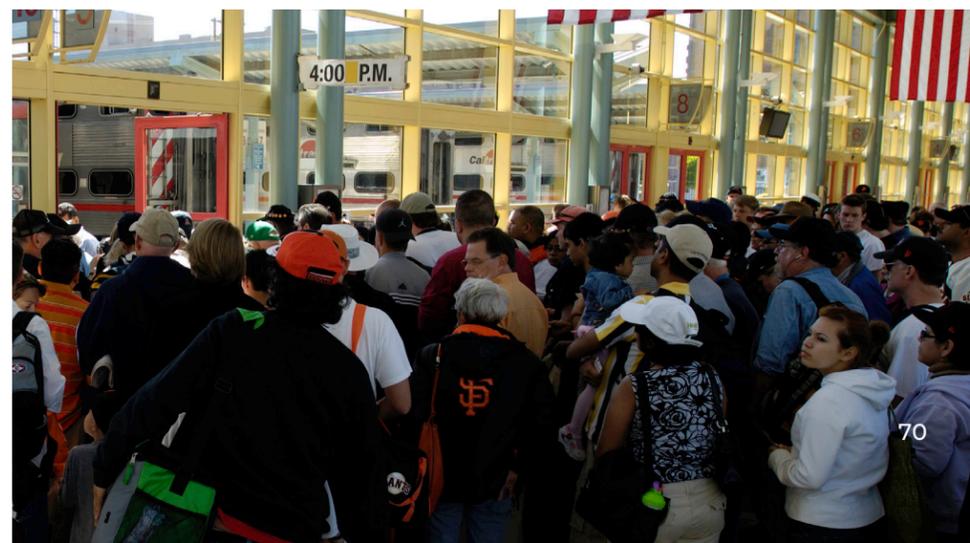
The figure above summarizes the projected crowding-constrained demand over time for the three growth scenarios, specifically highlighting the impact on ridership due to electrification and DTX.

These conversations took place throughout three rounds of outreach between Fall 2018 and Spring 2020. The feedback gathered captures the experience of current riders, potential future riders, and non-rider community members.

The first two rounds of outreach were city-specific meetings conducted with agency staff and elected officials. The first round focused on introducing the Business Plan and discussing existing benefits and challenges of Caltrain, while the second round focused on gathering input on the proposed Business Plan growth scenarios. The third round of outreach consisted of in-person interviews with two

community stakeholders in each of the three Caltrain counties and a survey of neighboring community-based organizations. Six follow-up phone interviews were completed with survey respondents who volunteered to provide more feedback at the end of the intake form. Concurrently, Business Plan staff reviewed nine existing transportation plans for cities or counties along the Caltrain corridor and noted community concerns related to Caltrain.

These conversations revealed that Caltrain communities share several needs and concerns with respect to the railroad.



HOPES & GOALS FOR CALTRAIN

Corridor community members expressed a range of comments and opinions.

A Better Service for Nontraditional Work Schedules and Non-Work Trips

Currently, Caltrain is focused on traditional commute hours, whereas low-income and vulnerable populations are more likely to have commutes that fall outside of these times. Stakeholders would enjoy more mid-day, late evening, and early morning service and better coordination with connecting services during non-typical commute times.

B More Frequent Service

Upgraded service would offer more flexibility and choice to access the corridor and better connections to partner transit, making travel easier for those who need it. Increased service would be particularly useful during peak periods to meet demand. For cities, peak period improvements are key in achieving mode split goals and reducing congestions on roads.

C Open Stations in Communities of Concern

Some residents living within Communities of Concern along the corridor would like to see new stations or greatly improved access to Caltrain in their community.

D Discounted Fares for Low-Income Riders

Currently, Caltrain does not offer discounts for low-income riders and has a significantly lower share of low-income riders compared with other agencies along the corridor (Muni, VTA, and SamTrans). Stakeholders would like to see a reduced fare or subsidy program for

low-income riders. Some respondents also recommended revisiting the zone fare structure to make sure that it is not disincentivizing the use of connecting bus service.

E Coordinated and Thoughtful Land Development

Cities want community-initiated and Caltrain-initiated land development near the rail corridor to be well-coordinated and aligned with community values. Land development factors of concern include placemaking, jobs-housing balance, transit-oriented development, and the zoning updates needed to facilitate and support these land use changes. As housing along the Peninsula is increasingly expensive and inaccessible to low-income and transit-dependent households, some stakeholders would like Caltrain to partner with jurisdictions along the corridor to prioritize

developing affordable housing and implement anti-displacement or local preference policies near stations.

F Better Connecting Bus Service

Stakeholders want to see more short-distance transportation connections ("first and last mile" connections) to and from Caltrain stations to expand the influence and usefulness of the Caltrain service. Currently, existing and potential Caltrain riders are poorly served by connecting bus services in San Mateo and Santa Clara Counties. Cities want to increase transit access for their residents and employees, and they need support from the region's transit providers to do this effectively. Respondents would like to see better schedule coordination with SamTrans and VTA to reduce the number of bus connections that result in long waits or

insufficient (<5 minutes) transfer times, as well as more frequent connecting bus services to Caltrain stations.

G Better Bike & Pedestrian Connectivity

Stakeholders are impacted by the physical realities of the railroad including at-grade rail crossings, separated rail crossings, and the stretches of fencing, walls, and vegetation in between the railroad corridor and the communities. These physical elements of the corridor create safety, nuisance, and connectivity challenges for community members living alongside or traveling across the rail corridor. Many cities want to improve connectivity and safety around stations, but lack the financial, political, and organizational resources to tackle these challenges on their own. Furthermore, enhancing connections of low-cost modes like biking and walking could expand access to Caltrain services. To this end, stakeholders would like to see better

bike facilities such as lockers and racks at stations, more separated grade crossings, and bike sharing opportunities at stations.

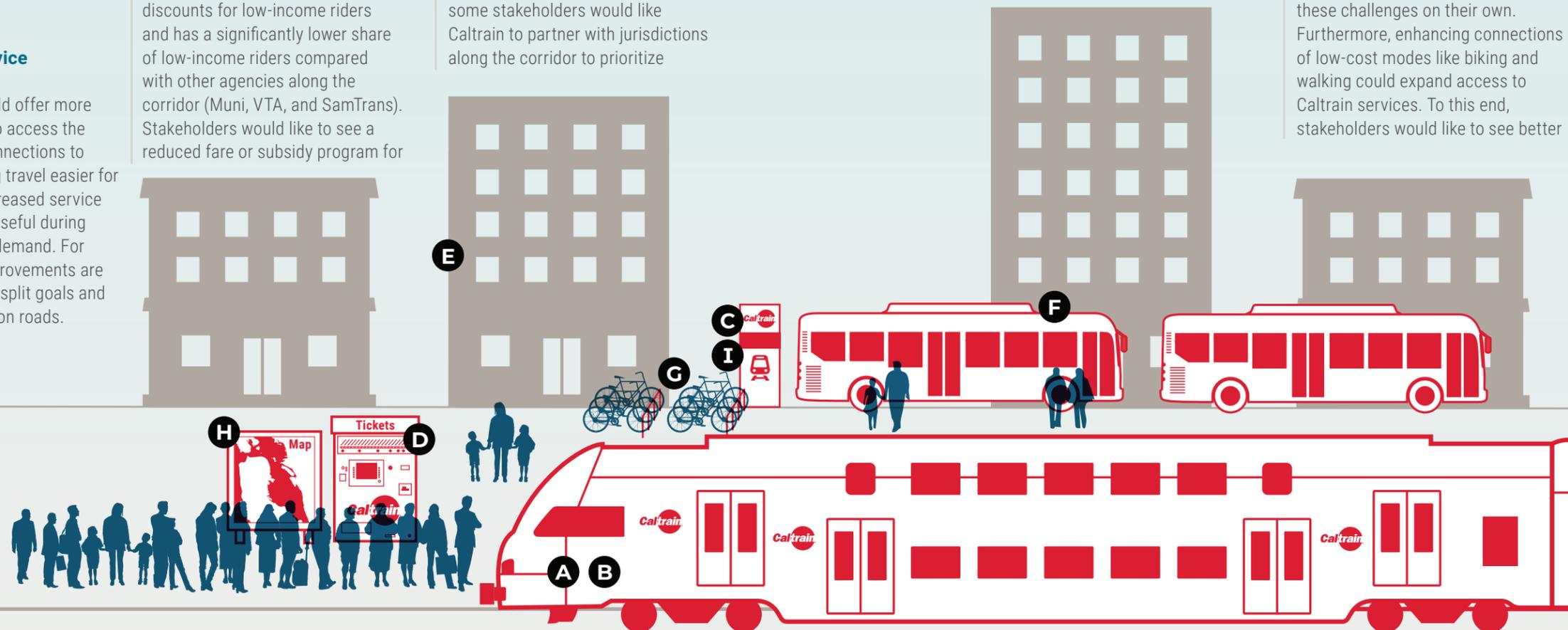
H Better Rider Information

The fragmented nature of public transit service in the Bay Area makes it difficult for riders, especially those from marginalized and limited English-proficient backgrounds, to navigate myriad systems and agencies. Outreach respondents assert that Caltrain can address this by showing area-based maps and schedules at stations that show services from all agencies, ideally in multiple languages. For particularly vulnerable groups, respondents recommend that Caltrain conduct outreach to teach people how to ride, perhaps with "captive audiences" such as ESL or citizenship classes. Finally, Caltrain could better utilize social media to advertise Caltrain service and connect with potential riders, especially youth.

I Accessible Station Design

Some Caltrain stations are poorly lit, provide limited access to ADA riders, and feel uninviting to riders. Stakeholders would like to see amenities at stations that improve rider experience, such as more lighting, shelter from the elements, and seating. Some respondents also called for greater ADA accessibility through level boarding at stations.

To evaluate the implications of the Business Plan on Caltrain riders and communities, we used the Business Plan Community Interface Assessment Process described in Chapter 2 and discussed further in Chapter 5.





04

THE 2040 SERVICE VISION

This chapter briefly summarizes the process used to develop and select the 2040 Service Vision for Caltrain and the key characteristics of that Service Vision. The Service Vision is an illustrative plan which includes the style, stopping patterns and frequencies of Caltrain service. The Service Vision is also a set of organizational directions and actions Caltrain will take on its own and in partnership with other agencies to realize the service levels specified in a coordinated and proactive manner.

The Caltrain corridor serves a growing mix of local, regional, and statewide travel markets and trip purposes. In developing service planning scenarios, a range of potential options, trade-offs, and solutions were considered to accommodate the variety of anticipated transportation needs.

4.1 SERVICE PLANNING CONTEXT

The Caltrain Business Plan process did not begin with a blank slate when developing a future Service Vision. Rather, the process began by considering the many projects and policy commitments in place.

Community acceptability and the size of Caltrain's market also bounded what is possible, as did fiscal realities of how much money could be available and what is enough value for money invested.

Uncertain timing of projects and an uncertain policy and funding future presented a complex service planning

context for Caltrain. And, railroads themselves are complex systems: successful operation is the result of many interconnected pieces and processes working together to achieve a desired service. Major changes to service or infrastructure impact all other parts of the railroad. Therefore, improving Caltrain service will require investment across multiple areas.

Among these categories, one of the biggest challenges is the need to add more tracks and determining where to add them, and managing the costs and impacts associated with adding tracks. The amount of new track required was a key differentiator between service options. Adding more Caltrain service also significantly impacts the operation of at-grade crossings and terminal facilities at the ends of the line. Caltrain is a 150-year-old rail corridor with communities that have grown up around the rail service. As a result, there is a minimal amount of room around the tracks, and in many areas, Caltrain's corridor runs through mature downtowns, creating limitations on the ability to expand infrastructure.

The possibility of growth in Caltrain service must be considered as far in advance as possible so that these impacts can be addressed, and infrastructure can be designed efficiently and implemented strategically. Careful planning allows for investments to be made in a way that is cost effective and minimizes community impacts.

IMPROVING CALTRAIN SERVICE REQUIRES INVESTMENT ACROSS MULTIPLE AREAS



OPERATIONS

Increased service coordination and expanded operations to maximize the use of physical infrastructure



INFRASTRUCTURE

Track enhancement and expansion, station and terminal improvements, grade crossings.



SYSTEMS

Improved train performance, fleet expansion, improved train control and signaling.

4.2 SERVICE PLAN DEVELOPMENT

The Caltrain Business Plan service planning process followed a rigorous methodology, tailored to Caltrain's specific context.

There were three areas of inquiry in the service planning process:

- 1. Service Differentiation:**
How can local, regional and high-speed services be blended and balanced in the corridor to best serve multiple markets?
- 2. Peak Service Volume:**
How much growth of peak train traffic volume can the corridor support and what types of service growth may be required to meet long term demand?
- 3. Service Investments:**
What types of investments into operations, systems and infrastructure will be required to achieve the desired types and volumes of service?

As shown in the diagram below, the service planning process started by developing some parameters and goals for future service plans. Caltrain then identified a range of different service approaches, developed peak-hour concepts in the corridor and screened and evaluated those concepts. Caltrain then extended those concepts south to Gilroy and looked at how they would work at terminals, as well as on weekends and off-peak. Finally, the service plans were subjected to detailed microsimulation to confirm they would perform well when service is disrupted by unplanned events and other operational variations.

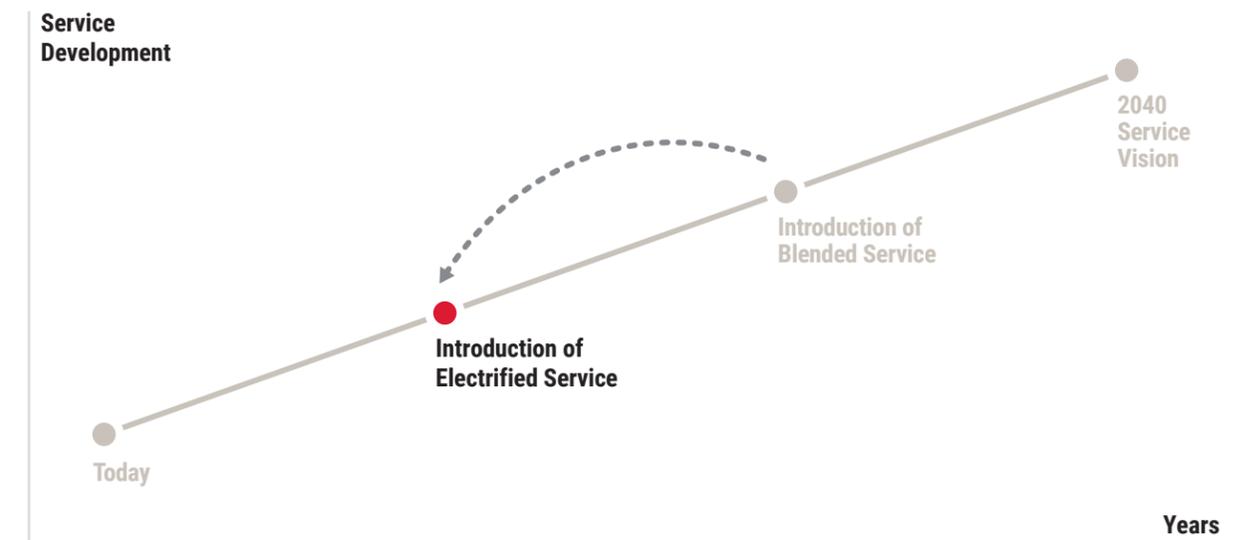
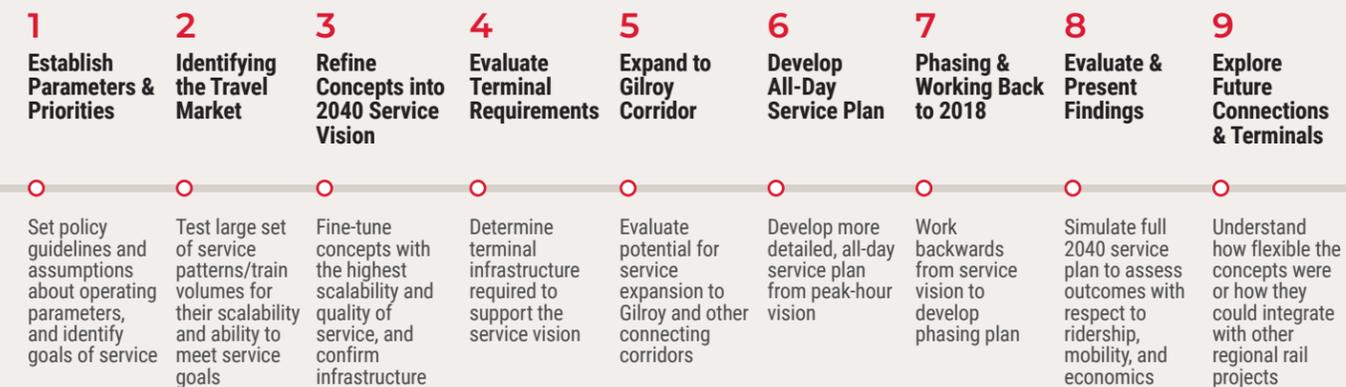
This was followed by a range of explorations and terminal analyses to understand how flexible the concepts were or how they could integrate with other regional rail projects.

Caltrain chose the Year 2040 as the planning horizon for the service planning analysis because it provides a sufficiently long period of time to fully implement electrified service; to conduct additional planning and development; and implement the partner, community and Caltrain projects required to support much higher levels of train service.

Determining the total number of trains that could use the corridor in 2040 during the peak was the foundational planning question. As the figure below shows, the process focused on a 2040 Service Vision and then worked backwards to the introduction of blended service, and then again to the introduction of electrified service.

THE CALTRAIN BUSINESS PLAN SERVICE PLANNING METHOD WORKS BACKWARDS FROM A 2040 VISION.

SERVICE PLANNING PROCESS



A PRIMER

ON THE LANGUAGE OF RAIL SERVICE PLANNING USED IN THE CALTRAIN BUSINESS PLAN

SERVICE PATTERNS (OR “SERVICE OFFERINGS”)

Service patterns, or service offerings, are different ways trains typically serve stations. For Caltrain, service patterns were tested to understand how different approaches performed against service goals. Service patterns can be organized into categories:

Local Service makes all stops on the line it operates. Local service provides maximum service coverage at the expense of end-to-end travel times.

Regional Express service stops at select stations to improve travel times between key markets. Today, Caltrain’s Baby Bullet service operates as a regional express between San Francisco and San José.

Zone Express service stops at a group of stations in succession within a zone and then operates as an express train.

Intercity Express service provides express service between more distant major station hubs. HSR service would function as an intercity express between San Francisco, Millbrae, San José, and Gilroy.

Skip-Stop service is a hybrid between local and express service. Skip-stop trains alternate stops to increase the average speed of trains by reducing the number of stops.

TRIP-TIME

Trip-Time (or run-time) is the amount of time it takes for a train to complete a journey. Rather than simply dividing distance by speed, trip-time is the culmination of factors that impact a trip.

PURE RUN-TIME

Pure run-time is the time it takes for a train to get from point A to point B. Acceleration and deceleration are important as the train negotiates stops, curves, or other features.

DWELL TIME

Dwell time is the time added at platforms while passengers board the train. Crowding, bicycles, or accommodations for passengers are factors that can increase dwell time.

SUPPLEMENTAL RUN TIME

Supplemental run time (or recovery time) is time added to account for planned meets between trains, connections with other services, or routine, minor delays.

TRACK ALIGNMENT

Track alignment refers to how many tracks exist in a specific segment. Track alignment is a major factor in capacity and helps determine what types of service patterns are possible.

Single-Track refers to a section where only a single set of tracks exist to accommodate traveling in either direction. Trains traveling in opposing directions must wait for traffic to clear before entering a single-track alignment. In busy corridors, this can present a choke-point and limit frequency or reliability. However, properly organized, single tracked sections can provide highly reliable, frequent, bi-directional service.

Double-Track refers to an alignment of two sets of tracks, serving trains in either direction. Double-track offers more capacity for more diverse service patterns.

Triple-Track refers to an alignment where three sets of tracks are present to accommodate overtakes, express service, or freight service.

Four-Track refers to an alignment where four sets of tracks are present.

Passing track (or sidings) can offer opportunities for increased capacity and service operations without the capital investment of adding a full track to the corridor. Passing tracks are an important tool to run mixed services (passenger and freight, express and local) in constrained single- or double-track corridors while not overbuilding unnecessary infrastructure.

SERVICE DIAGRAM

A service diagram is a depiction of the services offered in a given corridor. Like a subway-style transit map, a service diagram presents a customer-focused approach to analyzing different service patterns and hubs in a network.



TIMETABLE

A timetable is more than a schedule for when and where trains stop; it is the organizing plan for the network, how capacity is managed, and what infrastructure is needed to support the service. The timetable allows operators to visualize dependencies between service, operation, and infrastructure and identify pin-point investments needed to optimize the system.

RAIL NETWORK COMPONENTS

Caltrain’s Service Vision is based on the concept of networked rail – a system where many train services are connected in way that is convenient for passengers. These are the building blocks of a networked rail system:

Hubs are key stations in the network and are typically major destinations, terminals, and/or stations where two lines connect. Networked services are designed around connectivity at Hub stations. Hub stations aren’t necessarily the most important cities or towns, rather they are the key connection points in the overall network.

Corridors are the line or lines that connect the hubs. Some corridors may have a single operator providing a single service type; others may have multiple operators providing multiple service types. The success of the network design depends on the right service levels with the right service types providing connectivity to the hubs.

Pulse Schedule are the organizing principle of integrated networks. Pulse schedules design service around connections at hubs in order to give people access to origins and destinations throughout the network with minimum complexity and infrastructure. Pulse schedules provide regular, repeating service throughout the day that is customer-focused. For example, trains would leave every five minutes after every hour at a given hub station.

4.3 SELECTION OF A SERVICE VISION

The Business Plan team developed illustrative service plans for three growth scenarios: Baseline Growth, Moderate Growth, and High Growth. Each of these growth scenarios represented a different option for the kind of service Caltrain could provide in 2040 given different levels of supporting investment.

The Baseline Growth scenario created a basis of comparison for new 2040 service planning scenarios and addressed the service needs of all the pre-existing projects and policies along the corridor. The Moderate and High Growth scenarios were developed to demonstrate how Caltrain could meet the changing needs of the corridor by investing in additional service, infrastructure and system improvements beyond what was already proposed for the corridor.

The Baseline Growth, Moderate Growth and High Growth service plans were turned into comprehensive Growth Scenarios by combining them with infrastructure requirements and evaluated against a broad set of performance metrics through a Business Case Evaluation as described in Chapter 2. Based on this evaluation and public and stakeholder input, the **Moderate Growth scenario was selected** by the Caltrain Board of Directors as the 2040 Caltrain Long Range Service Vision, with policy language directing staff to consider,

and where practicable, accommodate the potential for even greater train volumes in the future.

4.4 THE 2040 SERVICE VISION

The service plan for the 2040 Service Vision (or Moderate Growth scenario) is characterized by two Caltrain service patterns (Local and Regional Express) along with HSR, each operating at 15-minute headways (or four times per hour) during the peak period.

Four high-speed trains operate between San José and San Francisco with two stopping at Millbrae and 4th & Townsend and two operating non-stop to Salesforce Transit Center. Both the Moderate and High Growth service plan operate on a 15-minute clock face schedule, with regularly spaced trains throughout the hour, avoiding bunching.

In this scenario, a **10-car Regional Express train** operates in between the high-speed slots with eight intermediate station stops between

San Francisco and San José. This service provides regular, frequent, limited-stop service between San José, San Francisco and major intermediate markets such as Redwood City, Palo Alto, and Mountain View. Regional Express trains would serve most of the current and future travel demand in the corridor, which tends to be intermediate- to long-distances.

A **six-car Local train** would complement the Regional Express serving most stops with 15-minute

headways. However, to operate within the limited passing track infrastructure in the service plan, some skip stop elements are necessary for the Local service. A local train can only stop twice between San Bruno and Hillsdale and between Hillsdale and Redwood City. These constraints result in infrequent half-hour local service for Broadway, Burlingame, San Mateo, Belmont and San Carlos. Additionally, Atherton, College Park, and San Martin would be served on an hourly or exception basis due to lower demand.



A key feature in the Moderate and High Growth plans is a timed transfer between Local and Regional Express trains at Redwood City. This transfer point improves intra-corridor connectivity and provides an opportunity for cross bay transfers to a future Dumbarton Rail service. Cross platform transfers between the Local and Regional Express services would occur for each train every 15 minutes.

The Moderate Growth plan includes several locations in which faster trains overtake slower trains along the corridor. To facilitate these overtakes, approximately three miles of new four track segments and stations are needed. These infrastructure

investments include a short four track main line section between Hayward Park and Hillsdale (inclusive of stations), a four track station at Redwood City, and a four track station somewhere in northern Santa Clara county (Palo Alto, California Avenue, San Antonio, or Mountain View). The service plan, as defined, used California Avenue as an overtake location, but some flexibility remains to shift this north or south without fundamentally changing the nature of the plan. Rail tracks are also required just beyond the Blossom Hill station to facilitate turning two Regional Express trains at this location, achieving 15-minute headways at both Blossom Hill and Capitol stations.

During the off-peak periods and weekends, Caltrain would operate six trains per hour, per direction – four Regional Express trains and two Local trains. This approach maximizes all-day Caltrain use between major markets, but scales back service to smaller markets. Although most stations would receive two to six trains per hour, per direction, Mid-Peninsula stations served by skip stop Local service would receive hourly service. However, should a stronger market for off-peak and weekend service materialize, Caltrain may increase Local service accordingly.³

The figure on the next page shows the weekday peak period service plan.

³ While BART is able to maintain relatively frequent off-peak and weekend service by reducing train consist lengths, Caltrain's EMU fleet is less flexible due to rolling stock and location of train storage facilities. Changes to consist length have not been assumed in the service plans.



MODERATE GROWTH SCENARIO

Service Plan Description

- **Local and Express trains each operating at 15 minute frequencies with timed cross-platform transfer at Redwood City**
- **Skip stop pattern for some Mid-Peninsula stations; some origin-destination pairs not served at all**
- **Trains serve Capitol and Blossom Hill every 15 minutes and Morgan Hill and Gilroy every 30 minutes**

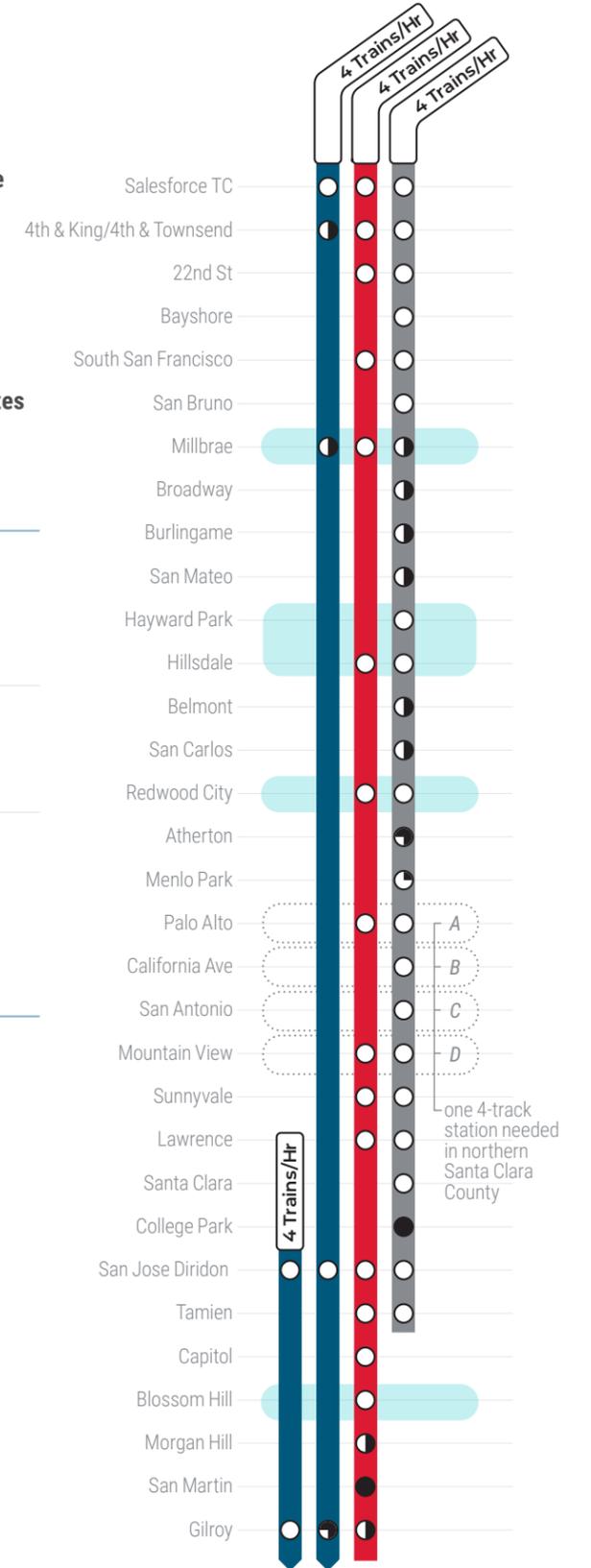
Trains per Hour, per Direction 8 Caltrain + 4 HSR *Peak*
 6 Caltrain + 3 HSR *Off-Peak*
 6 Cars *Stopping Pattern Local*
 10 Cars *Express*

Travel Time, Salesforce TC-Diridon 67 Minutes *Express*
 88 Minutes *Local*

New Passing Tracks Millbrae
 Hayward Park-Hillsdale
 Redwood City
 Northern Santa Clara County
 Blossom Hill

Service Type	Service Level (Trains per Hour)
HSR	● ◐ ◑ ◒ ◓
Skip Stop	<1 1 2 3 4
Express	Peak Direction Trains/Hour
Local	

Conceptual 4 Track Segment or Station to be refined through further analysis and community engagement.



2040 LONG RANGE SERVICE VISION

1

Caltrain’s Long Range Service Vision directs the railroad to plan for substantially expanded rail service that, by 2040, will address the local and regional mobility needs of the corridor while supporting local economic development activities. When fully realized, this service will provide;

- A. A mixture of express and local Caltrain services operated in an evenly spaced, bi-directional pattern
- B. Minimum peak hour frequencies of:
 - Eight trains per hour per direction on the JPB-owned corridor between Tamien Station in San José and San Francisco, extended to Salesforce Transit Center at such time as the Downtown Extension is completed
 - Four trains per hour per direction between Blossom Hill and Tamien Stations, subject to the securing of necessary operating rights
 - Two trains per hour per direction between and Gilroy and Blossom Hill Stations, subject to the securing of necessary operating rights
- C. Off-peak and weekend frequencies of between two and six trains per hour per direction north of Blossom Hill and hourly between Gilroy and Blossom Hill, with future refinements to be based on realized demand
- D. Accommodation of California High-Speed Rail, Capitol Corridor, Altamont Corridor Express and freight services in accordance with the terms of existing agreements

- E. Delivery of these services will occur through the incremental development of corridor projects and infrastructure to be further defined through individual planning process, feasibility studies and community engagement. At this time, such infrastructure is conceptually understood to include:
 - Investments in rail systems including a new, high performance signal system
 - Station modifications including platform lengthening, level boarding, and investments in station access facilities and amenities to support growing ridership and improve customer experience
 - New and modified maintenance and storage facilities in the vicinity of both terminals as well as the expansion of the electrified Caltrain fleet
 - A series of short, four-track stations and overtakes at various points throughout the corridor
 - Completion of key regional and state partner projects including:
 - The Downtown Extension to the Salesforce Transit Center
 - The reconstruction of Diridon Station and surrounding rail infrastructure
 - The reconstruction and electrification of the rail corridor south of Control Point Lick to the Gilroy Station
 - Additional improvements to allow for the operation of High-Speed Rail service between Gilroy and San Francisco
 - The substantial grade separation of the corridor as well as safety upgrades to any remaining at-grade crossings, undertaken in a coordinated strategic manner driven by the desires of individual local jurisdictions as well as legal requirements associated with any proposed four-track segments.

The 2040 Long Range Service Vision has been adopted by the Peninsula Corridor Joint Powers Board (JPB) to guide the long-range development of the Caltrain rail service and supporting plans, policies and projects. This Long Range Service Vision will be periodically reaffirmed and updated by the JPB.

2

Caltrain’s Long Range Service Vision further directs the railroad to continue its planning for a potential “higher” growth level of service as well as potential new regional and mega-regional connections. Specifically, the Long Range Service Vision directs the railroad to:

- A. Work with regional and state partners to collectively plan for and study the feasibility of higher levels of service as well as expanded regional and mega-regional rail connections. This work includes planning related to the Dumbarton Rail Corridor, a potential second Transbay Crossing, the potential for expanded Altamont Corridor Express and Capitol Corridor services, a potential extension of rail service to Monterey county, and ongoing planning related to the California High-Speed Rail system.
- B. To take certain specific actions to anticipate and, where feasible and financially practicable, facilitate, such higher levels of service and connections as they specifically relate to:
 - The planning of rail terminals and related facilities
 - The sale or permanent encumbrance of JPB land
 - The design of grade separations in areas where four-track segments may be required
 - The sizing of future maintenance facilities and storage yards
- C. To return to the Board with a recommendation regarding any formal expansion of the Long Range Service Vision at such a time as clear regional and state policy commitments are in place, the financial, operational and physical feasibility of such an option in the corridor has been confirmed, and community impacts have been assessed and affected communities have been consulted.

3

Caltrain’s Long Range Service Vision directs the railroad to prepare for the implementation of the Vision by:

- A. Completing the Caltrain Business Plan including additional analyses of issues related to funding, connectivity and access, and equity as well as the identification of a detailed implementation program of next steps and follow on work
- B. Evolving the organization in a manner that best prepares the railroad to deliver the Service Vision by deliberately and transparently addressing the issues of service delivery, internal organization and governance
- C. Seeking the new and dedicated sources of funding that will be needed to sustain the railroad’s operation and to incrementally implement the long range Service Vision

4

Finally, Caltrain’s Long Range Service Vision directs the railroad to periodically reaffirm the Vision to ensure that it continues to provide relevant and useful guidance to the railroad. Such reaffirmations should occur:

- A. At a regular interval of no less than five years
- B. In response to significant changes to JPB or partner projects that materially influence the substance of the Long Range Service Vision

4.5 HIGH GROWTH SERVICE PLAN

As described in statement #2 of the narrative above, the adopted Service Vision directed Caltrain to adopt the Moderate Growth scenario but continue to consider and plan for the potential to implement a higher growth scenario through coordination with other regional and state planning efforts.

The High Growth service plan provides a similar style service offering as the Moderate Growth service plan but adds an extra four Regional Express trains per hour, per direction to the Moderate Growth service plan. The High-Speed Rail and Regional Express trains are the same in both plans. Service south of Tamien and during

off-peak periods and weekends would mirror the Moderate Growth service plan.

The High Growth service plan differs from the Moderate Growth service plan in two ways. First, by adding additional passing track infrastructure, it offers a nearly complete Local stop service without the skip stop elements of the Moderate Growth service plan. Second, the additional passing track infrastructure enables a second six-car Regional Express service providing additional service to secondary travel markets and additional seats to major markets.

The High Growth service plan needs

approximately 15 miles of new four track segments spanning South San Francisco to Millbrae, Hayward Park to Redwood City, and California Avenue to Mountain View (or elsewhere in northern Santa Clara County between Palo Alto and Mountain View). In general, additional passing tracks enable additional service at 4-track stations, and there is flexibility in service levels between stations. Nonetheless, the stopping pattern of the second Regional Express service is somewhat constrained even with this infrastructure: trains cannot stop north of Burlingame.

The figure on the right shows the weekday peak period service plan.



HIGH GROWTH SCENARIO

Service Plan Description

- **Local and Express A trains each operating at 15 minute frequencies with timed cross-platform transfer at Redwood City**
- **Express B trains operate every 15 minutes between 4th & King and Tamien**
- **Local trains make nearly all stops**
- **Trains serve Capitol and Blossom Hill every 15 minutes and Morgan Hill and Gilroy every 30 minutes**

Trains per Hour, per Direction 12 Caltrain + 4 HSR *Peak*
6 Caltrain + 3 HSR *Off-Peak*
6 Cars *Stopping Pattern Local*
10 Cars *Express*

Travel Time, Salesforce TC-Diridon 6 Cars *Local*
10 Cars *Express A*
6 Cars *Express B*

Stopping Pattern (Train Cars) 67 Minutes *Express*
88 Minutes *Local*

New Passing Tracks South San Francisco-Millbrae
Hayward Park-Redwood
Northern Santa Clara County
Blossom Hill

Service Type

- HSR
- Skip Stop
- Express
- Local

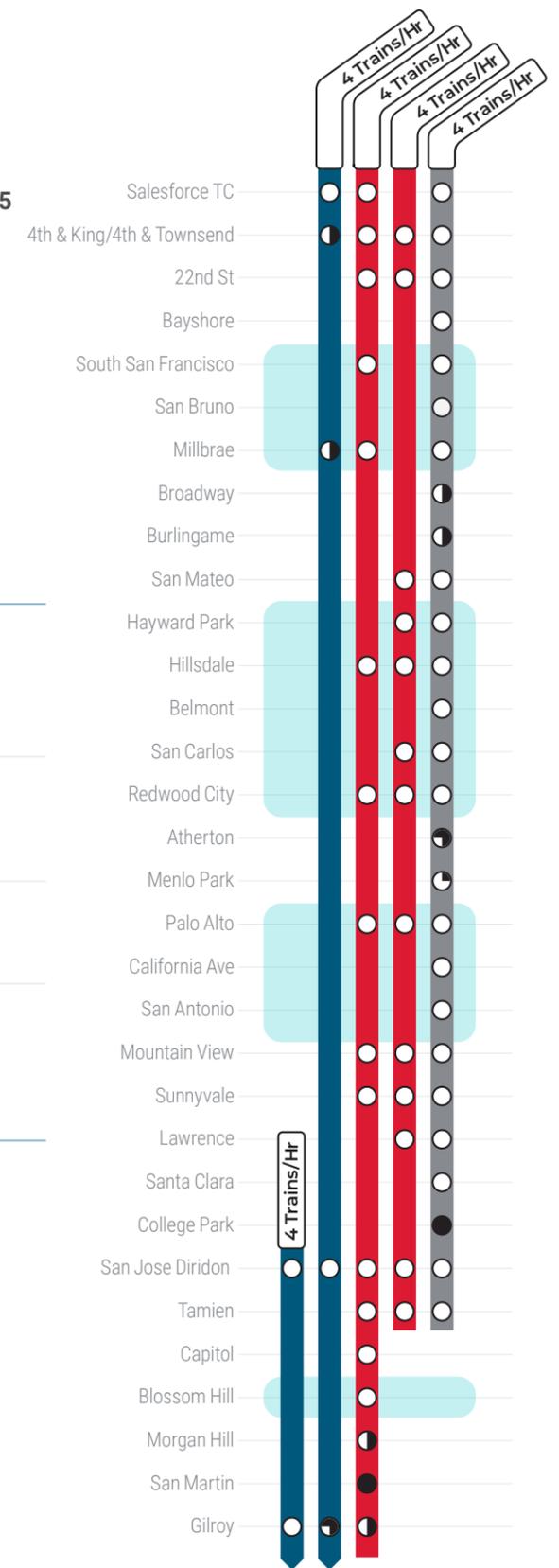
Service Level (Trains per Hour)

● ◐ ◑ ◒ ◓

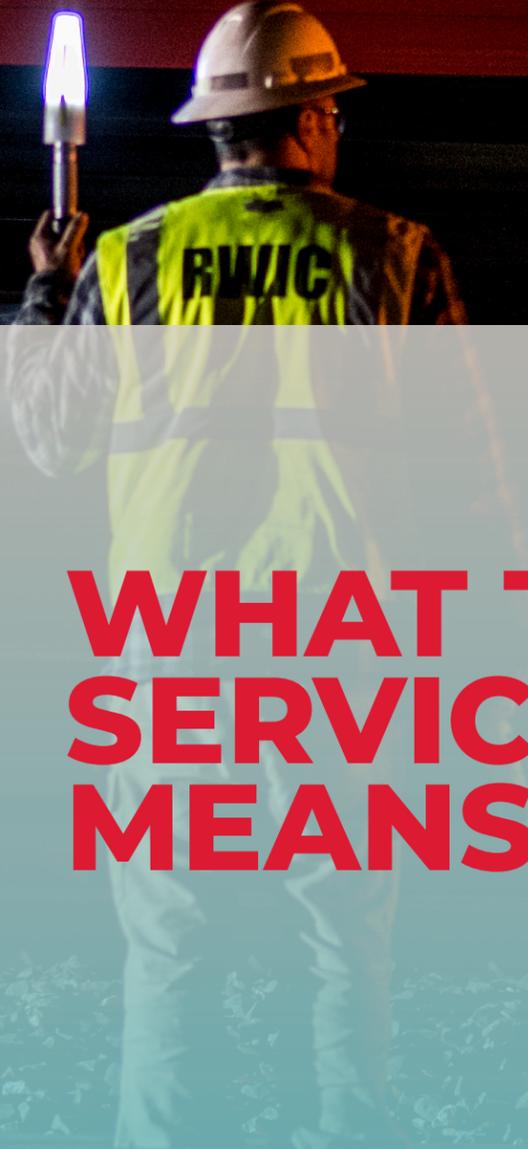
<1 1 2 3 4

Peak Direction Trains/Hour

Conceptual 4 Track Segment or Station to be refined through further analysis and community engagement.



05



**WHAT THE
SERVICE VISION
MEANS**

The 2040 Service Vision delivers benefits to the riders, corridor, and region. This section describes the implications of the Service Vision compared to existing service in the corridor, using the Business Case Evaluation methods described in Chapter 2: How Caltrain Did It.

One of the best ways to understand what the Service Vision means is to compare it to what service looks like today. This chapters summarizes the impacts of the Service Vision in terms of customer focused measures such as connectivity and frequency; interactions with communities Caltrain runs through; and Bay Area regional benefits such as traffic and air quality.

5.1 WHAT IT MEANS FOR RIDERS

For riders, the Service Vision represents a transformational difference in access, mobility, convenience and usability across the length of three counties – from San Francisco’s financial district, through the heart of Silicon Valley, to Gilroy. These benefits can be understood in four ways: Connectivity, Frequency, Travel Time, and Convenience.

5.1.1. CONNECTIVITY

Caltrain riders would be more connected to destinations along the corridor than they are today under the Service Vision as highlighted in the figure below. 96% of station pairs would be connected without a transfer compared to today’s service. Only 17 station pairs would not be connected at all with the Service Vision compared to 95 station pairs today. This means more direct travel options for riders and a greater ability to access all of the corridor destinations on Caltrain.

Caltrain riders would also be able to more conveniently connect to other transit services because of timed connections at regular intervals. Today, trains do not arrive and depart at regular intervals, making it difficult to time connections to other transit providers. The Service Vision expands the reach of Caltrain and reduces wait times for transferring riders by providing opportunities for seamless, coordinated connections with other transit services because other transit providers will be able to align their schedules at major transfer stations to facilitate short wait times. Timed

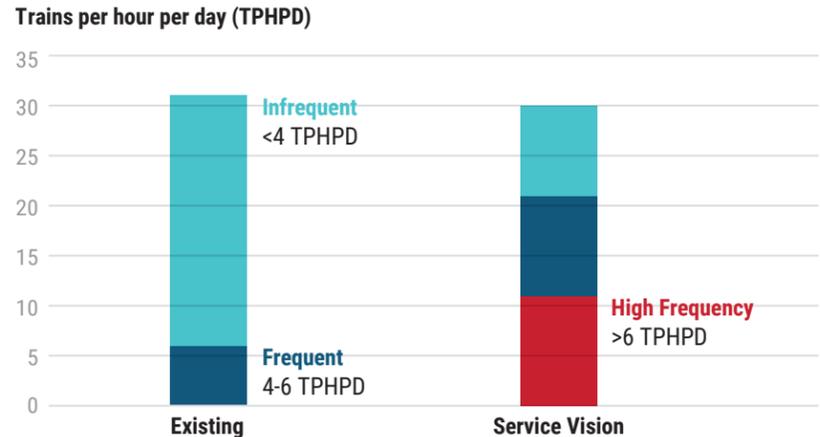
connections between Caltrain and other transit providers creates the foundation for Caltrain to become a key part of Bay Area’s regional network.

5.1.2. FREQUENCY

The Service Vision provides expands service in a number of ways, providing more commute service, more stations

with high frequency service and more express service. Commute service goes from five trains an hour today to eight trains in the Service Vision and the commute period is extended from four to five hours. Under the Service Vision, 21 stations have a train every 15 minutes in the peak compared with four stations today. Express service is also expanded to 12 stations compared to six stations today depending on the specific hour.

SERVICE VISION PROVIDES MORE STATIONS WITH HIGH FREQUENCY SERVICE



5.1.3. TRAVEL TIME

Riders of express trains will be able to travel from San Francisco to San José in less than an hour compared to 62-69 minutes today and those benefits will extend into the off-peak periods when Caltrain will continue to operate express trains, in contrast to today, as shown in the table below.

TRAVEL TIMES BETWEEN MAJOR STATIONS

ORIGIN	DESTINATION	2019		SERVICE VISION REGIONAL EXPRESS	
		TRAVEL TIME	WAIT TIME	TRAVEL TIME	WAIT TIME
4TH & KING	Palo Alto	38-42	7-47	34	15
4TH & KING	Redwood City	36-58	5-49	29	15
4TH & KING	San José	62-74	5-45	56	15
SAN JOSÉ	Palo Alto	23-28	7-47	21	15
SAN JOSÉ	Redwood City	29-36	5-49	26	15

5.1.4. CONVENIENCE

The Service Vision greatly expands the convenience of using the system for a variety of riders by increasing service levels throughout the day and extending service hours. Specific benefits include:

Midday frequency

Up to six midday trains per hour, each way. This is compared with one train per hour today.

Show up and go

15-minute express train service all day. This is compared to no all-day express service today.

Connected corridor

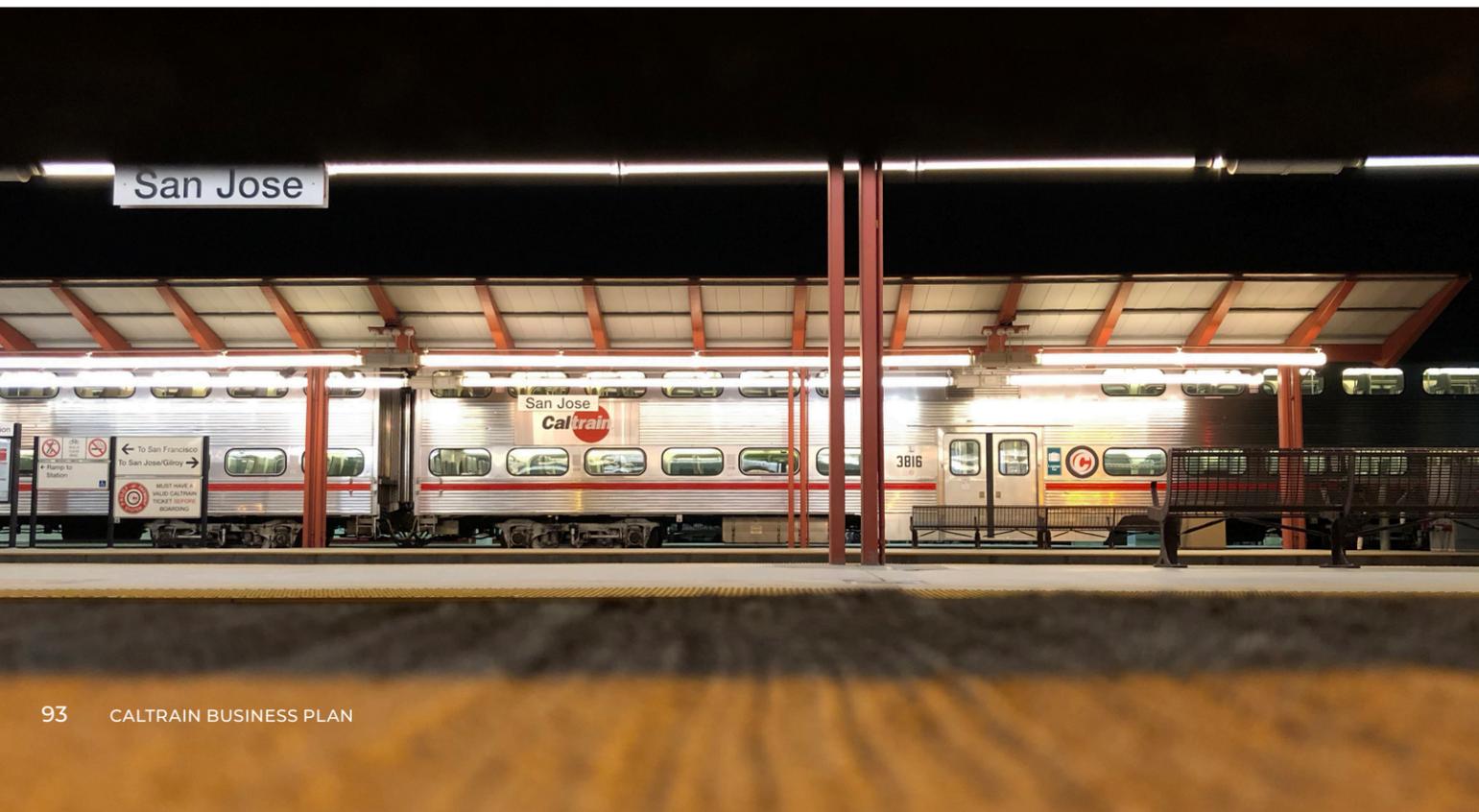
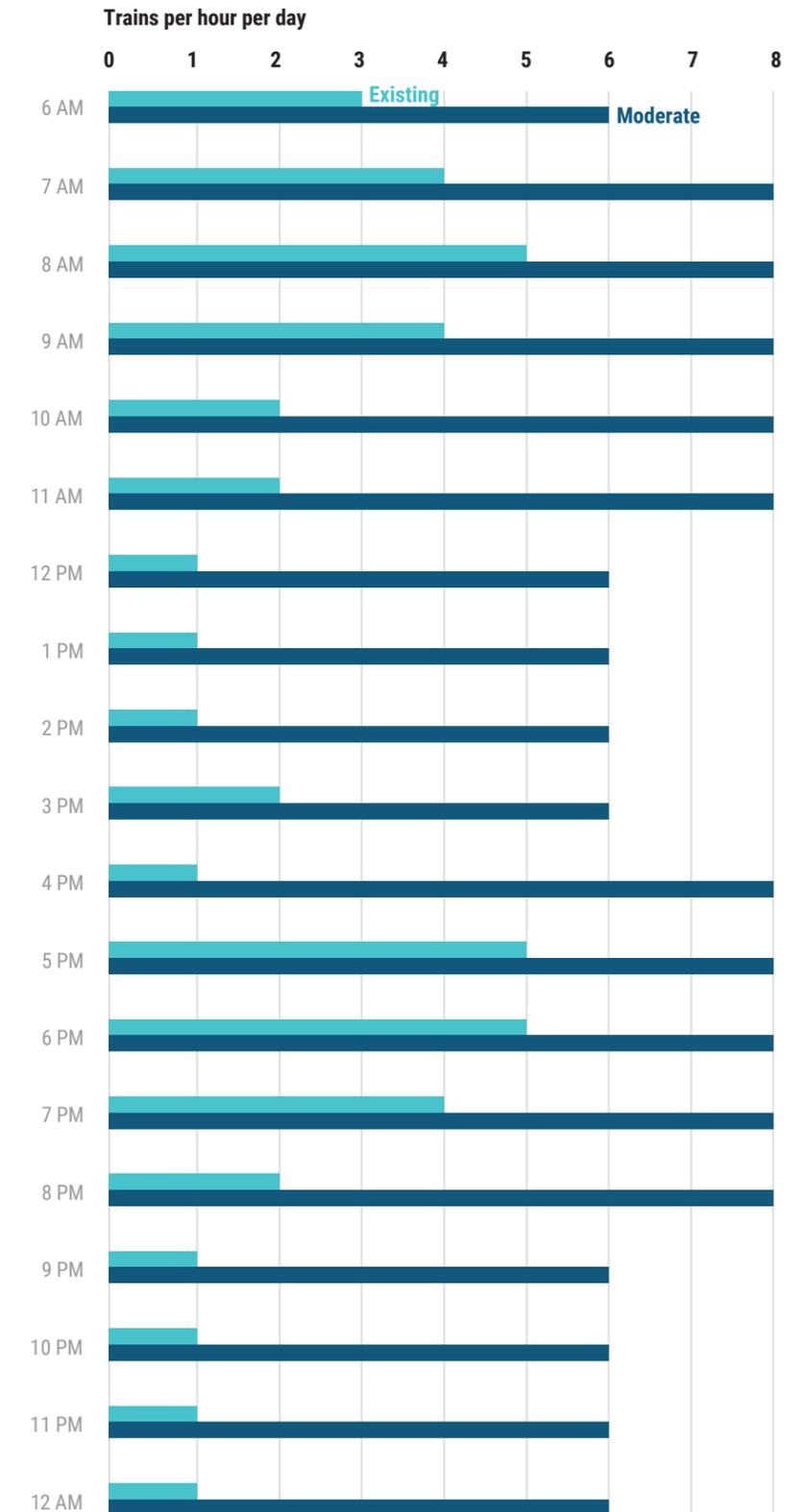
All-day service would be available on the 77-mile corridor from San Francisco to Gilroy. This is compared to just 50 miles of all-day service from San Francisco to San José today.

Regular Service

Simplified schedules with clearly differentiated services and consistent stopping patterns compared to variable stopping patterns depending on train today.

These are critical improvements for riders who need to access Caltrain using a connecting transit service and ride during off-peak hours, better capturing non-work trips made by students or older adults and non-traditional work schedules such as service or shift workers. A more robust discussion of the equity implications of the Service Vision is included in [Section 5.7](#).

SERVICE LEVELS BY TIME OF DAY, 2019



5.2 WHAT IT MEANS FOR COMMUNITIES



Through the Business Plan process, stakeholders identified how service growth and associated improvements will affect their communities, both positively and negatively. The Service Vision means many more trains running through cities, more riders getting on and off at stations, more access to destinations in the corridor and the region and an enhanced transportation option to help manage and support local land use development activities. Expanded train service will also have an effect on areas of community focus including grade crossings, safety, and noise.

As the railroad electrifies and grows it will become essential for there to be an increasingly intentional, corridor-wide approach to railroad-community projects. This section describes key areas where communities and Caltrain will work together to manage issues and opportunities arising from implementation of the Service Vision. Caltrain and adjacent communities have a long history of working together to improve safety, access, and mobility along the corridor and to better integrate the railroad into the communities where they interface.

5.2.1. PHYSICAL INFRASTRUCTURE AND EQUIPMENT

Caltrain owns and operates extensive physical equipment that support the operation and maintenance of the railroad. This infrastructure spans the length of the corridor and interfaces in various ways with each community.

Caltrain's physical infrastructure and equipment include:

Facilities encompasses maintenance, storage, and turning facilities. Maintenance facilities are buildings that are used to repair Caltrain vehicles

and other equipment. Storage facilities are buildings where Caltrain stores vehicles not currently in use. Turning facilities typically sit in locations at the end of rail lines and provide space and track to turn rail vehicles around.

Track refers to the tracks on which the rail vehicles run, including the ballast (the gravel that forms the rail bed along the corridor).

Fleet refers to the train vehicles used for Caltrain rail service. The railroad currently uses a diesel fleet for its service, but as part of the electrification project, Caltrain will be adding new electric trains – known as

electric multiple units (EMUs) to the fleet for service. Mixed-fleet Caltrain service, with both diesel and electric trains, is anticipated to commence in 2024.

Systems and equipment includes communications equipment to track trains; signaling equipment for train operators; positive train control (PTC) – a train safety system, and traction power facilities which provide electricity to trains.

The Service Vision's growth in rail service levels will require further investment in major facilities along the Caltrain corridor. These physical

investments that are needed to achieve the Service Vision will be implemented using a phased program of rail expansion over the next two decades. These additional improvements include:

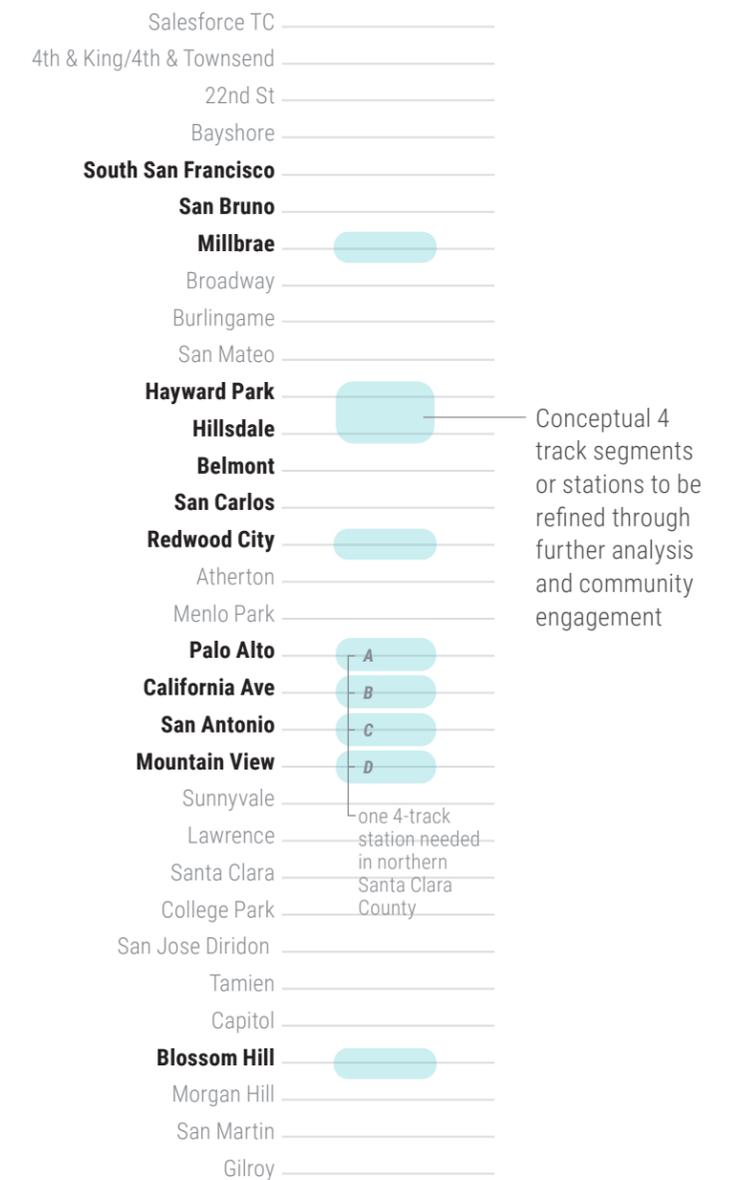
Fleet - With the arrival of the new fleet of EMUs as part of Caltrain electrification, the railroad's Centralized Equipment Maintenance and Operations Facility (CEMOF) will be operating near capacity. Growth in the future fleet, which is needed to support increased rail service, will likely require additional space in a new facility.

Passing Tracks - With more complex and frequent service, the Service Vision requires the addition of new passing track infrastructure. While the specific locations of passing infrastructure has not been determined, initial planning resulted in a concept that includes approximately five miles of new infrastructure which could be configured as follows:

- Four-track station in Millbrae for High-Speed Rail
- A short passing track between Hayward Park and San Mateo
- Four-track station in Redwood City to facilitate passing and transfers between express and local trains
- Four-track station in Northern Santa Clara County – either Palo Alto, California or San Antonio or Mountain View would need to be a four-track station
- Either a four-track station or turnaround tracks to enable better service to Blossom Hill and stations in southern San José

SERVICE VISION PASSING TRACK NEEDS

The Service Vision requires **less than 5 miles of passing track** infrastructure to support blended service with HSR, so that faster trains can pass slower trains at multiple points in the corridor.



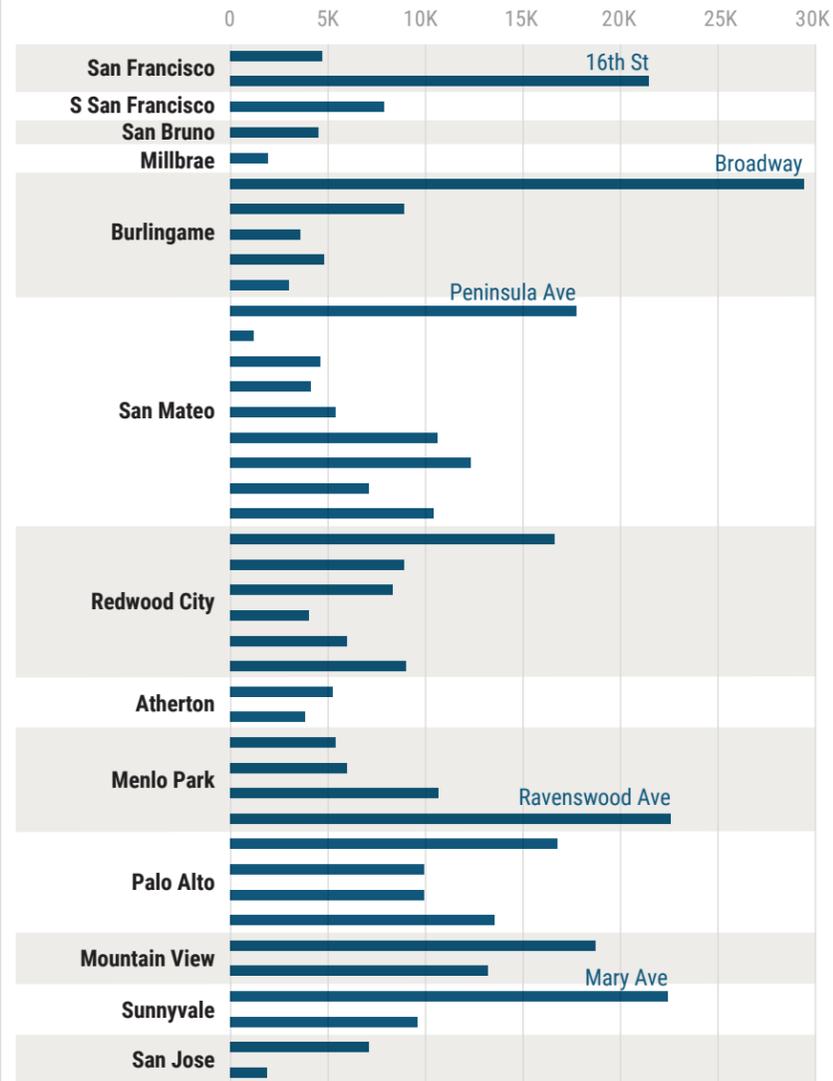
5.2.2. CROSSINGS

Crossings of the railroad track by roads or bicycle and pedestrian facilities are an important issue for both Caltrain and its surrounding communities. **At-grade crossings** occur where railroad tracks cross at the same level as the road.

Grade-separated crossings physically separate railroad tracks from other modes as either over- or under-crossings. These are typically rail track bridges over a roadway or road underpasses. While grade separations allow for higher speed of traffic, they can be space intensive, and complicated and expensive to build and maintain.

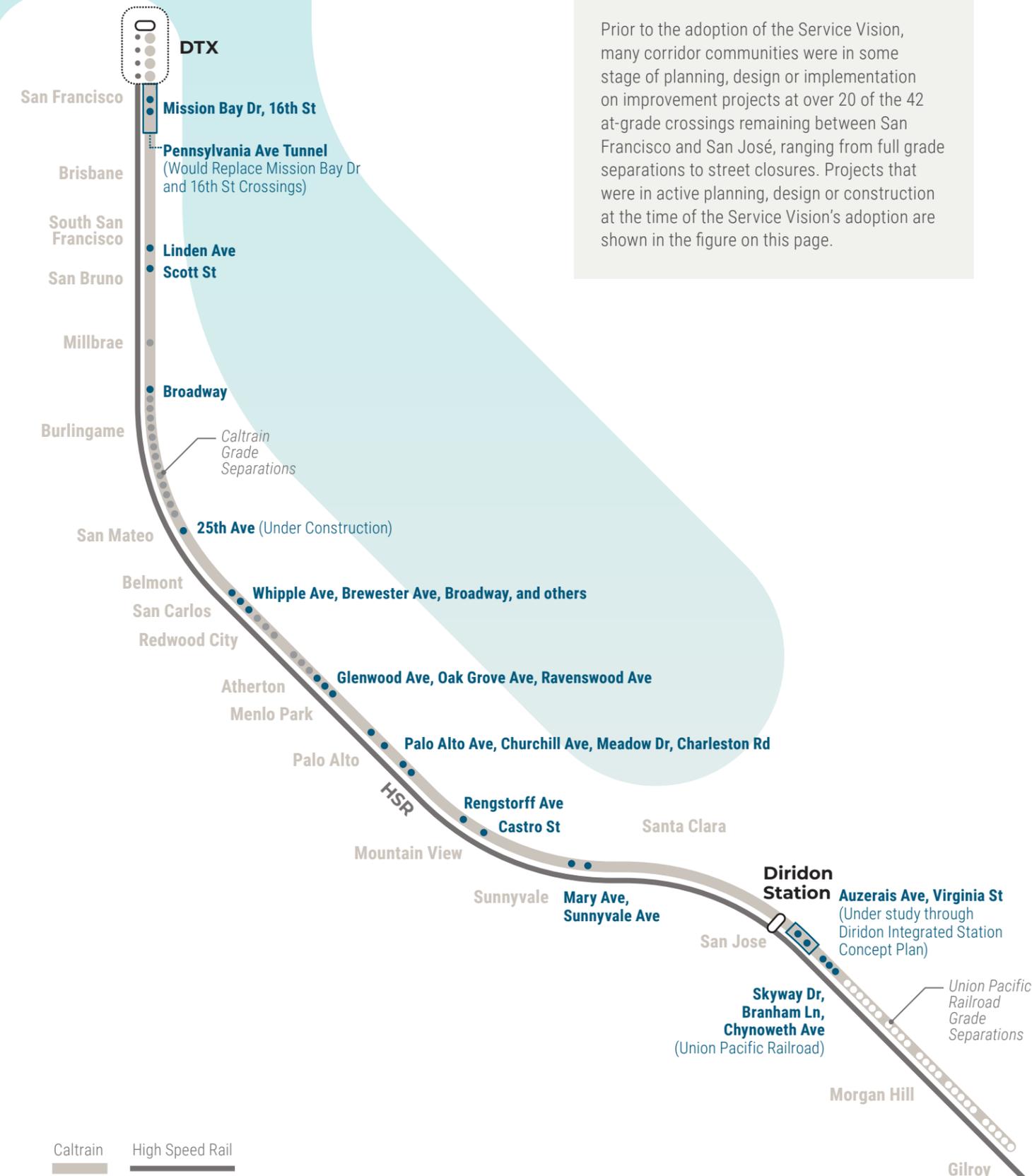
Today, 71 of the 113 crossings along the Caltrain corridor are grade separated (63%) and 12 of the 30 crossings along the UP Corridor have been separated (29%). During a typical weekday, Caltrain's at-grade crossings are traversed by approximately 400,000 cars, equivalent to the combined traffic volumes on the Bay and San Mateo Bridges. As shown on the graph, the 10 busiest at-grade crossings accounted for half of all 2016 traffic volumes.

DAILY TRAFFIC CROSSING CALTRAIN GRADE CROSSINGS, 2016



OVER 20 AT-GRADE CROSSINGS PROJECTS WERE ACTIVE DURING THE SERVICE VISION'S ADOPTION

Prior to the adoption of the Service Vision, many corridor communities were in some stage of planning, design or implementation on improvement projects at over 20 of the 42 at-grade crossings remaining between San Francisco and San José, ranging from full grade separations to street closures. Projects that were in active planning, design or construction at the time of the Service Vision's adoption are shown in the figure on this page.



Grade separation projects are in planning or under construction at 20 out of 42 at-grade crossings

The 2040 Service Vision acknowledges that many additional crossing improvements and grade separations will be needed and desired on the corridor. The impetus to pursue grade separation or crossing improvements can be driven by regulatory requirements (areas where more than four tracks are planned require grade separation under California Public Utilities Commission guidance), local circulation and connectivity concerns, or safety reasons.

The challenge of addressing the railroad's at-grade crossings is significant. Following the completion of the Business Plan, Caltrain has committed to undertake a corridor-wide grade separation strategy. Through this effort, Caltrain will need to work together with local jurisdictions, county transportation authorities and congestion management agencies.

5.2.3. STATIONS

Rail stations connect customers to trains through station buildings, platforms, station amenities, wayfinding, and lighting. Caltrain's 32 stations vary widely in size, facilities, and number of passengers served. Ownership of station land and assets varies across the Caltrain corridor, though most stations are predominantly owned by the JPB between San Francisco and San José. Other entities own portions of stations (e.g., significant portions of the Palo Alto Station are owned by Stanford). Santa Clara Valley Transit Authority (VTA) owns all stations south of Tamien Station. Some of the older station buildings are subject to historic landmark protections and regulations, which Caltrain must comply with as part of the railroad's ongoing station operations and maintenance.

Many stations will need to be upgraded to accommodate the expected increase in service and ridership that will be achieved with the Service Vision. This would include extending platforms system-wide to accommodate longer trains; sizing amenities to comfortably accommodate larger crowds; adding new stairways and enhanced vertical circulation to accommodate a larger volume of passengers at many stations; and reconfiguration of station layouts to support new access facilities. Improving station wayfinding will be increasingly important to facilitate movement of a higher number of customers. More customers will also make retail opportunities increasingly viable at a larger number of stations; this, in turn, can encourage upgrades to make stations more inviting spaces for larger groups of people. Similarly, as service evolves and ridership grows, Caltrain will also need to manage stations more actively and intensively, expanding maintenance activities and monitoring.

5.2.4. MANAGEMENT AND MAINTENANCE OF THE CORRIDOR

In order to manage and maintain the corridor Caltrain invests in new construction and maintenance, safety improvements, and noise mitigation. Construction activities incorporate contractor work on the railroad, third-party projects on Caltrain property, and external construction near the railroad. Caltrain generally hires contractors to lead major construction projects on its property. Construction on the railroad can be disruptive for communities; in some cases, construction projects cause stations to close temporarily or rail schedules to change. Construction projects can also impact traffic

circulation or local businesses if they require roadway closures. Caltrain aims to limit impacts to transit service during peak commute hours as much as possible; the only construction allowed during peak commute times is in emergency situations where work must be done to keep trains moving. To reduce the impact of service changes to Caltrain customers, construction work is often conducted at night or during weekends.

Safety on the rail corridor refers to collisions, customer and conductor safety, trespassing, emergency response, and other safety considerations such as ADA policies and crowd control. Local agencies and rail companies typically coordinate to prevent intrusions and trespassing by employing a variety of fencing and surveillance-related strategies and programs. Rail agencies typically enforce the use of anti-trespass fencing and panels to prevent trespassers from entering railway right-of-way; modern surveillance technologies to detect trespassing activities; and, active campaigns to educate people about the risks of trespassing, as well as public outreach for suicide prevention.

Noise and vibration generated from rail service can have significant impacts on local communities by creating noise pollution and disturbing the peace. The sources of rail noise include friction between the moving wheels on tracks, diesel engines idling at stations, and warning bells and train horns from an approaching train. Construction activities can also generate noise and cause visual effects due to the use and siting of construction equipment and staging areas. These all can interrupt sleep and cause general annoyance to residents and employees during the day and night.



Implementing the Service Vision will bring more construction along the right-of-way. For example, it may be necessary to install new signal systems to support significantly increased rail service. There may also be a need to improve stations, access facilities, and parking to accommodate the increased ridership that will come with substantially increased service. Additionally, as discussed previously, the electrification project and PTC systems will make construction more complicated due to the need for more coordination and management to ensure service quality.

Several projects are currently underway to increase safety along the corridor for current and future service. Positive train control will add federally-mandated safety controls to the railroad, such as automatically stopping a train before certain accidents could have a chance to occur (such as train-to-train collisions). Caltrain's new EMUs will also improve safety, since electric trains can decelerate more quickly than the current diesel trains. As Caltrain implements the Service Vision, the railroad will continue to

monitor if safety measures also need to increase. For example, with more train service in the corridor, the trains will move across at-grade crossings more frequently, increasing the chance of collisions and the desire for more at-grade crossing mitigations to minimize at-grade conflict points.

As Caltrain increases service to achieve the Service Vision, it could bring more of the same impacts, both positive and negative. Increased service would result in more vibration and noise, though Caltrain's new electric trains will be quieter than the current diesel train locomotives. New infrastructure, such as additional grade-separated crossings, could reduce some of these noise effects, but could result in more visual effects. Caltrain can take several measures to mitigate the impacts of noises and nuisances along the corridor and the stations, such as creating a "Quiet Zone" for reduced train horn areas, constructing noise barriers, enforcing noise and vibration reduction programs, and updating building codes to mitigate the impacts. Additionally, grade separating a crossing eliminates the need for a train horn.



GRADE CROSSING PROGRAMS

Across the world, railroads and communities have mutually benefitted from resolving common issues where railroads and communities interface.

As part of the Business Plan, Caltrain studied global successes at improving the railroad-community interface for grade crossings and grade separations.

METROLINX LEVEL CROSSING STRATEGY, ONTARIO, CANADA

A program which included 51 grade crossings, 10 separations, 32 station upgrades, 21 new stations. The program required close coordination between Canadian rail and road agencies, and local municipalities. Metrolink used a defined grade separation prioritization process dictated by need (exposure index, safety, congestion, air quality, etc.), environmental clearance, right-of-way availability/acquisition, and funding availability.



LEVEL CROSSING REMOVAL PROGRAM, MELBOURNE, AUSTRALIA

An eight-year program established in 2015 which used a multi-criteria assessment tool to prioritize grade crossing solutions across the system. Identified four stages of improvement: 1) closure assessment, 2) congestion and safety assessment, 3) initial prioritization, 4) short list prioritization. Cost was \$8.3 billion.



BERLIN STADTBAHN, BERLIN, GERMANY

A five-mile elevated rail line with a series of elevated track sections, totaling 731 arches and 11 stations. A variety of urban land uses including core government zone, cultural institutions, and retails are integrated into the viaducts through historic brick arches. The undersides of the viaducts are usually closed off except crossing a street, an area with sensitive environmental features, or accommodating a land use. Each arch is large enough to be occupied by different land uses such as retail, restaurants, bookstores, museums, outdoor seating, etc.



ALAMEDA CORRIDOR-EAST, SOUTHERN CALIFORNIA

The ACE corridor includes 30 cities and three Los Angeles County districts, with 19 grade-separated crossings and 39 at-grade crossings. The grade crossing program coordinated multijurisdictional funding, property acquisition, utility relocations, local business impact mitigation, archeological resources mitigation, and traffic maintenance.



5.2.5. LAND USE DEVELOPMENT AND PROPERTY VALUE



Multiple cities along the corridor are in the midst of developing plans for areas around the Caltrain corridor, such as transit-oriented development, general plans, station area and specific plans, zoning, and development approvals. One example is the station planning effort for the San José Diridon Station and surrounding area, a process being led by the City of San José. Additionally, the areas near the 22nd Street, South San Francisco, Santa Clara, Millbrae, and Hayward Park Caltrain Stations each have a number of development projects currently underway.

Additional train service under the Service Vision will make Caltrain an even better tool for helping to manage development and mitigate traffic impacts; however, it may also bring increased development pressure and increases in land value around stations that may or may not be in line with local policy goals. As shown in the figure below, without implementation of the Service Vision, the total land value of real estate within one mile of the station is estimated to reach over \$620 billion by 2040. Improvements to train service at the scale of the 2040

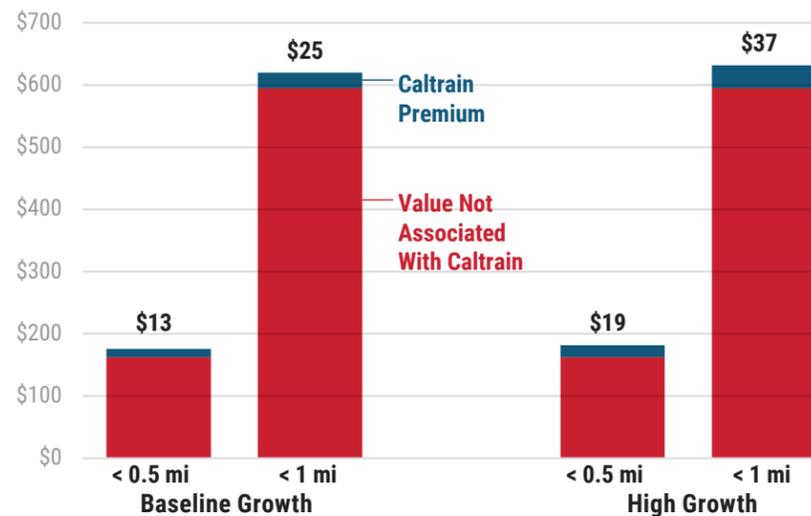
Service Vision are estimated to have the following impacts:

- The increase to land value within one mile of a station due to the Service Vision is estimated at \$37 billion in total across the corridor. This is an overall increase of approximately 4.5%.
- Residential property value premiums are estimated at three to 7% for single-family homes and two to 6% for condominiums. The premium would vary with the frequency of service.
- Office property value premiums would be 20% higher within a half-mile of Caltrain.

Land use changes catalyzed by increased transit service also raise policy questions that should be considered by communities: where new land value should go, who benefits from it, and how to address equity and affordability. It will be important for Caltrain and local jurisdictions to work together to ensure that expanded accessibility and increases in land value around stations are captured and utilized in a way that achieve individual policy goals.

PROPERTY VALUE IMPACTS

Estimated Residential and Property Value in Billions, 2019 Dollars



5.3 WHAT IT MEANS FOR STATION ACCESS

The Service Vision will result in triple the number of passengers accessing and circulating within Caltrain stations. Consequently, substantial improvements in onsite and offsite facilities are needed by Caltrain and its partners to accommodate this growth. These access and circulation improvements will support the changing ways that riders use Caltrain and help maximize Caltrain's ability to attract new riders.

5.3.1. STATION ACCESS IMPROVEMENTS

In order to reach its full ridership potential, Caltrain will need to make a variety of programmatic access improvements across all stations. The scope and scale of these improvements may vary by station, with some stations seeing relatively lower ridership gains while others may see growth upwards of ten times today's ridership. Consequently, specific onsite and offsite improvements would need to be tailored to each station's local context.

Some of these programmatic investments may include:

- Shift to market-rate parking pricing to better manage supply and demand at park-and-ride facilities
- Substantially expanded bicycle parking at stations, prioritizing secure shared bike station facilities

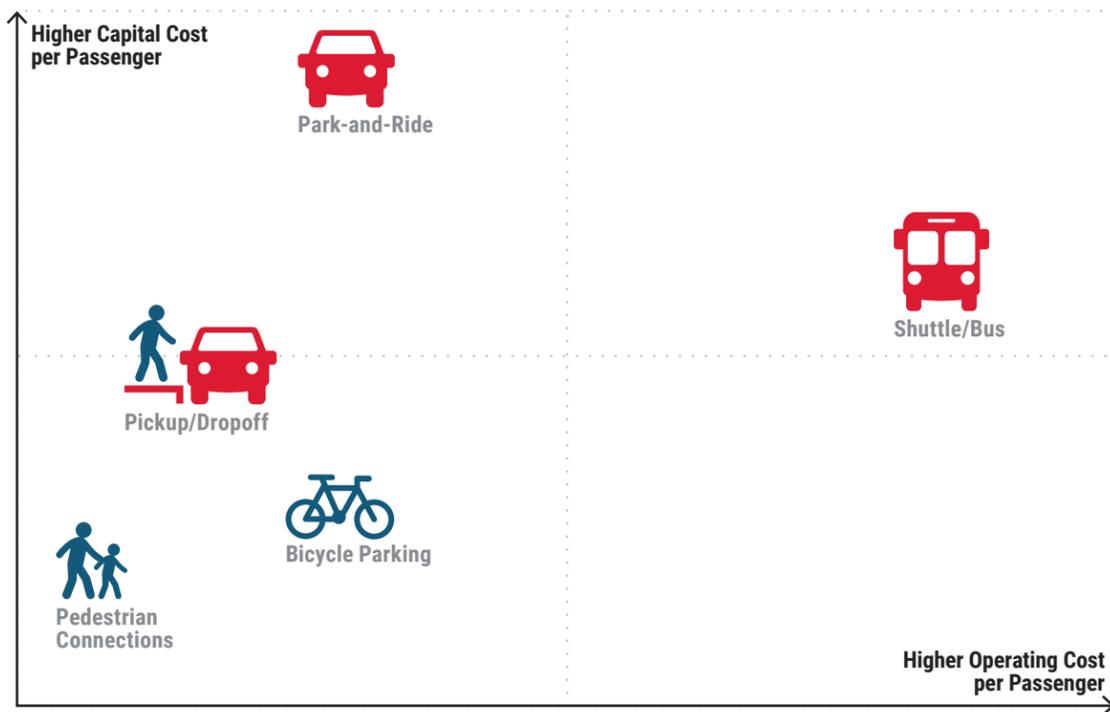
- Improved transit connections through investments in Caltrain's interface infrastructure with offsite buses, shuttles, and active transportation
- Better station amenities such as expanded shelters, strategically-located Clipper readers, level-boarding, improved wayfinding and signage, and more pedestrian-scale lighting

In order to achieve these improvements, Caltrain will need to play a larger role in providing and coordinating access to its system through organizational and policy changes. By expanding its organizational capacity to more proactively manage its station access needs, Caltrain can greatly improve access via auto parking, bike parking, pedestrian circulation, and transit schedule coordination.

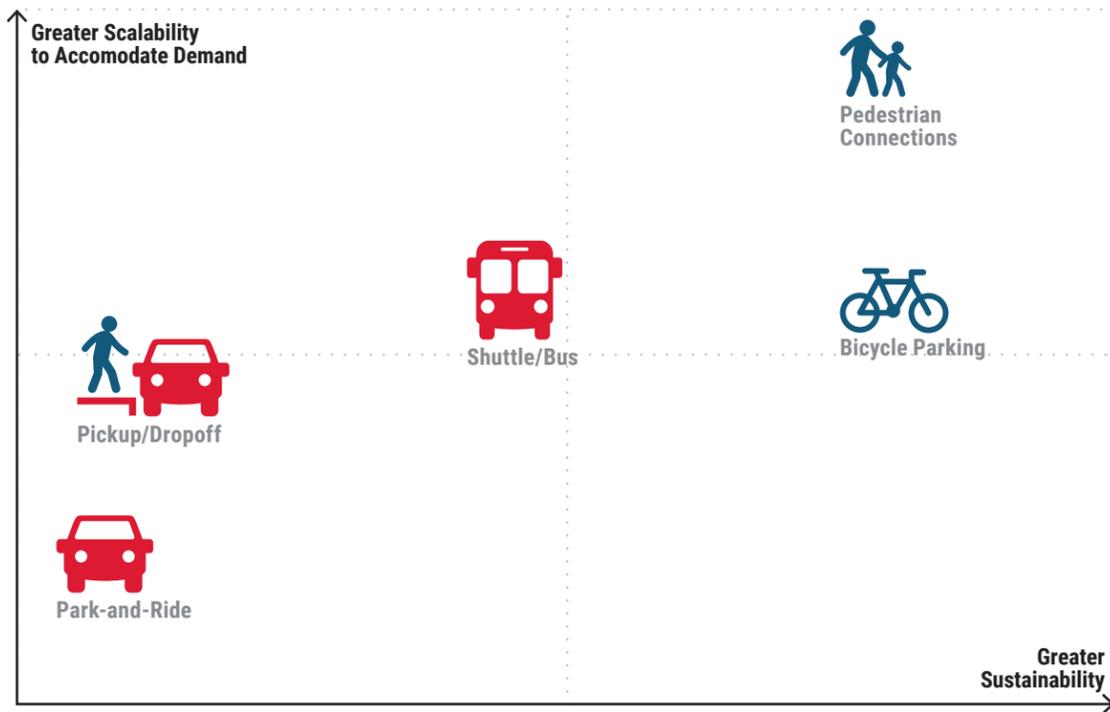
In weighing different types of access improvements, Caltrain will need to invest strategically to serve the

greatest number of passengers. For example, tripling the number of parking spaces in new garages to maintain the current park-and-ride mode share at stations would be extremely costly (approximately \$100,000 per space) and would require Caltrain to grow its station footprints (since it does not own enough land to accommodate these garages). In contrast, Caltrain could more efficiently accommodate this ridership growth at a lower cost by improving the frequency and coordination of feeder bus and shuttle services and collaborating with cities to improve pedestrian and bicycle access as well as secure onsite bicycle parking. While context may vary between stations, the ridership value of joint development and non-auto access investments typically exceeds the value of maintaining or expanding parking supply. Consequently, systemwide park-and-ride mode share is likely to decline over time while transit, active transportation, and pickup/dropoff use may increase.

**WEIGHING ACCESS IMPROVEMENTS
BY COST**



**WEIGHING ACCESS IMPROVEMENTS
BY SUSTAINABILITY & SCALABILITY**



5.4 WHAT IT MEANS FOR REGIONAL TRANSIT SYSTEM CONNECTIONS

The Service Vision will lead to significantly improved connectivity between Caltrain and other regional transit providers, and with additional investments beyond the Service Vision, would support a large expansion and integration of the regional transit system.

From a service standpoint the Caltrain service and corridor can integrate with the regional network through both timed connections and transfers at stations, as well as direct “interlining” or shared use of rail infrastructure. Both options are equally important from a customer and mobility perspective – but the technical opportunities and challenges associated with each are significantly different.

5.4.1. BETTER CONNECTIVITY BETWEEN SERVICES

The Service Vision enables timed connections to the regional transit network – repeating patterns “pulsed” out of major stations on regular intervals. These service patterns provide excellent opportunities for seamless, coordinated connections with other transit services because other transit providers will be able to align their schedules at major transfer stations to facilitate short wait times. This solves an issue with connections today, which are hard to coordinate due the bunched and irregular intervals of train service associated with the

current timetable. The ability to time connections makes the service more efficient for operators and riders as there is less time spent waiting in stations and queuing for trains. Major stations where timed transfers would be available under the Service Vision include Diridon, the Salesforce Transit Center and Redwood City. Additional smaller stations would also support time transfers.

5.4.2. SUPPORTING AN INTEGRATED AND EXPANDED REGIONAL RAIL NETWORK

The 2040 Service Vision creates eight slots for Caltrain and four for High-Speed Rail. With additional investment, the Service Vision could be scaled up to a higher growth scenario that is fully compatible with a larger vision for expanded megaregional rail including sharing the corridor among trains which are traveling to and from other parts of the region. This kind of expanded scenario is contingent on substantial investment in adjoining and connecting corridors. These are described as explorations in Chapter 2. Specific implications of the regional

transit system on the Service Vision for are described here.

Second Transbay Rail Crossing

The Second Transbay rail crossing will provide a second underground rail connection across the San Francisco Bay between Oakland and San Francisco, increasing ridership demand for Caltrain service under the high growth service vision and creating the need for more passenger capacity. New markets served by a second tube would span from Oakland to Richmond, but may extend to eastern Contra Costa County, Solano County, and beyond.

Dumbarton Rail

The Dumbarton Rail corridor spans the Dumbarton Bridge (Highway 84) between the Peninsula and East Bay. Analysis for service from the East Bay via Dumbarton has focused on a rail shuttle service between the East Bay and Redwood City with a timed connection to Caltrain. With the Service Vision, Caltrain could provide multiple simultaneous connections for Dumbarton passengers.

Alternatively, a shuttle service could operate into a newly build station approximately midway between the existing Redwood City and Atherton Station, rather than Dumbarton service operating into an expanded Redwood City station. A new station south of Redwood City could facilitate transfers to local service near North Fair Oaks.

ACE & Capitol Corridor

Both the ACE and Capitol Corridor services would remain separate services using dedicated tracks

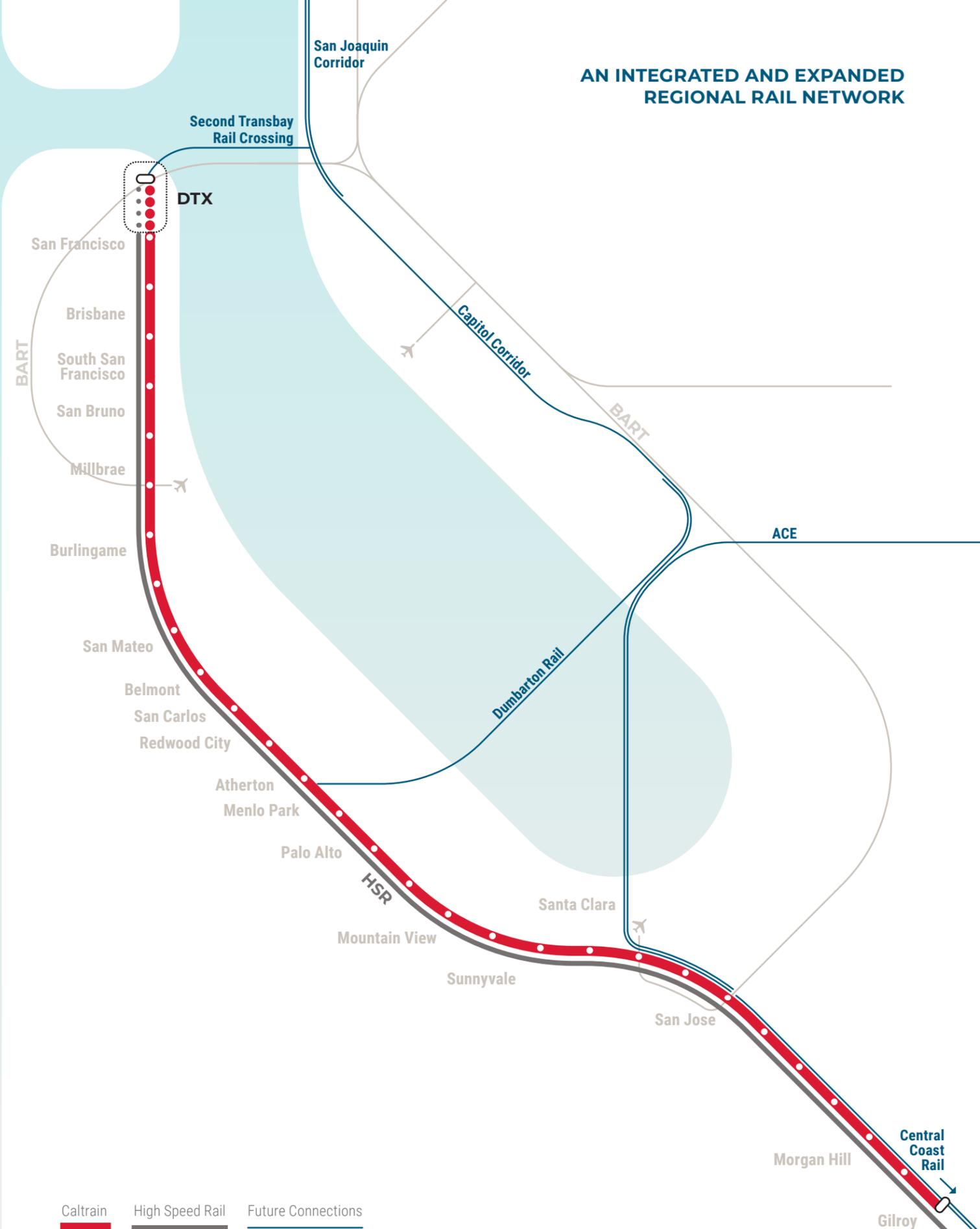
under the Service Vision. However, each agency is now contemplating a broader electrification effort to achieve four trains per hour, per direction. While there are limited transfers between these services and Caltrain, their operations overlap between Santa Clara Station and Tamien Station. If ACE and Capitol Corridor are able to achieve comparable fleet performance and reliability to Caltrain, it may introduce interlining possibilities along the Caltrain corridor across the Dumbarton Bridge in the High Growth service plan.

Central Coast Rail Interface

The State Rail Plan calls for expanded intercity rail service to the Central Coast region between Los Angeles and Gilroy, which would connect to Caltrain at Gilroy Station. In order to interline or extend passenger rail service south of Gilroy, the Monterey/Central Coast corridor would need to be electrified. For the Service Vision, there are no additional peak-period slots available between San José and Gilroy to interline non-Caltrain, non-HSR services unless passing tracks were added north of Blossom Hill station.



AN INTEGRATED AND EXPANDED REGIONAL RAIL NETWORK

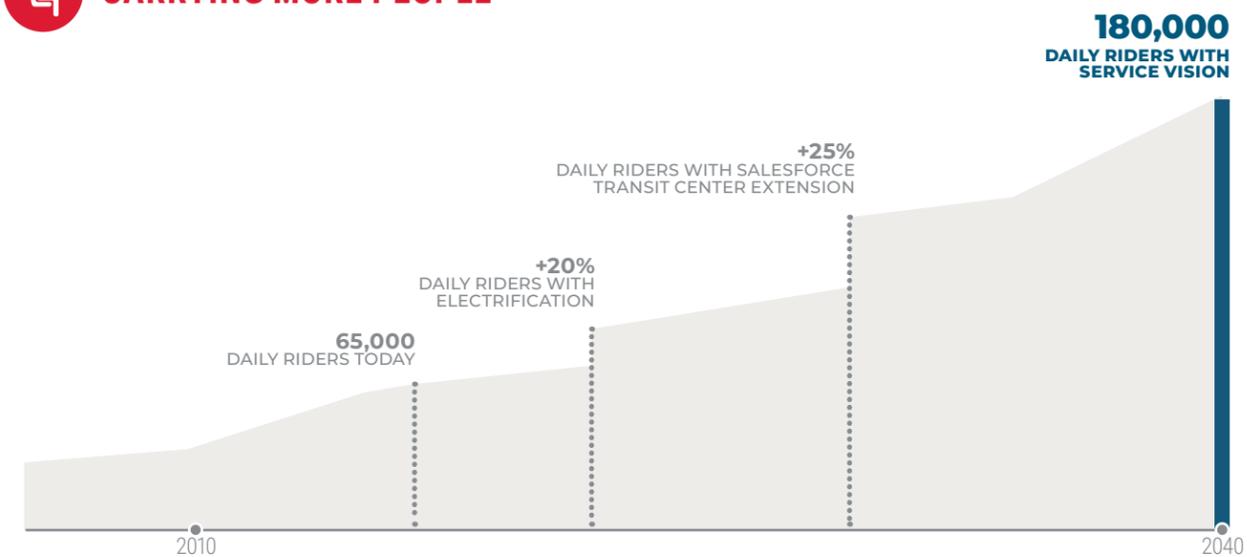


5.5 WHAT IT MEANS FOR THE REGIONAL ECONOMY

The Service Vision provides benefits to the regional economy beyond better mobility and access, including increased economic output, reduced need for freeway improvements, improvement in air quality, and better public health outcomes.

MORE TRANSPORTATION CAPACITY

CARRYING MORE PEOPLE



Improving Caltrain lets us carry three times more people in 2040. That's equivalent to selling out the Giants' ballpark four times every day.

Today, Caltrain carries 4 freeway lanes worth of people during rush hour. The service vision adds the equivalent capacity of 5.5 new freeway lanes.

IMPROVING AIR QUALITY

REDUCING DRIVING

825,000 FEWER MILES DRIVEN EACH DAY
Resulting from drivers who switch to Caltrain. That's like taking 16,000 trips between SF and SJ off the road each day

REDUCING GREENHOUSE GAS EMISSIONS

110 FEWER METRIC TONS OF CO₂ EMISSIONS EACH DAY
Resulting from full electrification of our fleet and drivers switching to Caltrain

STIMULATING THE ECONOMY

ADDING JOBS

51,000 NEW JOBS CREATED
Total full- and part-time jobs along the corridor resulting from Caltrain investment

INCREASING ECONOMIC ACTIVITY

\$40.8 BILLION IMPACT ON THE REGION
Total impact on regional spending and economic activity resulting from Caltrain investment

	METRIC	BASILINE GROWTH	MODERATE GROWTH	HIGH GROWTH
FREEWAY THROUGHPUT	Additional Freeway Lanes	+4 lanes	+5.5 lanes	+8.5 lanes
REGIONAL RAIL INTERGRATION	Accommodation of Large-Scale Corridor-Sharing Beyond HSR	could be scaled to accommodate	could be scaled to accommodate	can accommodate
ENVIRONMENTAL BENEFITS	GHG (MTCO ₂ e)	1,108,045	1,898,330	3,006,028
LAND VALUE BENEFITS	Property Value Premiums Generated by 2040 Service Growth within 1 Mile of Station	\$10B	\$10-\$22B	\$22B
ECONOMIC PRODUCTIVITY	Economic Output	\$32.8B	\$40.8B	\$47.7B
	Full and Part-time Jobs	44K job-years	51K job-years	69K job-years

5.5.1 ECONOMIC OUTPUT

Growing Caltrain service improves the entire Bay Area economy. The Business Plan economic output analysis looked at economic effects of the Service Vision from 2018 through 2070. The total economic output associated with building, operating and maintaining the Service Vision would be \$40.8 billion and 51,000 job-years.

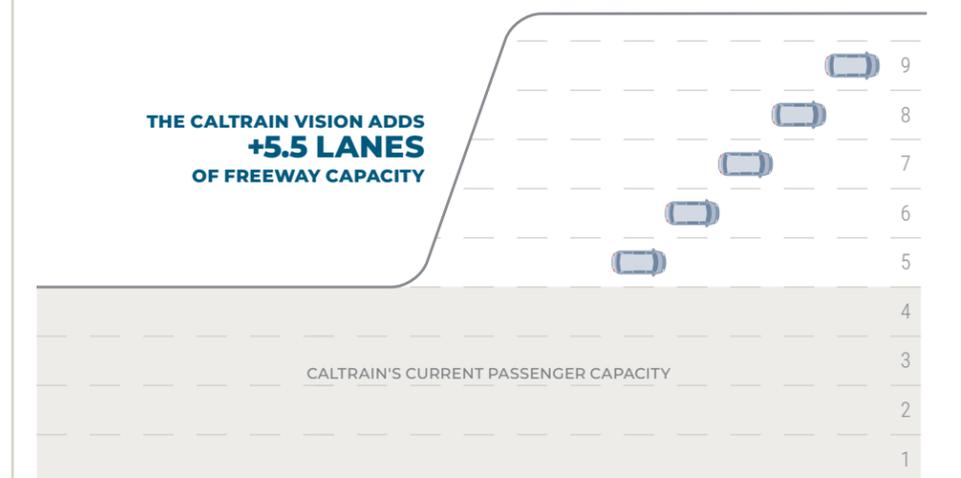
The Service Vision will also have more tangible benefits for employers and institutions located in the Caltrain corridor itself, many of which are global companies whose growth has impacts which extend far beyond the Bay Area. The Service Vision proposes increases in service at key stations such as South San Francisco station which serves Genentech, and Mountain View station which serves Google and LinkedIn.

5.5.2. FREEWAY CONGESTION

Today, Caltrain carries four freeway lanes worth of people during peak hours. The Service Vision would carry the equivalent of 5.5 new freeway lanes worth of passengers during peak hours, substantially reducing the need to expand highways along the Peninsula over the next 20 years.

AMOUNT OF TRAFFIC THAT COULD BE ACCOMMODATED WITH EXPANDED CALTRAIN CAPACITY

The **Baseline Growth** scenario would carry the equivalent of 4 new freeway lanes worth of passengers during peak hours by 2040. The **Moderate Growth** scenario would carry the equivalent of 4 new freeway lanes worth of passengers during peak hours by 2040. The **High Growth** scenario would carry the equivalent of 4 new freeway lanes worth of passengers during peak hours by 2040.



Assumes 1.1 persons/vehicle and lane capacity of 1,500 vehicles/hour

CALTRAIN'S CURRENT PASSENGER CAPACITY

5.5.3. AIR QUALITY BENEFITS

The Service Vision delivers significant environmental benefits – both through the elimination of remaining diesel train service and the diversion of a substantial number of auto trips to Caltrain. The figure below summarizes the resulting air quality benefits expected from implementation of the Service Vision.

ENVIRONMENTAL BENEFITS OF THE SERVICE VISION

All scenarios deliver significant environmental benefits - both through the elimination of remaining diesel train service and the diversion of a substantial number of auto trips

	GHG Savings MTCO2E	ROG Emission Reductions (lbs.)	NOX Emission Reductions (lbs.)	PM2.5 Emission Reductions (lbs.)	Diesel PM Emission Reductions (lbs.)
SERVICE VISION	1,898,330	450,131	7,199,666	251,535	269,889

Assumes conversion to 100% renewable power starting in 2009, consistent with CHSRA goals. Analysis conducted using the California Air Resources Board Qualification Methodology for transit and intercity rail capital program investments.



5.6 WHAT IT MEANS FINANCIALLY FOR CALTRAIN

This section covers three aspects of financial implications for Caltrain: the results of a benefit cost analysis, the incremental investment required for the Service Vision, and the farebox recovery ratio.

5.6.1. BENEFIT COST ANALYSIS

The methodology used for estimating benefits and costs is described in Chapter 2. The table at right summarizes the benefit-cost analysis (BCA) findings. Annual costs and benefits are computed over the entire lifecycle of the Service Vision, from 2040 through 2070.

Considering all monetized benefits and costs, the estimated internal rate of return of the project is 7.4%. With a real discount rate of 4%, the \$1.7 billion in additional Caltrain capital and operations and maintenance investment in Service Vision over a Baseline Growth scenario would result in \$2.4 billion in total benefits and a benefit-cost ratio of approximately 1.33. In other words, for every dollar invested one would expect to see \$1.33 in benefits. The net present value (NPV) of the investment would be \$0.5 billion. What this NPV shows is that Caltrain receives \$0.5 billion more in benefits than it pays to build, operate, and maintain the Service Vision over the 2018 to 2070 planning analysis period.

CALTRAIN USER BENEFITS AND COSTS PRESENT VALUE OF BENEFITS AND INCREMENTAL COSTS FROM 2018 TO 2070

	SERVICE VISION
Existing transit user travel time savings	\$0.65B
New transit user travel time savings	\$0.18B
VMT/Auto operating cost savings	\$0.94B
Roadway network safety improvements	\$0.39B
Public health benefits	\$0.19B
TOTAL BENEFITS	\$2.36B
Incremental Capital Cost	(\$0.94B)
Incremental O&M Cost	(\$0.84B)
TOTAL COSTS	(\$1.78B)
BENEFIT-COST RATIO	1.33
NET PRESENT VALUE	\$0.58B

5.6.2. NET INVESTMENT

Another way to measure the financial implications of the Service Vision to Caltrain is to consider the total net financial investment Caltrain will make into the Service Vision compared to a Baseline Growth scenario. This differs from the net present value, because it only includes projected revenues and expenditures, not the monetized value of benefits like travel time. The costs shown for the Baseline Growth scenario include Caltrain's committed investments, such as electrification, as well as projects committed by Caltrain partners, such as HSR and grade separations. The analysis completed shows that to achieve the Service Vision, Caltrain will need to make a net investment of about \$1.5 billion more in today's dollars over the 2018-2070 period than what it would invest to accomplish a Baseline Growth scenario. This is a reasonable additional cost when considering the additional ridership, regional connectivity and regional economic growth that the Service Vision would generate.

5.6.3. FAREBOX RECOVERY RATIO

Today, Caltrain is one of the leanest, most efficient transit services in the country. At present, \$97 million of the total \$135 million annual operating and maintenance costs (73%) are covered by fares, requiring a \$38 million public investment. With the 2040 Service Vision, Caltrain would continue to benefit from a similar ratio of costs covered by fares: of the \$370 million annual operating costs, \$266 million would be covered by fares (72%), leaving a \$104 million annual operating investment needed.

NET FINANCIAL INVESTMENT OF SERVICE VISION

	METRIC	SERVICE VISION
FINANCIAL METRICS	Total Capital Costs	(\$25.3B)
	Caltrain Allocated Capital Costs	(\$7.6B)
	Total Operating Costs	(\$6.0B)
	Year 2040 Operating Costs	(\$0.37B)
	Farebox Recovery Ratio	75%
	Net Investment	(\$8.6B)
CALTRAIN ECONOMIC METRICS	Net Present Value	\$0.58B
	Benefit Cost Ratio	1.33

ANNUAL OPERATING COSTS & SUBSIDY NEED

2018 **\$135 million**
total annual operating costs



Sustaining the Railroad

Adopting a Service Vision sets a long range policy goal for the railroad to work towards. It does not commit the JPB or its member agencies to funding the Vision.

2040 **\$370 million**
total annual operating costs



Finding the money to fund the Service Vision will be a challenge. In addition to the significant level of capital investment required, significant ongoing funding will be required to operate and maintain Caltrain service. This investment is needed on an ongoing basis and potential new sources of funding will be a major focus of analysis and discussion in the remainder of the Business Plan.

5.7 WHAT IT MEANS FOR EQUITY

This section helps to understand how the Service Vision affects equitable use of Caltrain and how the Service Vision distributes the burdens and benefits of an upgraded corridor to low income and minority communities. Equity is measured from multiple angles and builds on standard Title VI and MTC metrics as well as transit industry best practice for assessing equitable access and outcomes. Each metric is presented below with a description of what is being measured, why it is important, and a list of key considerations for advancing equitable outcome.

EQUITY METRIC	DESCRIPTION	KEY CONSIDERATIONS
SERVICE FREQUENCY	All stations will receive substantial peak period service increases with the Service Vision resulting in show-up-and-go transit service. More frequent service means more convenient service and more capacity for riders. Stations located within a community of concern will see a 91% increase in peak period service while stations outside communities of concern will see a slightly larger, 105% increase.	<ul style="list-style-type: none"> More frequent service means shorter, more manageable transfer times. This is a critical improvement for the 20-25% of lower income riders who access Caltrain using a connecting transit service. Service increases are a double-edged sword. Better service means better mobility, but also higher property value premiums that can contribute to higher housing costs.
	Low-income communities travel proportionally more during off-peak hours making more non-commute trips than higher income communities and would benefit most from an expansion in off-peak service. Across the system, off-peak service with the Service Vision will increase by approximately 200%. Off-peak hours can better capture trips made by students, older adults, and people working multiple jobs or non-traditional work schedules such as service or shift workers.	<ul style="list-style-type: none"> Off-peak service is most accessible to low-income populations if transit transfers can be coordinated due to standardized schedules. Transitioning from a commuter railroad to an all-day transit service represents a major shift in Caltrain's identity and service offerings. In order to capture the attention of potential off-peak customers, the rollout of new off-peak service must be preceded by a comprehensive and community-assisted outreach campaign.
SERVICE HOURS		

EQUITY METRIC	DESCRIPTION	KEY CONSIDERATIONS
TRAVEL TIME	Travel time savings are spread throughout the system and all groups benefit equally. On average, riders will experience an approximately 15% decrease in travel times so that they complete their trips more quickly. This is only a measure of in-train travel time and does not account for wait times at stations, which will also be shorter due to timed transfers between trains and more standardized schedules improving connectivity to sister services.	<ul style="list-style-type: none"> None
STATION CONNECTIVITY	Low-income riders tend to rely on transit connections to access Caltrain stations more than middle- or high-income riders. Coordinated transfers benefit low-income communities most. Increased service frequency and a standardized, clock-face schedule will allow for improved ability to coordinate transfers with BART, Muni, SamTrans, and VTA as well as any future connections such as AC Transit at Salesforce Transit Center or the proposed Dumbarton Rail link.	<ul style="list-style-type: none"> The equity benefits of improved connectivity would be strengthened by integrated fare systems and transfer fare discounts. Not all corridor communities have direct transit access to a Caltrain station. Bus or shuttle first/last mile connections should be prioritized for Communities of Concern within the corridor.
DISPLACEMENT RISK	Additional train service under the Service Vision will make Caltrain an even better tool for helping to manage development and mitigate traffic impacts; however, it may also bring increased development pressure and increases in land value around stations that may or may not be in line with local policy goals to preserve housing affordability. As shown in section 5.2.3, the increase to land value within one mile of a station due to the Service Vision is estimated at \$37 billion in total across the corridor. This is an overall increase of approximately 4.5%. Increases in property values can create opportunity for depressed communities, but small and local business and cultural spaces can also be pushed out by this change, and housing can become even more expensive.	<ul style="list-style-type: none"> Land values increases and displacement pressures are likely to be most pressing at stations that experience large increases in service levels. Caltrain does not own much developable land itself and would need to instead focus on supporting community affordability policies in coordination with its own TOD Policy development.

EQUITY METRIC	DESCRIPTION	KEY CONSIDERATIONS
SAFETY	Safety improvements will primarily accrue in communities that complete grade separations and reduce the number of conflict points between trains and crossing vehicle, pedestrians, and bicyclist. The Service Vision plans for \$9.4 billion in grade separation projects, but the grade separation locations are not selected nor is there a list of the order in which separations would be completed.	<ul style="list-style-type: none"> Any framework set up to prioritize grade separation projects should include neighborhood demographic information as a factor in the scoring system. At-grade crossings in communities of concern that also experience high traffic volumes and high collision rates should be prioritized for grade separation projects.
CONSTRUCTION DISRUPTION	In addition to grade separation projects, the Service Vision requires construction of passing tracks, new maintenance facilities, and other pieces of supportive infrastructure. A rough distribution of this infrastructure was developed for Business Planning purposes, but final locations, project design and site-specific impacts are something that will be decided at a future date. The duration, scale, and type of construction required for each piece if supportive infrastructure imposes a burden on the surrounding community. It will be important to distribute the burden in a thoughtful way and to ensure that the least amount of harm is imposed on communities that already have a limited safety net.	<ul style="list-style-type: none"> Lower income business districts and employees could be more dramatically impacted by lengthy construction efforts than affluent business districts or office environments. It will be important to put safety nets and thoughtful outreach processes in place that mitigate the disruptions to lower income residents and communities of concern.
GHG EMISSIONS	The Service Vision adds the equivalent capacity of 5.5 new freeway lanes and in doing so results in 825,000 fewer miles driven and 110 fewer metric tons of CO2 emissions each day. The emissions reductions are spread throughout the system but have greatest impact on those living closest to the US-101 corridor.	<ul style="list-style-type: none"> None
NOISE	The Service Vision will result in an overall reduced noise levels due to quieter electric trains, more grade separations requiring less frequent use of the horn, and more quad gate quiet zones. However, there will be more trains per hour. The noise reductions are spread throughout the system but have benefit to those living closest to the Caltrain corridor.	



06

WHAT TO BUILD AND BUY

Delivering the Service Vision requires coordinated large-scale investment in the Caltrain corridor by Caltrain, partner agencies, and local jurisdictions to provide higher levels of train service while also supporting local and regional transportation, land use, and economic objectives.

This chapter describes the approach used to scope the investments included in the Business Plan; a summary of the infrastructure, fleet, operations and maintenance investments required, broken down into key categories of investment; and a discussion of the sources of the major projects included in the cost estimates. It also addresses the costs of capital replacement as infrastructure reaches the end of its useful life.

6.1 BUILDING A BIG PICTURE OF CORRIDOR CAPITAL FUNDING NEEDS

This section outlines the new capital investments assumed and required to support the 2040 Service Vision. Costs in this chapter are conceptual estimates that are subject to refinement and change. Cost totals are in no way intended to represent a single, monolithic project. Costs shown are the accumulation of many different investments that can be delivered incrementally and over time – each with independent utility and value.

Many different organizations and jurisdictions are developing and planning projects – whether terminal projects, connecting services, or grade separations – that will directly affect and enhance the Caltrain corridor. The program of investments assumed for the Business Plan was intended to be “visionary” and has thus been developed to be comprehensive of all the projects and plans already ongoing in the corridor, not only new projects defined by the Business Plan. This means most of the capital investments and conceptual costs shown to deliver the Service Vision are related to projects and plans already under development by Caltrain’s partner agencies and local jurisdictions.

Key projects driving most costs shown for the Service Vision include:

- Major terminal projects in San Francisco and San José including the Downtown Extension (DTX) to the Salesforce Transit Center, and a high-level placeholder cost estimate associated with the rebuilding of Diridon Station and surrounding rail infrastructure
- The introduction of High-Speed Rail service to the corridor between Gilroy and San Francisco
- Grade separation projects currently being planned by local jurisdictions (including the Pennsylvania Avenue tunnel in San Francisco)

The Business Plan team augmented these costs with additional investments required to deliver Caltrain service levels associated with the Service Vision. The figure below shows the proportion of the capital cost investments carried in the Business Plan that are attributable to projects that partner agencies and local jurisdictions were already developing prior to the Business Plan (“projects under development”) compared to the new costs that were uniquely identified through the Business Planning process. As the figure shows, over \$15.7 billion of capital investment in the corridor is associated with projects already under development or proposed by Caltrain partners. The Business Plan identified additional investments of \$2 billion for the Service Vision.

SERVICE VISION CONCEPTUAL COST ESTIMATES

\$22.9 BILLION

Service Vision conceptual cost estimate

\$15.7 BILLION
Investments planned and proposed by Caltrain partners

\$3.7 Billion
Downtown extension to Salesforce Transit Center

\$3.0 Billion
Diridon Station and surrounding rail infrastructure

\$2.6 Billion
High speed rail investments

\$6.4 Billion
City-led grade separations

\$7.2 BILLION
New Caltrain investments to support Service Vision scenario

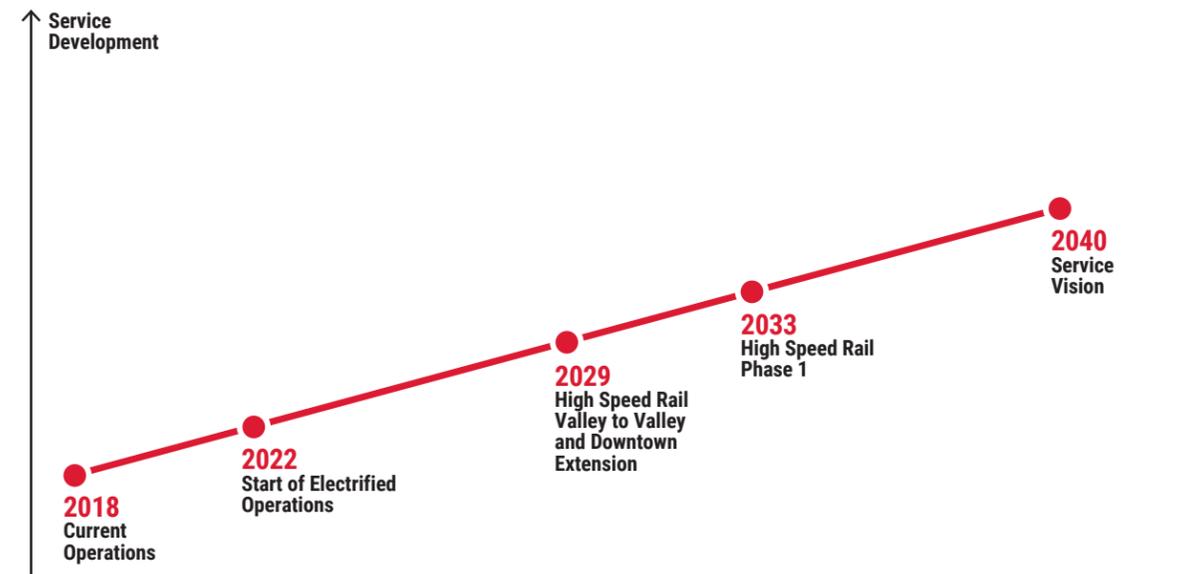
\$7.2 Billion

6.2 CORRIDOR CHANGE POINTS

The program of capital investments described in this chapter follows a series of “change points,” between 2018 and 2040; these are milestones or markers which structure the growth of the corridor over time, as shown in the figure below. These years were selected based on given or

assumed dates for implementation of major Caltrain and/or partner projects. The change points, in turn, drive the timing of various other needed investments in the corridor and serve to structure the overall program of capital investments assumed in the Business Plan.

CALTRAIN CORRIDOR CHANGE POINTS



The program of capital investments described in this chapter follows a series of “change points”, between 2018 and 2040

6.3 METHODOLOGY AND ASSUMPTIONS

This section briefly summarizes the methodology used to compile and develop estimates as well as key assumptions reflected in the costs shown.

6.3.1. PROJECT COSTS FROM EXISTING SOURCES

Two sources were available to use for estimates related to existing projects: partner project costs and Caltrain project costs. As noted earlier, most of the costs associated with the Service Vision are derived from partner agency and local jurisdiction project costs. These costs were then augmented by Caltrain developed estimates and independently generated cost estimates for additional investments.

The partner project cost estimates were provided by the following partners:

- The California High Speed Rail Authority;
- The Transbay Joint Powers Authority and the City of San Francisco (for costs associated with DTX and the Pennsylvania Avenue Tunnel);
- Cities along the Caltrain corridor leading efforts to plan or design grade separations, grade crossing treatments, or other projects

The team conducted individual meetings with partners to confirm the estimates carried in the Business Plan were broadly consistent with the estimates provided by partner agencies, and subsequent modifications to costs were made as needed. These modifications included deflating cost estimates to 2018 dollars, the common year for all of the cost estimating, and disaggregating the costs into the

categories developed for the Business Plan. For example, the costs of the Pennsylvania Avenue tunnel were included under Grade Separations, rather than as Terminal Cost associated with the DTX project.

Caltrain project costs were developed or provided directly by Caltrain. These generally included the costs of ongoing projects, such as the Peninsula Corridor Electrification Project. It also included future fleet needs based on the costs in Caltrain’s existing contract for Electric Multiple Unit (EMU) trains.

6.3.2. COST ESTIMATES FOR NEW PROJECTS

The Business Plan team developed independent cost estimates for needed capital investment not already included in a partner project or Caltrain project costs. These costs were developed on a conceptual, “pre-design” basis and were considered to be high level and subject to change. For example, the cost of a grade crossing program along the corridor was estimated to establish a reasonable level of total corridor wide investment. In general, these costs were based on City-developed plans and then supplemented with generic cost estimates for each crossing improvement type developed by the Business Plan team. Key assumptions related to team-generated cost estimates are discussed in the Approach sidebar.



COST ESTIMATING APPROACH FOR NEW PROJECTS

CONCEPTUAL COST ESTIMATING APPROACH

The estimated project costs were developed in accordance with the Association of the Advancement for Cost Engineering International (AACE) methodology using a Level 5 (Rough Order of Magnitude), which is applied to projects that are highly conceptual and pre-design level of development. The methodology takes account of all appropriate contingencies to reflect this level of accuracy. For estimated project costs, the team applied a standard estimating contingency of 30%, reflecting the low level of detail and design available and a standard estimating owner's soft cost (professional services) of 15%. The following methods enabled development of a comprehensive cost estimate for all the project elements:

- Typical cost ranges for some project elements.
- Benchmarking with similar facilities on other railroads in North America.
- Team-generated costs based on highly conceptual sketch designs. These designs were used to generate quantities. The quantities were then multiplied by typical unit costs to create the estimate.

However, these methods introduced the potential for double counting, particularly where there was a physical overlap between certain project elements. This was most evident in the estimation of the cost of new infrastructure associated with four-tracking at stations or segments and the costs being allocated to grade crossing separations near those areas (e.g., the four-tracking of Redwood City Station overlaps with a proposed grade separation at Broadway). This overlap was addressed by comprehensively reviewing the overall program of investments and then adjusting conceptual cost estimates to exclude projects that would be covered by overlapping elements or to include additional work where there were gaps.

PARAMETERS AND ASSUMPTIONS

- Right of Way Costs - Right of way costs were incorporated and itemized when specifically called out in project costs provided by partners (in the summary table that follows, right-of-way costs are rolled into larger investment categories). Caltrain provided a unit rate to obtain an indicative land acquisition cost.
- Soft Costs - Costs derived from partners were assumed to already incorporate all the necessary project soft costs. For independently generated costs, the team applied a standard estimating markup of 15% for owner's soft costs.
- Contingencies - Costs derived from partners were assumed to already incorporate all the necessary project contingency costs. For independently generated costs, the team applied a standard estimating markup to account for a contingency of 30%, considering the low level of detail and design available.

ROUNDING OF CONCEPTUAL COST ESTIMATES

The cost estimates included here are derived from many sources but are, in aggregate, highly conceptual and subject to refinement and change. Given the variability in the order of magnitude for different cost categories, the following rounding was applied:

- Round to the nearest \$10,000,000 if estimated cost is below \$100,000,000
- Round to the nearest \$100,000,000 if estimated cost is above \$100,000,000

6.4 2040 CONCEPTUAL CAPITAL COST ESTIMATES

The total cost for delivering the Service Vision's capital investments is estimated at \$22.9 billion.

6.4.1. CAPITAL COSTS OVER TIME

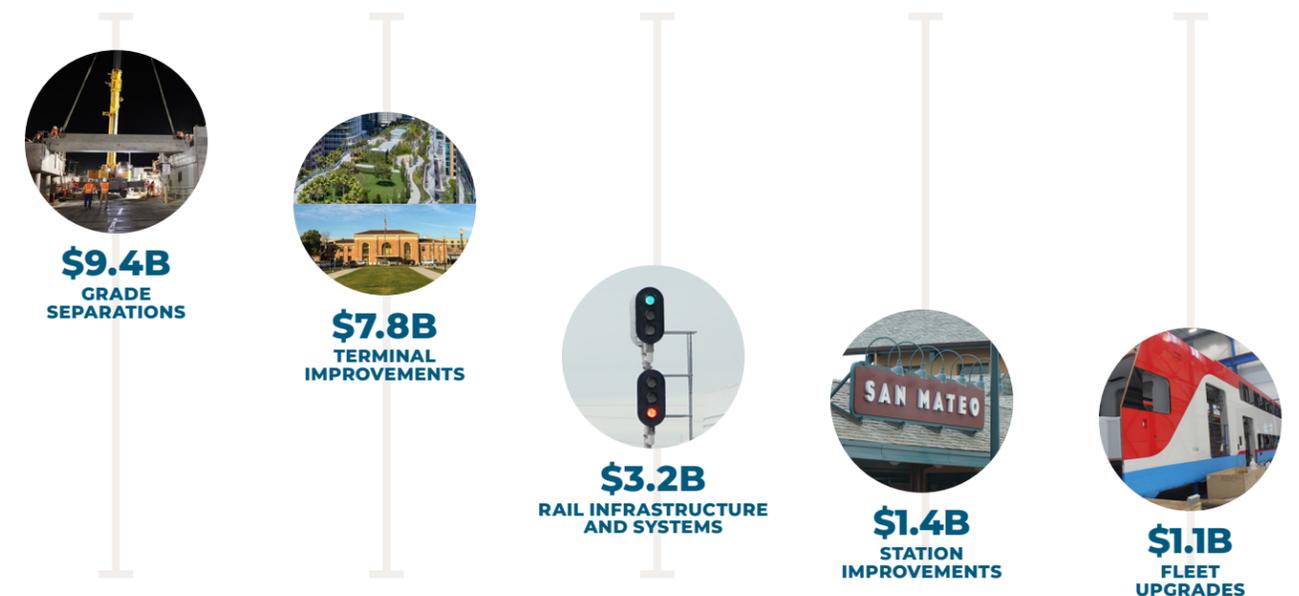
The table on the next page presents a comprehensive summary of new capital investments organized into categories and change-point years that are intended to support a relatively transparent and intuitive understanding of investment types the costs of each incrementally and in total.

TOTAL CONCEPTUAL CAPITAL COST ESTIMATE

\$22.9 BILLION

Capital costs include all projects from SF to Gilroy, knitting together a connected corridor with greatly improved service. This does not include the \$2 billion of projects already programmed or underway in the corridor, mostly for electrification.

BREAKDOWN OF SERVICE VISION CONCEPTUAL CAPITAL COST ESTIMATES



CAPITAL INVESTMENTS: DESCRIPTIONS

INVESTMENT CATEGORY		BASELINE				GROWTH SCENARIO
		2022	2029	2033	2040	2040 SERVICE VISION
 TRACK & RAIL	SF - SJ	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Curve straightening & track upgrades to achieve 110 mph capability 4-tracking associated with Millbrae HSR Station 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 4-track segment from Hayward Park to Hillsdale 4-track Redwood City Station 4-track station in northern Santa Clara County
	SJ - Gilroy	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Rebuilding of corridor to three tracks (two for 110 mph passenger service and one for freight) 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Addition of turn tracks at or past Blossom Hill Station
 SYSTEMS	SF - SJ	<ul style="list-style-type: none"> PTC Program PCEP Program Install broadband communications system 	<ul style="list-style-type: none"> New signal system to support 110 mph blended operations Additional communications systems 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Allowance for traction power system upgrades
	SJ - Gilroy	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> New signal system to support 110 mph blended operations Overhead catenary and traction power systems Additional communications/systems 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
 STATIONS & PLATFORMS	SF - SJ	<ul style="list-style-type: none"> South San Francisco Station Rebuild Hillsdale Station Rebuild associated with 25th Ave Grade Separation 	<ul style="list-style-type: none"> Platform extensions at all stations to accommodate 8-car trains Platform modification to achieve level boarding at 22" Station amenity/access allowance 22nd Street Station rebuild Removal of holdout rule stations at Atherton and College Park (Broadway station rebuild included within grade separation category) HSR station at Millbrae 	<ul style="list-style-type: none"> Allowance for improved station amenities & expanded access facilities 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Incremental cost of extending platforms to accommodate 10-car trains Allowance for improved station amenities and expanded access facilities
	SJ - Gilroy	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> HSR station at Gilroy Total rebuild of all Caltrain stations from Capital to Gilroy (includes level boarding and platform extensions to accommodate 8-car trains) Allowance for improved station amenities and expanded access facilities 	<ul style="list-style-type: none"> Allowance for improved station amenities & expanded access facilities 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Incremental cost of extending platforms to accommodate 10-car trains Allowance for improved station amenities and expanded access facilities
 GRADE CROSSINGS & SEPARATIONS	SF - SJ	<ul style="list-style-type: none"> 25th Ave Grade Separation 	<ul style="list-style-type: none"> 23 grade separations, 5 mitigated closures, 12 quad gates 		<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 1 additional grade separation
	SJ - Gilroy	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> 5 grade separations, 3 mitigated closures, 22 quad gates 		<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
 TERMINALS & YARDS	SF	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Completion of Downtown Extension Development of northern light maintenance and storage facility (LMF) 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Incremental size increase to LMF
	Diridon/South Terminal	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Diridon Station Project including both station rebuild as well as all rail improvements between CP Coast and CP Lick (includes Tamien Station) CEMOF relocation/construction of new Heavy Maintenance Facility (HMF) near Capitol Expressway 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Incremental size increase to HMF
 FLEET	Systemwide	<ul style="list-style-type: none"> 133 EMUs 	<ul style="list-style-type: none"> Increase to total of 192 EMUs 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Increase to total of 350 EMUs

CAPITAL INVESTMENTS: CONCEPTUAL COST ESTIMATES

All costs in 2018 dollars

INVESTMENT CATEGORY	BASELINE			GROWTH SCENARIO	
	2029	2033	2040	2040 SERVICE VISION	
 TRACK & RAIL	SF - SJ	\$400,000,000	None	None	\$900,000,000
	SJ - Gilroy	\$1,000,000,000	None	None	\$10,000,000
 SYSTEMS	SF - SJ	\$500,000,000	None	None	None
	SJ - Gilroy	\$400,000,000	None	None	None
 STATIONS & PLATFORMS	SF - SJ	\$700,000,000	\$200,000,000	None	\$100,000,000
	SJ - Gilroy	\$300,000,000	\$50,000,000	None	\$10,000,000
 GRADE CROSSINGS & SEPARATIONS	SF - SJ	\$100,000,000	\$6,800,000,000	None	\$1,100,000,000
	SJ - Gilroy	\$1,400,000,000	None	None	None
 TERMINALS & YARDS	SF	\$3,700,000,000	None	None	\$80,000,000
	Diridon/South Terminal	\$3,800,000,000	None	None	\$200,000,000
 FLEET	Systemwide	\$400,000,000	None	None	\$700,000,000
TOTAL INCREMENTAL COST BY YEAR	\$12,600,000,000	\$350,000,000	\$6,800,000,000		\$3,100,000,000
TOTAL 2040 COST			\$19,750,000,000		\$22,850,000,000
SF - SJ			\$16,600,000,000		\$19,680,000,000
SJ - GILROY			\$3,150,000,000		\$3,170,000,000

6.4.2. CAPITAL REPLACEMENT COSTS

From time to time, capital infrastructure must be wholly or partially replaced in order to be maintained in good condition. The purpose of the capital replacement cost estimate is to establish the cost of replacing capital investments over a long period of time, in this case 53 years, from 2018 through 2070. Evaluating replacement costs was an essential part of developing the business case for increased Caltrain service, by appropriately aligning the potential benefits of new service with the long-term costs.

Methodology

Capital replacement costs were developed by the project team based on recommended industry practices for life cycle costs of infrastructure projects and FTA recommended projected useful life of each. The replacement estimates for each project are based on having the infrastructure replaced by the end of the projected useful life, with the replacement cost spread over the number of years needed to implement the replacement. Not all projects will require the full 100% replacement at the end of the projected useful life, and assumptions were made as to

the percentage of each project that would have to be replaced each cycle. The estimate uses the capital costs as a baseline, applying percentages of required replacement for each line item, to generate the replacement cost at each life cycle of each entry.

Replacement Costs

Based on the replacement estimates, the total capital replacement cost for the Service Vision is \$10.4 billion, with the largest portions coming from replacement of grade crossings, track and rail, and fleet.

SERVICE VISION SCENARIO: REPLACEMENT COST SUMMARY

COST CATEGORY	PROJECTED USEFUL LIFE (YEARS)	ALLOWANCE SPREAD (YEARS)	REQUIRED REPLACEMENT (% OF INITIAL CAPEX)	TOTAL REPEX COST (2018 \$)
TRACK AND RAIL	15 - 35	2 - 4	15 - 100%	\$2.3B
SYSTEMS	15 - 35	1 - 4	15 - 100%	\$1.8B
STATIONS	5 - 35	1 - 4	15 - 20%	\$1.1B
GRADE CROSSINGS	15	3	15%	\$2.7B
TERMINALS AND YARDS	20 - 35	2	10 - 100%	\$0.5B
FLEET				\$1.9B
TOTAL				\$10.4B

07



**WHAT THE
SERVICE
VISION COSTS
TO OPERATE**

This chapter describes the estimated conceptual cost to operate and maintain the level of train service associated with the Service Vision.

In developing the cost to operate and maintain train service in the future, Caltrain considered a number of key changes including:

- The shift to electrified service which introduces new operating and maintenance practices
- A substantial expansion in the amount and frequency of service being operated
- The personnel required to operate and maintain trains
- A substantial increase in daily ridership which will increase activity and maintenance needs at stations
- The need to grow administrative capabilities and depth to support the Service Vision
- Use of the Caltrain infrastructure by other operators including HSR

With all these factors considered, the costs of operating and maintaining the railroad is expected to grow from \$135 million annually in 2018 to over \$370 million a year by 2040 as discussed in the following sections. All costs shown are conceptual estimates subject to refinement and change.

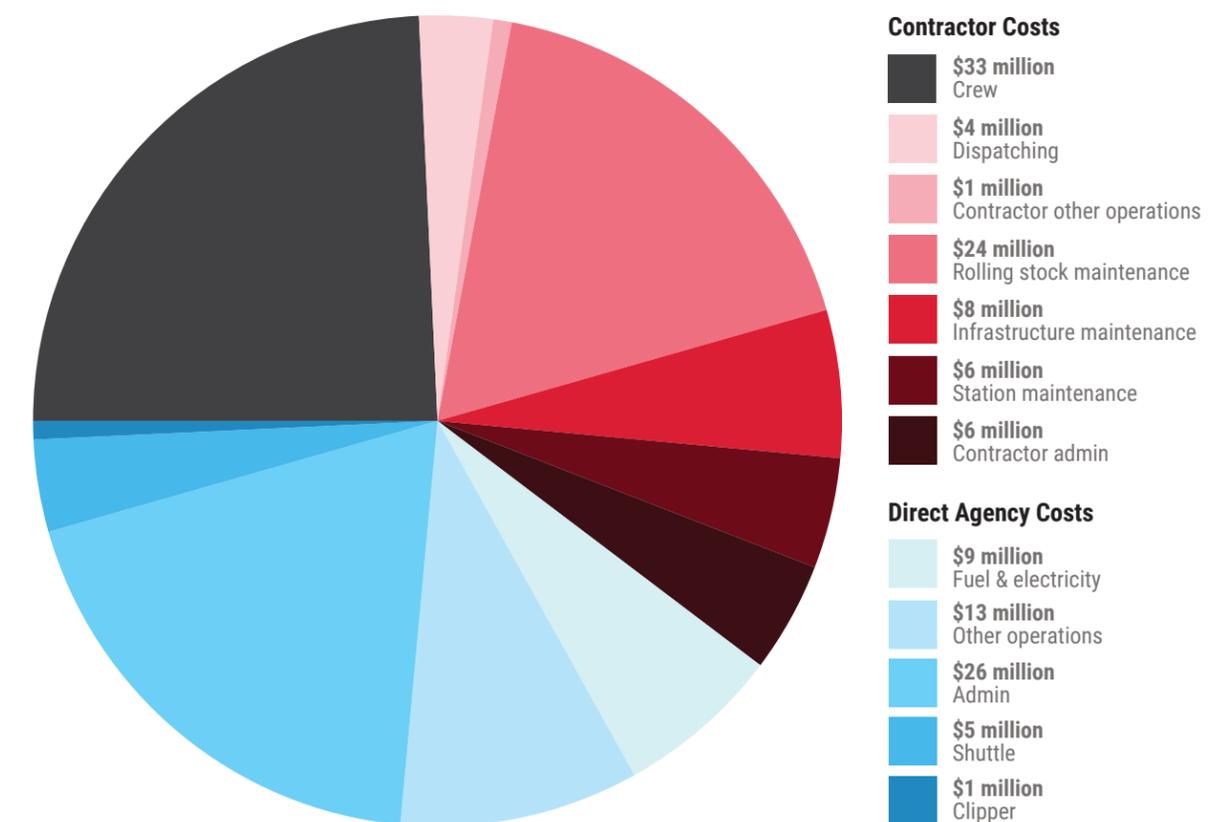
7.1 EXISTING OPERATING AND MAINTENANCE COSTS

Today, Caltrain operates and maintains a fleet of diesel trains sized to allow five trains per hour per direction in the peak periods. Caltrain has a farebox recovery ratio of approximately 75%, meaning that fares paid by passengers cover roughly three-fourths of the

cost to operate and maintain the train service. Operating and maintenance costs for Caltrain totaled \$135 million in 2018 as shown in the chart below. The largest costs are for train crews, followed by administration and rolling stock maintenance. The costs in the

chart are color coded by whether they are self-performed and/or funded directly by Caltrain or whether they are contracted out to the operations and maintenance concessionaire.

2018 CALTRAIN OPERATING COSTS: \$135.3 MILLION, 2018 DOLLARS



7.2 METHODOLOGY TO ESTIMATE FUTURE COSTS

This section summarizes the methodology used to compile and develop the estimates of future operating and maintenance costs.

7.2.1. OVERVIEW OF COST MODEL

Cost estimates were generated using a Caltrain-specific operating and maintenance cost model within the IBM developed for the Business Plan that estimates changes to the administrative, operations, and maintenance costs as service increases over time. The modeling process included the following key steps:

1. Development of unit costs for all of Caltrain's existing and proposed operations and maintenance categories;
2. Calculation of operating statistics for Caltrain's existing operation;
3. Calibration and validation of the cost model to the existing operating and maintenance costs;
4. Calculation of operating and maintenance statistics for the proposed Service Vision based on the levels of train service, maintenance needs and administrative considerations; and
5. Applying the unit costs to the operating and maintenance statistics to generate annual operations and maintenance costs for the Service Vision.

The development of unit costs and calculation of estimates are summarized below.

Development of Unit Costs

The first step in developing the cost estimates was to generate unit costs for a set of cost categories based on Caltrain's current operations and maintenance costs, supplemented by national and international research for new activities like the maintenance of EMU cars. These inputs were analyzed and manipulated to develop a set of unit costs covering all categories of Caltrain's operations, maintenance, and administrative activities. These unit costs include fixed costs that would not vary with changes in service and variable costs that would be expected to grow along with service increases. Some cost categories have both a fixed and variable component. The following cost categories and associated unit costs were included in the model:

- **Crew** – the personnel onboard a train including drivers and conductors
- **Dispatch** – the personnel controlling the movement of trains through the network and at terminals
- **Maintenance of Equipment** – upkeep of equipment including daily service and routine maintenance
- **Maintenance of Way** – upkeep of the track and right-of-way
- **Station Maintenance** – upkeep

of the stations including cleaning and repairs to items like shelters and benches

- **Contractor Administration** – the costs to oversee the contractors that provide the crew and personnel to operate and maintain train service
- **Diesel Fuel** – the cost of diesel fuel to power trains
- **Administration** – Caltrain staff across all departments
- **Shuttle Buses** – service connecting Caltrain stations to surrounding businesses
- **Clipper Card fare payment system** – costs paid to regional agencies and the vendor for use of the Clipper Card technology
- **Track Access Costs** – costs paid between Union Pacific, Caltrain and (in the future) CHSRA to use each other's track infrastructure
- **Other Operating Costs** – a catchall for other operating costs not captured in the above categories that are incurred by Caltrain direction
- **Contractor Other Operations** – a catchall for other operating costs not captured in the above categories that are incurred by the operations and maintenance contractor

Under the crew category, for example, a 6-car diesel train has an estimated crew unit cost of \$239 per paid hour.

Calculation of Cost Estimates

The next step in the process was to generate a set of operating statistics based on the proposed service plans. These operating statistics covered all the cost categories, including the following:

- Train miles
- Train hours
- Coach miles
- Cab car miles
- Diesel locomotive miles
- EMU car miles by number of cars in the set
- Gross ton miles
- Paid crew hours
- Number of stations by size
- Dispatching

To determine the variable portion of the costs, the model multiplied the operating statistics by the unit costs. For example, the cost of Diesel Fuel is \$6.19 per diesel locomotive mile. Under the existing operations, there are about 1.4 million miles traveled by trains annually. By multiplying these two numbers together (the unit cost by the operating statistic) the total annual existing fuel cost is \$8.6 million.

In addition to the variable costs, the model also applied fixed costs to certain categories including the following:

- Dispatching
- Contractor other costs
- Station maintenance
- Shuttle services
- Administration



These costs are assumed to remain constant over time, no matter the service levels. For example, the cost of providing connecting shuttle services to Caltrain stations is a fixed cost estimated at \$4.6 million a year regardless of train service. Administration costs are the one exception, as they grow significantly to support both increased levels of train service and the evolution the organization is expected to undergo in several areas to support implementation of the Service Vision.

As the final step, the variable and fixed costs were summed to calculate the total operating and maintenance costs for the Service Vision.

7.2.2. PARTNER PROJECT COSTS

A portion of the overall operating and maintenance costs for the Service Vision are attributable to sharing the corridor with HSR service and supporting the operations of new

terminals. This would include costs related to the following:

- Increased maintenance of mainline tracks due to heavier traffic levels from High-Speed Rail service; and
- Maintaining passing tracks developed specifically to support High-Speed Rail service in the corridor;
- Operations of the Salesforce Transbay Terminal and an upgraded Diridon Station.

The operating and maintenance cost estimates included in this plan do not differentiate between those attributable to partners and those attributable to Caltrain, as these will be the subject of future discussions between the partners. The general concepts governing these discussions will include Caltrain assessing track access charges for use of the corridor, and Caltrain contributing to the cost of operating the expanded terminals based on usage levels.

7.3 2040 OPERATING AND MAINTENANCE COSTS

Under the Service Vision, Caltrain will operate and maintain an Electric Multiple Unit (EMU) fleet on an electrified railroad sized to allow eight trains per peak hour per direction and will host up to four trains per peak hour for its partner railroads. Additionally, off-peak service will increase substantially from today. This will greatly expand the amount of service that Caltrain operates and maintains each day increasing the cost of those activities to over \$370 million a year by 2040. This is a 175% increase over existing operating and maintenance costs. The chart below

shows how these costs are broken down across key categories.

The primary drivers of cost increases over time are:

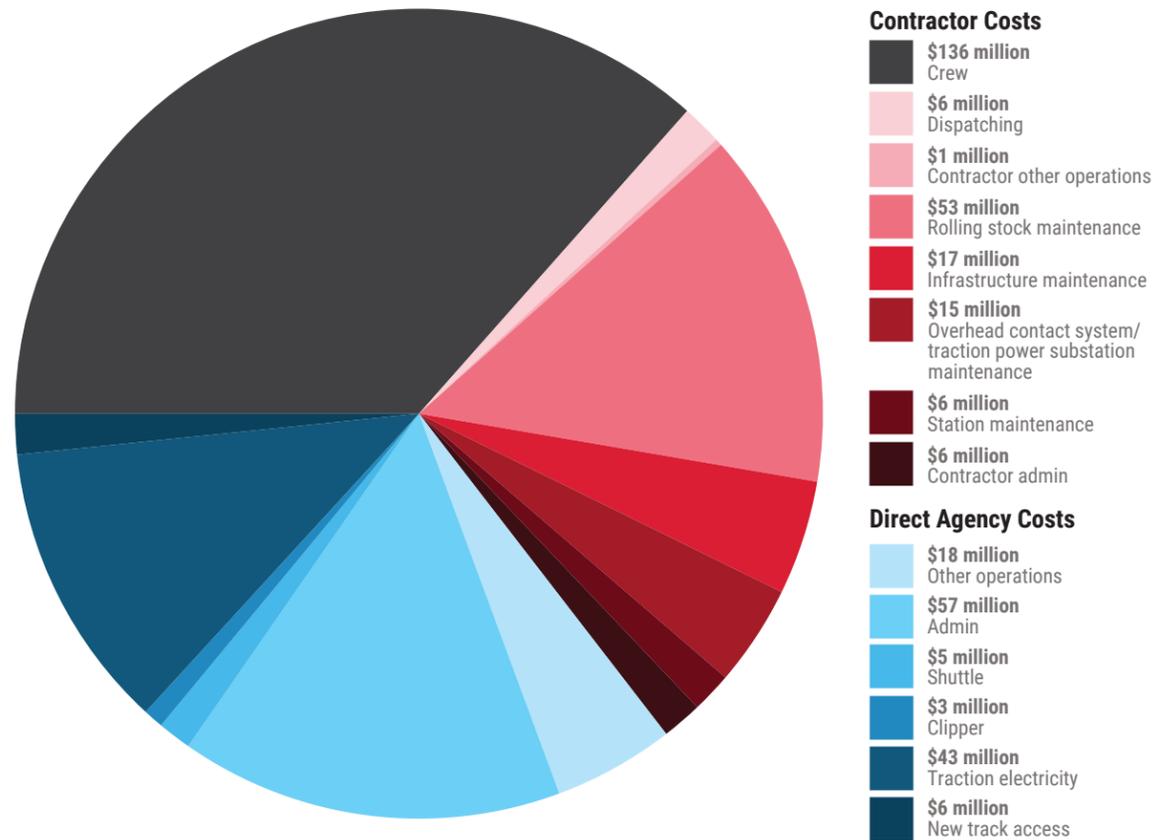
- Crew costs increase both because the number of trains being operated increases and because the number of train crew personnel per train increases as the trains become longer.
- Rolling stock maintenance costs increase as the level of service and fleet size both grow.
- As the service becomes

electrified, diesel fuel costs are replaced by the cost of electricity for traction, which increases as the number and length of trains being operated increases.

- The costs of administrative staff and overhead increase in line with the need to manage a growing railroad.

Even with these increases in cost, Caltrain is expected to remain a cost-effective railroad with a projected farebox recovery ratio of 72%, meaning that passengers cover \$0.72 of each dollar it costs to provide the service.

2040 CALTRAIN OPERATING COSTS: \$372 MILLION, 2018 DOLLARS



7.4 CHANGE IN COSTS OVER TIME

Operating and maintenance costs will grow over time as service is increased at change points between 2018 and 2040.

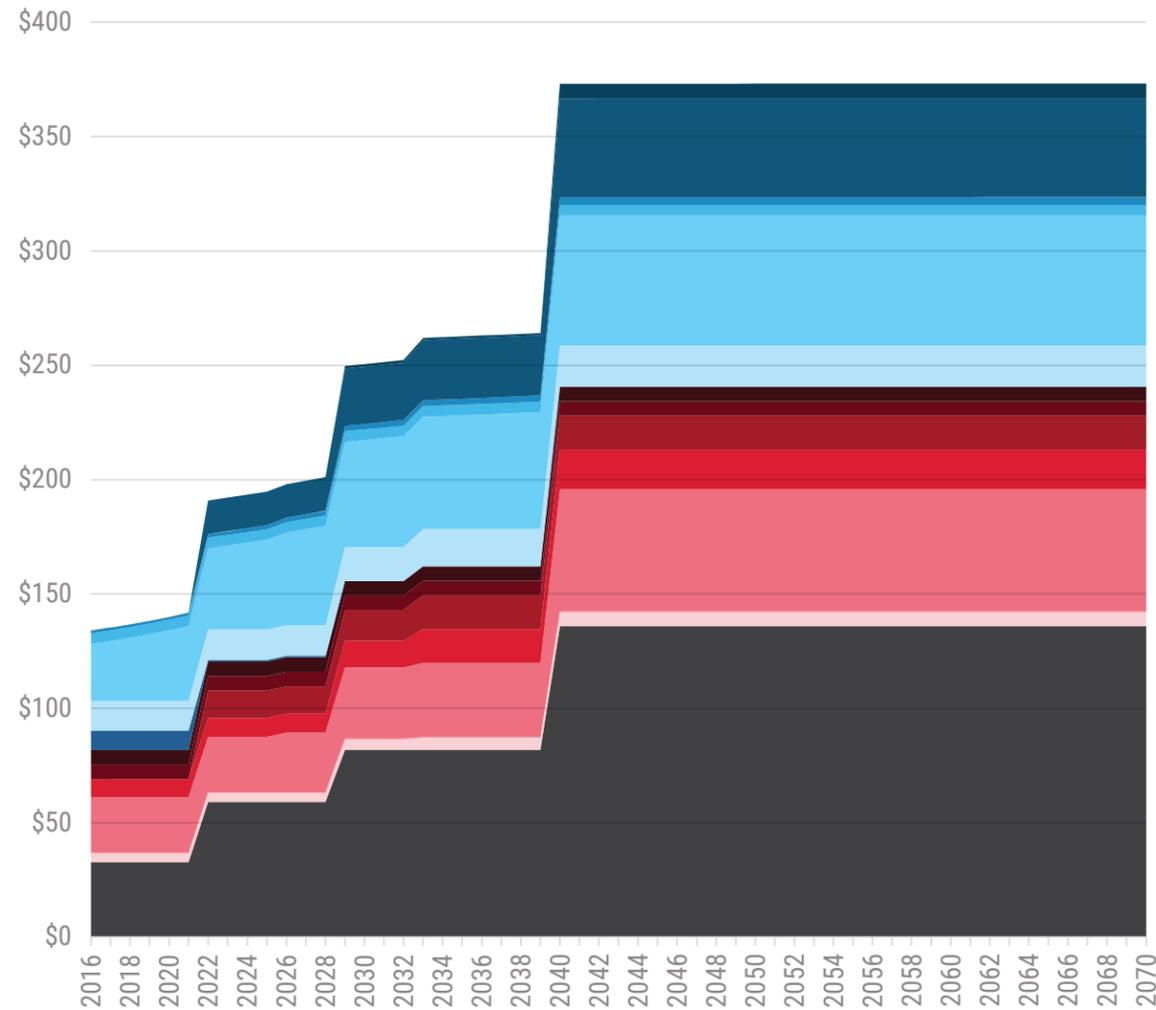
These years were selected based on both given and assumed dates for implementation of major Caltrain and/or partner projects. The change points, in turn, drive the timing of increases in operating and maintenance costs as service levels grow toward the Service Vision and HSR is introduced into the corridor.

- 2018** – Current Operations - **\$135 million**
- 2024** – Start of Electrified Operations - **\$190 million**
- 2029** – Initial HSR Operations from Merced to San Francisco - **\$250 million**
- 2033** – DTX Opens and HSR Operations Expand - **\$320 million**
- 2040** – Service Vision fully implemented - **\$370 million**



CALTRAIN OPERATION COST CHANGE OVER TIME, 2018 DOLLARS

This chart shows how the costs would change by cost category over time.



Contractor Costs

- Crew
- Dispatching
- Contractor other operations
- Rolling stock maintenance
- Infrastructure maintenance
- Overhead contact system/ traction power substation maintenance
- Station maintenance
- Contractor admin

Direct Agency Costs

- Other operations
- Admin
- Shuttle
- Clipper
- Traction electricity
- New track access

Operating and maintenance costs will grow over time as service is increased at nominal change points between 2018 and 2040.

7.5 STATE OF GOOD REPAIR

In addition to the daily costs of operating and maintaining train service in the corridor, Caltrain also must invest in ongoing capitalized maintenance to keep assets such as bridges, stations and crossings in a State of Good Repair per Federal Transit Administration (FTA) requirements.

Based on analysis of the costs of the TASI contract and Caltrain's Transit Asset Management Plan (TAM Plan), the annual cost of capitalized infrastructure maintenance investments would grow from \$7.2 million a year today to nearly \$39 million a year by 2040. **The total cost from 2018 to 2040 is estimated at \$565 million.** The table at right shows how these costs are broken down by category.

Annual capital maintenance expenditure for keeping the fleet in a State of Good Repair were developed based on the current TASI contract annual expenditure on Maintenance of Equipment. Unit Costs for future years were derived from TAM Plan assumptions. **Total expenditures on fleet State of Good Repair from 2018 through 2040 are estimated at \$525 million.**

CATEGORY	TOTAL COST 2018-2040 (MILLIONS, 2018 DOLLARS)	2040 ANNUAL COST (MILLIONS, 2018 DOLLARS)
 TRACK & STRUCTURES	\$206	\$11.4
 GRADE CROSSINGS	\$10	\$0.5
 MAINTENANCE FACILITIES	\$41	\$3.0
 SIGNALING/PTC	\$18	\$0.9
 OCS/TPS	\$35	\$1.4
 STATIONS	\$256	\$21.7
TOTAL	\$65	\$38.9



08

HOW TO PAY FOR IT



8.1 HIGH-LEVEL FUNDING STRATEGY

The Service Vision requires investments by Caltrain and its partners estimated at \$23 billion in corridor capital projects and \$370 million in Operations and Maintenance (O&M) annually by the Year 2040.

The ability of Caltrain and its partners to secure the revenue and funding necessary for implementation in a timely and strategic manner will drive the ultimate timeframe for realizing the Service Vision and frame funding policies, priorities and actions for decades to come.

This chapter presents a high-level funding strategy to guide the actions of Caltrain and its partners as they utilize and develop funding and revenue sources for the Service Vision. Funding strategies shown are high level and conceptual only. They do not reflect commitments or agreement from specific sources or partner organizations.

The funding strategy helps answer key questions including:

- What is the full list of potential funding and revenue sources that Caltrain and its partners may access and create?
- What is the likely range of funding that a specific source could generate over the next 20 years?
- What is the relative difficulty or ease of accessing this funding source?
- What is the relationship between ease of developing the funding source and the potential amount of funding that could be captured?
- Conceptually, what is the mix of funding and revenue sources that will be needed to support capital and O&M costs?
- When all known funding and revenue sources have been developed, how much additional new public funding will be required to meet the needs of the Service Vision?

The strategy is not meant to represent a specific funding plan for the Service Vision, but rather to set a framework for more detailed studies and analyses. As funding is developed for specific projects and O&M needs over time to support the incremental growth towards the Service Vision, more detailed funding plans will be created.

The strategy covers four overarching funding categories of existing or potential funding and revenue sources to support the increase in capital and O&M costs necessary to achieve both

near-term improvements and Caltrain's long-term vision.

Following the discussion of sources, a funding gap analysis quantifies the range of funding gaps that are estimated to remain after all known sources have been utilized. The final section draws from all the sources described in the previous sections to put forth a strategic implementation approach that weighs the complexity, risk, and potential amount of each source and outlines the near- and long-term steps Caltrain will take to move toward implementation.

EXISTING & POTENTIAL FUNDING CATEGORIES



COST-SHARING

Fair distribution of costs between Caltrain and other major users of the corridor



SELF-GENERATED REVENUE

Fair distribution of costs between Caltrain and other major users of the corridor



VALUE CAPTURE

Mechanisms to capture new property-based economic value generated by the railroad



PUBLIC INVESTMENT

Federal, state and local grant sources, as well as funding provided by the three member counties

8.2 METHODOLOGY

Funding analysis was completed for each of the revenue and funding sources covered in this chapter using one or more of the following approaches:

- Review of historical funding and revenue levels and trends;
- Outreach to funders and peer agencies to assess potential funding levels and requirements;
- Review of funding plans for major capital projects;
- Review of funding measures, expenditure plans, and remaining balances attributable to the Caltrain corridor;
- Review of regional funding allocation history and future projections;

- Funding and revenue projections using assumptions about changes in policy or approach by Caltrain that could yield additional funding levels; and
- Funding projections based on the implementation of various value capture strategies based on recent statewide experience and bonding models

Based on using these approaches, the range of funding and revenue that could reasonably be captured from each source was estimated over 20 years or annually. The sources were then allocated to operating and maintenance costs, capital costs, or both. For example, it was estimated that parking revenue could generate

between \$6 and 12 million a year and that it would be applied to O&M costs.

Finally, separate gap analyses were undertaken for O&M and capital costs. To complete the gap analyses, the various funding and revenue sources were combined into a funding portfolio and compared to the total costs of the Service Vision. The analysis considered what the funding gap would be if the low end, mid-point and high end of the funding ranges were secured from each source. The resulting gaps were categorized as funding that would need to be raised from a new public funding source like a regional funding measure, since all other potential funding sources were already accounted for in the funding portfolios.

8.3 FUNDING CATEGORY 1: COST SHARING

Cost sharing establishes an equitable distribution of the costs of constructing, operating, and maintaining shared infrastructure between Caltrain and other major users of the corridor based on adopted agreements. Today, Caltrain is predominantly responsible for direct investment and upkeep of the corridor. The corridor is an asset for the agency and presents an opportunity for revenue generation from agencies and companies who depend on access to Caltrain's tracks for their daily operations. Other users – such as freight, ACE, and Capitol Corridor – pay track access fees for using the facilities and systems.

At this time, only operating and maintenance costs are shared by corridor users via payment of track access fees, but there could be future opportunities for capital cost sharing, particularly with California High Speed Rail (CA HSR), which will drive the need for additional passing track and signal system infrastructure. The figure to the right shows the potential range of cost-sharing revenue from each key source.

High Speed Rail Direct Funding & Capital Cost Sharing

Given the infrastructure upgrades contemplated in the 2040 Service Vision, enhanced funding partnerships are needed to serve all operators in the corridor. Other owners in the region, like Union Pacific, collect funding from track users for capital costs. CA HSR

has already significantly invested in electrification and modernization of the Caltrain corridor. As part of the 2040 Service Vision, Caltrain will continue to partner with CA HSR for more joint capital investments for blended service on the corridor. The Business Plan assumes \$5.3-\$5.9B over the next 20 years from CA HSR, the majority of which is for the San José to Gilroy segment.

Track Access Fees

Track access fees are intended to help Caltrain, as the owner and operator of its rail corridor, maintain

and manage track infrastructure so all users can sustain their individual business operations. Caltrain shares its tracks with several other rail operators, including ACE, Capitol Corridor, and freight operators. CA HSR will also pay track access fees to Caltrain once operational.

Looking ahead, Caltrain will explore its ability to modify contracts based on regional market comparisons. The Business Plan assumes that Caltrain will generate \$23 million annually in track access fees once CA HSR is operating on the tracks based on the assumed share of train miles that CA HSR operates once fully implemented.

COST SHARING SUMMARY 2018 DOLLARS



Capital Source

HSR Direct Funding & Capital Cost Sharing

Amount defined in DTX funding strategy presented to the TJPA and capital cost allocated to HSR

Potential Range
\$5.3B-\$5.9B over 20 years



Operating Source

Track Access Fees

Caltrain income from rail operators using the track, including HSR.

Amounts in current contracts, market research of comparable benchmarks.

Potential Range
\$22M-\$23M annually



8.4 FUNDING CATEGORY 2: SELF-GENERATED REVENUE

Self-generated revenue comes from the agency's operations, primarily farebox, but also parking, advertising, and other sources. As part of the 2040 Service Vision, Caltrain is identifying opportunities to increase self-generated revenue without unduly impacting passengers or the community-at-large. The goal is to help Caltrain operate as an entrepreneurial, customer-focused business that allows the railroad to achieve efficiencies and support itself. The figure below summarizes the approach and range of potential funding from each component of self-generated revenue.

Passenger Facility Charges

Passenger facility charges are fare

charges for passengers disembarking at the Transbay Terminal. The Transbay Joint Powers Authority's (TJPA) latest Downtown Extension funding plan assumes \$800 million in funding from passenger facility charges to offset the capital costs of the terminal and the downtown extension of Caltrain over the 20-year period.

Farebox

Caltrain has a high farebox recovery ratio compared to peer agencies (over 70%). A projected increase in demand for Caltrain service suggests that the agency could increase fares in the future, although this would have equity impacts that need to be weighed against the potential revenue benefits. The Business Plan assumes

that farebox revenue by 2040 could generate between \$268 million, if fares are kept relatively consistent with today, and \$290 million, if the fare program is restructured to generate more revenue, on an annual basis.

Parking

Currently, Caltrain charges a fixed fee of \$5.50/day for parking across all stations, though there are varying levels of demand at each station. Monthly passes are available for \$82.50/month. Caltrain has no plans to expand parking supply significantly. To understand the ability to generate more revenue, the Business Plan analyzed dynamic parking pricing that allows the parking fees to match demand in the vicinity. It is

estimated that this could double Caltrain's parking revenue from \$6 to \$12 million annually. Again, however, equity implications of fee increases would need to be weighed against the benefits of dynamic pricing.

Advertising

Advertising revenue is essential to the long-term sustainability of most transit agencies' budgets and Caltrain is no different. The agency currently contracts with Outright Media to implement advertising campaigns at Caltrain stations, with a focus on station domination campaigns allowing one company to fully own the advertising space at a transit station for high impact exposure of their brand. The Business Plan assumes Caltrain could generate an additional \$2 to \$5 million annually.

Naming Rights

Naming rights are a form of advertising in which a corporation or other entity purchases the right to name a facility

or event, typically for a defined period. Caltrain has not historically employed naming rights to raise revenue in the past, but in 2019, the Caltrain Joint Powers Board (JPB) approved a facility naming rights policy that allows naming of stations and other facilities. The Business Plan estimates that Caltrain could generate between \$100,000 and \$5 million annually through naming rights opportunities.

Carbon Credits

A key component of Caltrain's modernization over the next decade involves electrification of the fleet. By electrifying the fleet, Caltrain unlocks funding potential from the California Air Resources Board (CARB) for which its diesel fleet is currently ineligible. With electrification, Caltrain will be eligible to generate credits under California's Low Carbon Fuel Standard (LCFS). Upon electrification, Caltrain will register with CARB's LCFS Reporting Tool and report the quantity of kilowatt hours (kWh) consumed by trains each quarter. Generated credits can then be sold to

those entities who need credits.

At current credit prices (Q4 2019) Caltrain would be eligible to receive \$0.17-\$0.25 cents per kWh electricity consumed, and even more if sourcing electricity from renewable energy sources, which would increase potential revenue to \$0.22-\$0.31 cents per kWh. These carbon credits could generate \$18 to \$30 million annually, depending on the market price of credits, fleet mix, and the source of electricity.

Utilities And Digital Services

The JPB recently approved and installed 48 miles of dark fiber cable in the Caltrain corridor to support electrification, positioning Caltrain for a potential new source of revenue. Caltrain will launch a new business program model to market the JPB's dark fiber. A Caltrain study that looked at the revenue potential of leasing the dark fiber strands and fiber conduit installed in Caltrain's right-of-way estimated the agency could generate \$500,000 to \$1.5 million annually.

SELF-GENERATED REVENUE, 2018 DOLLARS



Capital Source Facility Charges

Fare charges for passengers getting on and off at Transbay Terminal

Amount defined in TJPA DTA funding strategy

Potential Range
\$0M-\$800M over 20 years



Operating Source Farebox

Reviewed existing fare studies & conducted market research to develop comparable benchmarks

Stretch goal over baseline: 5% for low-end, 8% for high-end

Potential Range
\$270M-\$290M annually



Operating Source Parking

Researched parking rates for surrounding public and private facilities

Calculated market-rate price for each facility

Potential Range
\$6M-\$12M annually



Operating Source Advertising

Reviewed contract with Outfront Media

Identified new advertising opportunities

Potential Range
\$2M-\$5M annually



Operating Source Naming Rights

Reviewed the JPB Naming Rights Policy

Review international case studies

Potential Range
\$0M-\$5M annually



Operating Source Carbon Credits

Sell generated credits upon electrification

Amounts developed from discussions with California Air Resources Board

Potential Range
\$0-\$30M annually



Operating Source Utilities & Digital Services

Lease dark fiber strands and fiber conduit in Caltrain ROW

Amounts developed from market research

Potential Range
\$0-\$1.5M annually

8.5 FUNDING CATEGORY 3: VALUE CAPTURE

Public investments in transit and other infrastructure generate value for nearby property owners. The term “value capture” refers to any strategy in which a public agency “captures” a portion of the increased property values resulting from transit improvements to help pay for the infrastructure itself.

Starting during the second decade of the Business Plan (2030-2040), with proper mechanisms in place, the Caltrain corridor could start reaping some of the real estate value that the railroad creates and therefore enable investments in city-driven improvements, such as the terminals and grade crossings. In some cases, new governing entities would need to be established to collect and allocate the funds. In other cases, existing entities such as the Caltrain Board or a

city redevelopment successor agency could be granted such new authority.

Caltrain’s ability to pursue value capture funding strategies will be influenced by the political context and market conditions. Value capture strategies are more likely to be successful with the support of local jurisdictions, property owners and residents. As a result, value capture strategies tend to be most successful in places where planned improvements offer a strong value proposition for surrounding property owners, especially where significant new development is planned. Value capture sources are uncertain because their application changes frequently – for instance, the state laws governing the use of tax increment financing (TIF) have undergone many revisions in the past few years.

District-based funding mechanisms such as TIF or Community Facilities Districts (CFDs) will require collaboration with local jurisdictions and property owners. Caltrain will need to look for opportunities to encourage use of these tools to maximize revenue. For example, there may be opportunities to encourage the formation of a TIF district and/or CFD in areas where significant development is planned, and where that development will directly benefit from Caltrain investments or access improvements. Potential opportunities include Diridon Station, Redwood City Station and 4th and King Station.

In addition, Caltrain will benefit from engagement with ongoing potential changes to state legislation impacting value capture tools. Modifications

to TIF legislation, in particular, are frequently considered as part of broader efforts to help encourage infill development, especially housing, in transit-served locations. As these discussions continue, there may be opportunities to support changes to existing laws that will encourage the use of TIF or special taxes for transit improvements or operating expenses.

Five value capture tools are discussed in detail below.

Real Estate Revenue

Caltrain and its partners may utilize revenue generated by development of publicly-owned real estate or air rights to contribute to capital costs and operating expenses. The recently adopted Rail Corridor Use Policy and Transit-Oriented Development Policy⁴ identified a limited number of properties that could be independently developed, with revenues most likely to come in the form of annual ground lease payments. Additional development opportunities are expected to be created in the future, as capital projects are completed,

including the potential for some air rights development. This development will generate a revenue stream for Caltrain to use at its discretion. The Business Plan estimates that Caltrain can generate \$30 to \$180 million over the 20-year period from development on its agency-owned property, including property that could become available in the future as the Service Vision is implemented.

Tax Increment Financing

Tax Increment Financing (TIF) is a public financing method wherein future increases in property tax revenues (and in some cases, other taxes) are pledged to deliver needed infrastructure or other improvements within a specified area. TIF revenues are generally driven by development, and as such, are best suited to be applied to areas where development is planned. Since the dissolution of redevelopment in 2011, the State of California has authorized various new TIF tools. The two types with the greatest potential for use in funding Caltrain improvements are Enhanced Infrastructure Financing Districts (EIFDs) and Neighborhood Infill Finance and Transit Improvement Districts. The Business Plan estimates that \$84 million could be generated annually from one or more TIF districts starting in 2035, or a total of \$366 million by 2040 assuming issuance of bonds.

Parcel Tax

A parcel tax is a special tax imposed in a city, county, community college/ school district, or other special district, and requires 2/3 approval by voters in the applicable jurisdiction. While parcel taxes may be imposed for practically any type of municipal purpose, including transit and other transportation uses, the most common use of such taxes is for school districts.

Parcel taxes are not required to demonstrate proof of nexus or special benefit. They cover all parcels in the city, county, school district, or special district that initiates the tax. Parcel taxes may be used to fund capital improvements and/or operations and maintenance, including for transit. Tax rates are calculated as a flat amount per parcel but may vary based on parcel characteristics, such as land use, frontage or square footage. The tax rate cannot be proportional to the assessed property value.

Caltrain can explore the potential to establish a new parcel tax but the level of funding that can be generated from this source depends on the willingness of voters to tax themselves to pay for improvements. Recent examples of successful parcel taxes in the region include AC Transit’s parcel tax for transit operations and Measure AA, a regional parcel tax that funds wetland restoration. The Business Plan estimates that a parcel tax could generate up to \$860 million over the 20-year period, depending on the geographic extent of the properties taxed and the amount.

Community Facilities District Or Special Assessment District

This funding type includes a variety of tools designed to capture revenue from property owners who agree to contribute to beneficial community assets by voting to levy additional taxes on their property. The most likely forms of district-based taxes are Mello Roos Community Facilities District (CFD) or a Special Assessment District. The Business Plan estimates that Caltrain could generate up to \$120 million over the 20-year period for corridor operating expenses. An additional \$460 million is estimated to be generated for the Downtown Extension of Caltrain.

VALUE CAPTURE TOOLS, 2018 DOLLARS



Capital Source Real Estate Revenue

Includes JPB-owned property not currently available for development but that might become available as service vision is implemented

Sum of annual potential revenues over 20 years

Potential Range
\$30M-\$180M over 20 years



Capital Source Tax Increment Finance (TIF)

High end assumes a corridor-wide EIFD; would require new state legislation and/or other incentives

Sum of potential annual revenue over 10 years starting with district formation in 2030; note potential for bonding could increase amount generated

Potential Range
\$0-\$366M



Capital Source Parcel Tax

Tax on properties in counties with Caltrain service

Sum of annual potential revenues over 10 years starting in 2030

Potential Range
\$0M-\$860M annually



Operating Source CFD/Assessment District

Assumes 1-3 CFDs established to fund station access improvements

Sum of potential annual revenues over 10 years starting in 2030

Potential Range
\$0M-\$120M annually



Operating Source Transit Center District Plan

Amount defined in TJPB DTX funding strategy

(note this amount may overlap with preceding sources)

Potential Range
\$0M-\$460M over 20 years

⁴ http://www.caltrain.com/Assets/_Agendas+and+Minutes/JPB/2019/SI/23+7++Draft+Transit+Oriented+Development+Policy.pdf

8.6 FUNDING CATEGORY 4: PUBLIC INVESTMENT

Direct public investment into the railroad includes sources like member contributions from the three member counties, as well as new federal, state, regional, and local funding streams, which help fund the construction and operation of the Caltrain system. The figure below shows the public investment anticipated over the next 20 years.

JPB Member Contributions and Existing Tax Measures

Each of the three JPB members – San Francisco, Santa Clara, and San Mateo Counties – currently contributes \$7.5 million to support Caltrain's operating budget on an annual basis for a total of \$22.5 million annually from this source. The sources of

funds per member varies based on the availability of local sales tax or bond funds. For the purposes of Business Planning, the total operating contribution is assumed to increase to \$29.9 million per year

On the capital side, most local sales taxes are already earmarked for specific projects in the expenditure plan of the respective county's sales tax measures. While Caltrain has received discretionary funding from current sales taxes beyond their member contributions, this is the exception, not the rule. A specific purpose or project must be attached to such additional funding allocations should they be made. The Business Plan relies on \$1,800 million in capital contributions based on the breakdown

in the table on the next page.

Regional Measures

Caltrain has previously received limited amounts of regional funding for projects.

Regional Measure 3

In fall 2017, Bay Area voters passed Regional Measure 3 (RM3) which increases bridge tolls by \$1 in 2019, \$1 in 2022, and \$1 in 2025 to fund regional transportation investments. The RM3 capital expenditure plan earmarked \$425 million for Caltrain projects: \$325 million to fund the Downtown Extension project and \$100 million to fund Diridon Station improvements.

CALTRAIN AND CORRIDOR-RELATED FUNDS FROM MEMBER AGENCY COUNTIES		\$1,831
San Francisco County		\$150
Prop K (Or Successor) for JPB Capital Budget (based on current levels)		\$150
San Mateo County		\$517
Measure A - Caltrain Item in Expenditure Plan, for JPB Capital Budget		\$150
Measure A - Grade Separation		\$230
Measure W - Grade Separation		\$69
Measure W - Regional Transit Connections		\$68
Santa Clara County		\$1,164
Measure B - Grade Separation		\$700
Measure B - Caltrain Santa Clara County-specific enhancements + Gilroy		\$314
VTA Caltrain capital budget funding (based on current levels)		\$150

the Caltrain 2040 Service Vision. The Business Plan assumes that Caltrain will receive between \$800,000 and \$2.5 billion in eligible federal funding over the next 20 years, or 5-15% of the anticipated regional total. The Business Plan assumes that the agency will receive between \$400,000 and \$2.1 billion in state funding over the next 20 years, or 3-15% of the anticipated regional total. In addition to these totals from discretionary programs, the Business Plan also estimates that Caltrain will receive \$460 million in federal and state formula funds over 20 years.

ANTICIPATED PUBLIC FUNDING, 2018 DOLLARS



JPB Member Agency Contributions & Existing Tax Measures

Anticipated Capital Funding
\$180M total over 20 years

Anticipated O&M Funding
\$30M annually



Regional Measure 3

Anticipated Capital Funding
\$425M total over 20 years



Formula Funds (Federal/State SOGR)

Anticipated Capital Funding
\$460M total over 20 years



Federal Funding FTA Discretionary Programs

Anticipated Funding for Region
\$16.6B total over 20 years

Anticipated Caltrain Corridor Share of Region
\$0.8B-\$2.5B over 20 years



State Funding State Transit Programs

Anticipated Funding for Region
\$13.8B total over 20 years

Anticipated Caltrain Corridor Share of Region
\$0.4B-\$2.1B over 20 years

Regional Transportation Plan

MTC distributes state and federal funding via the region's RTP, Plan Bay Area. The most recent RTP earmarked \$2.3 billion in funding for Caltrain projects over the next 20 years, including the Transbay Transit Center, Downtown Extension, Caltrain electrification, and station improvements.

Public Grants

Caltrain receives public grants from the federal and state level. Below are some of the sources of public grant funding available to support

8.7 FUNDING GAP ANALYSIS

This section synthesizes the analysis of specific funding sources from the previous sections to identify the range of new public funding that will need to be generated by Caltrain and its partners in order to close the gap between the estimated costs of the service vision and the known and potential sources of revenue and funding.

CAPITAL FUNDING

Identifying and capturing capital funding to support the Business Plan requires a strategic approach, and an understanding of the time, complexity, and risks associated with securing each source. The chart below shows the capital costs compared to the funding estimates and the resulting funding gap for three

potential scenarios: low, medium, and high-end funding capture. In all cases, committed public funds total \$2.7 billion over the 20-year period. Anticipated new public funds range from \$1.2 to \$4.6 billion. CA HSR's contribution ranges from \$5.3 to \$5.9 billion. Value capture mechanisms could generate up to \$2 billion for the corridor.

While Caltrain is eligible for many existing sources of public funding, even after exhausting all of them, a funding gap of between \$7.1 to \$14.9 billion remains over the 20-year period. The remaining gap points to a need for new dedicated public funding sources. Today, federal funds (both formula and competitive) make up about half of Caltrain's annual capital funding. Major new sources could include a regional



funding measure, or a dedicated Caltrain-only sales tax measure in the three-county area enabled by SB 797

O&M FUNDING

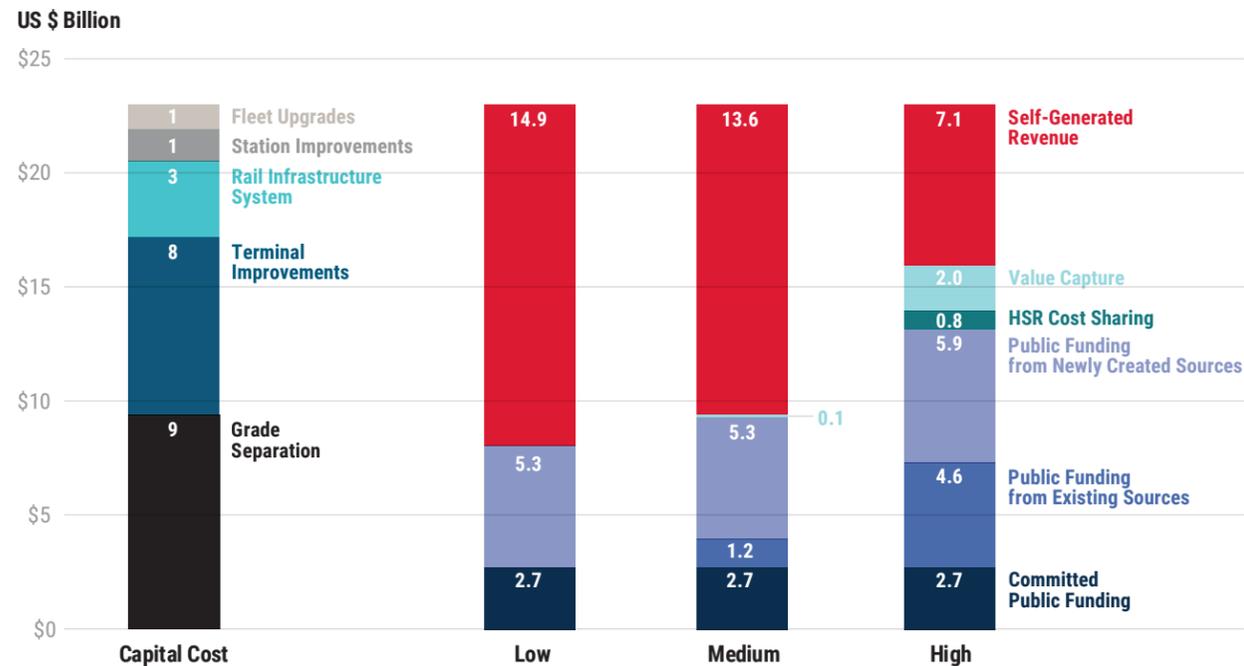
The Service Vision will require increased O&M revenue to support Caltrain's expanded service offerings, as well as use of the corridor by ACE,

Capitol Corridor and CA HSR. The figure below shows the estimated Year 2040 O&M costs and the funding gap across three potential funding outcomes: low, medium, and high-end estimate. Farebox is assumed to continue to cover over 70% of O&M costs in all cases. The balance could be generated from a combination of carbon credits, parking, advertising, naming rights, track access fees, and

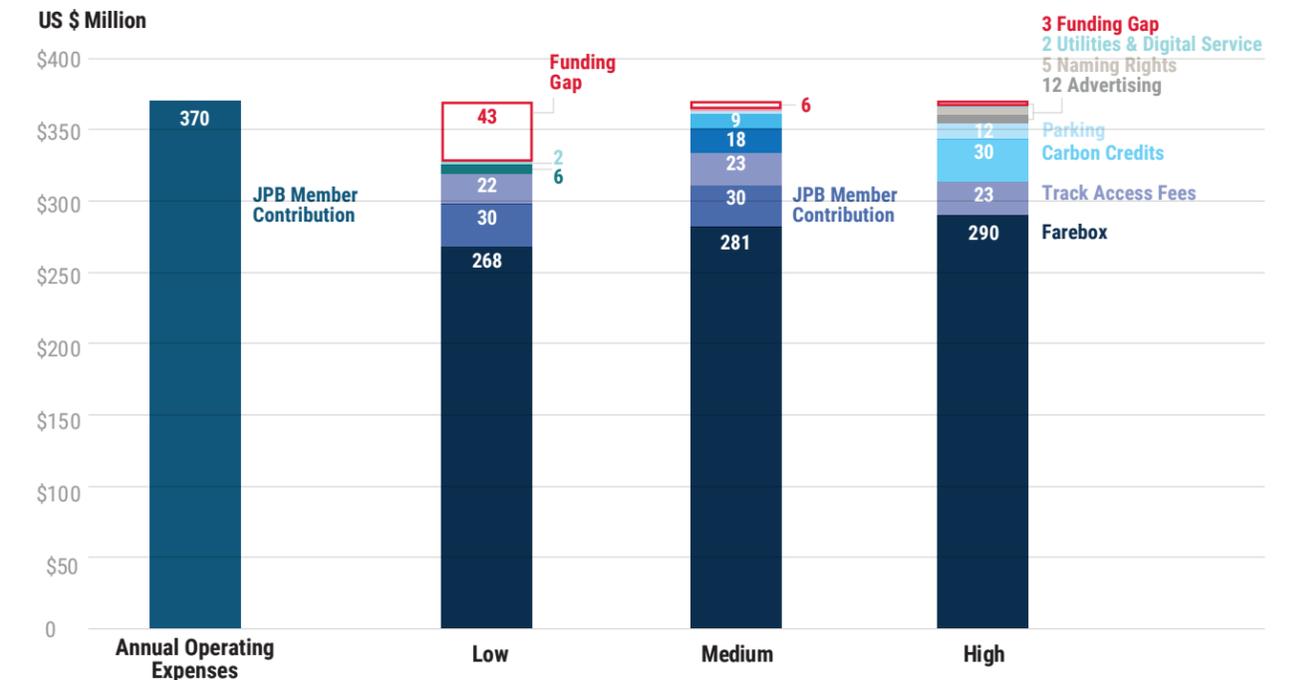
JPB member contributions.

As shown in the figure, the funding gap ranges from \$3 million to \$43 million. The low and medium gaps assume that JPB member contributions continue at a level of \$30 million annually, while the high analysis assumes that these are replaced by other sources.

SUMMARY OF ANTICIPATED CAPITAL FUNDING GAP, 2018 DOLLARS



SUMMARY OF YEAR 2040 ESTIMATED ANNUAL O&M FUNDING GAP, 2018 DOLLARS



8.8 FUNDING IMPLEMENTATION

This implementation section guides Caltrain and its partners on how to focus energy and staff resources to secure these funds.

The previous sections described the four overarching categories of funding: cost-sharing, self-generated revenue, value capture, and public investment; and the funding gap analysis that identifies the range of funding required from completely new public sources. This implementation section guides Caltrain and its partners on how to focus energy and staff resources to secure these funds and close the gap based on the following considerations related to the potential performance of the various funding sources:

Funding Source Ease of Implementation

All sources are analyzed for the relative ease of implementing the funding source based on factors such as legislative and regulatory requirements and number of parties that would need to coordinate to realize the funding stream

Anticipated and Potential Magnitude of Funding

The sources are reviewed to understand the relative amount of funding each could generate based on original analysis or review of how this source has performed for other transit agencies

Finally, near- and longer-term actions are identified to secure each source. Near-term actions will be pursued in the first 10 years of the Business Plan: 2020-2030. Generally, longer-term actions will be pursued in the second decade of the Plan 2030-2040.

FUNDING SOURCE PERFORMANCE

The funding sources presented vary widely in terms of the time, complexity, and risk to implement as well as the level of revenue and funding they will generate. The figure below illustrates how the funding and revenue sources perform across these factors. The upper quadrants are significant revenue sources, with increasing implementation complexity, time and/or risk to the right. The lower quadrants are less significant revenue opportunities, with increasing implementation complexity, time and risk to the right. The potential funding sources are mapped to the four quadrants.

Many funding and revenue-generating opportunities are available to Caltrain within the next 20 years, but there are several options that can be achieved early. The sources outlined on the left two quadrants in the figure are priorities for the agency given the simplicity of implementation. The sources in the upper left quadrant are particularly attractive as they are both simple and potentially generate a high level of funding for the agency. The sources on the left side will be the focus in the near term (2020-2030), while those on the right may be implemented over the long-term(2030 and 2040) because they are more complex, higher risk, or require more time to implement.

PERFORMANCE OF FUNDING SOURCES



NEAR-TERM AND LONGER-TERM ACTIONS

Based on the investigations in the sections above, and the sources performance analysis, this section presents a set of actions related to capital funding, O&M funding, and the major terminal projects that Caltrain will undertake with its partners to advance funding for the Service Vision. In addition to these actions, Caltrain will continue financial planning

to develop more detailed funding plans for specific components of the program in partnership with other corridor stakeholders and agencies.

Capital Funding

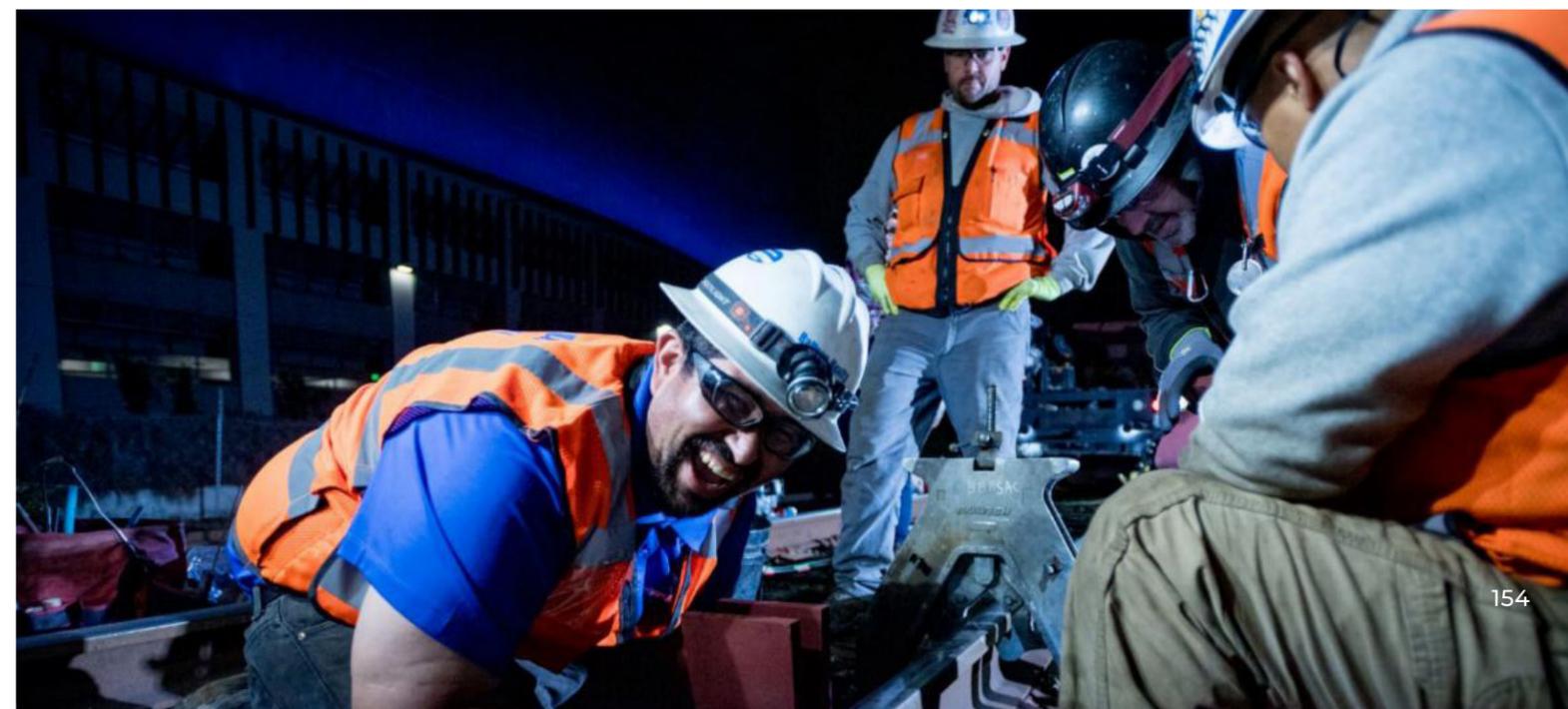
As part of the Business Plan, Caltrain reviewed a wide range of potential funding from state and federal grants. Based on eligibility and competitiveness, priority grants that Caltrain will apply for in the near term

are presented in the table below.

Caltrain is currently pre-positioning for these grants and preparing to submit proposals in the next rounds. As part of that, the agency intends to be involved in guidelines development processes where applicable to ensure Caltrain's eligibility. For success in securing federal monies, Caltrain may need additional staff or consultant support to competitively pre-position for them.

PRIORITY NEAR-TERM GRANTS

FUND NAME	GRANT-MAKING ENTITY	ANNUAL FUNDING AVAILABLE	FUNDING SOURCE	FUNDING TYPE	GOVERNANCE LEVEL
Transit and Intercity Rail Capital Program (TIRCP)	CalSTA	\$224 million	SB1, Cap and Trade	Competitive	State
Section 130 Railroad-Highway Grade Crossing Program	Caltrans, CPUC	\$16 million	FAST/HSIP	2,996,900,000	408,800
Solutions for Congested Corridors Program (CPC)	CalSTA	\$250 million	SB1	Competitive	State
Carl Moyer Program	BAAQMD	\$50 million	CARB	First-come, first-served	Regional
Federal Rail Administration	FRA	Various	FRA		Federal



CAPITAL FUNDING ACTIONS

FUND NAME	NEAR-TERM	LONGER-TERM
Cost Sharing	CA HSR Cost Sharing: Strengthen partnership with CA HSR to secure capital cost sharing agreements.	
	Capital Cost Sharing: Build upon existing partnerships with cities, other agencies, and private rail operators to increase capital cost sharing.	
Self-Generated Revenue		Passenger Facility Charge: Work with TJPA to establish passenger facility charge for DTX.
Value Capture	Value Capture: Monitor and participate in potential future changes to state legislation that enable broader use of value capture tools such as TIF for transit improvements.	Real Estate Revenue: Maximize the value of real estate and air rights in capital planning.
	Value Capture for Grade Separations: Convene an advisory group consisting of MTC, the Peninsula Corridor Joint Powers Board, CA HSR, and cities along the corridor to structure a grade separations funding program.	Tax Increment Financing / Community Facilities Districts: Explore the use of value capture tools such as TIF and CFDs where transit or access improvements are planned that will directly benefit nearby development or property owners.
Public Investment	Member Contributions: Keep member contributions steady, increase with inflation.	
	Local Sales Tax: Pursue three-county sales tax in 2020, enabled by SB 797.	
Corridor Business Contributions	Public Grants: Aggressively position for new federal, and state funding sources, including Congested Corridors Program, TIRCP, and Carl Moyer Program.	
	Corridor Business Contributions: Convene employers in Caltrain's service area, to develop pathways for corridor businesses to contribute to the system's capital needs.	

TERMINAL CAPITAL FUNDING

FUND NAME	NEAR-TERM	LONGER-TERM
Terminals	Downtown Extension: Utilize the Downtown Rail Extension Project working group to advance DTX funding.	
	Diridon Station: Work with the City of José, Valley Transportation Authority, CA HSR, and Google, to establish a new or augmented Diridon Station Area Plan stakeholder group to estimate costs by each responsible party and identify potential funding sources.	

In addition to these grant pursuits, the table on the previous page summarizes the capital funding activities that Caltrain will pursue in the near and longer terms to help secure the necessary funding to achieve the Service Vision.

Terminal Capital Funding

In addition to the more general actions to raise capital noted in the sections

above, Caltrain will continue to partner with cities of San Francisco and San José to raise funds to fill the gap for major capital projects at the terminals as noted in the table on the previous page.

OPERATING AND MAINTENANCE FUNDING

Caltrain will pursue a range of

activities across the different types of funding and revenue sources to support increased levels of service and CA HSR operations in the corridor. These actions are summarized below. Nearer term actions are generally focused on self-generated revenue options, while longer term actions are focused on value capture and new public funding sources.

O&M FUNDING ACTIONS

FUND NAME	NEAR-TERM	LONGER-TERM
Cost Sharing		Track Access Fees: Explore opportunities to match track access fees with market rates in the region.
Self-Generated Revenue	Farebox: Review the fare schedule as soon as practicable and implement an altered fare structure that maximizes both farebox revenue and access for the corridor's lowest-income populations. Review the Go Pass program.	
	Parking: Conduct in-depth parking study to determine the impacts and expended revenue from parking at station parking lots. Consider shift from fixed parking prices to market-based, dynamic parking prices and equity impacts.	
	Advertising: Increase station domination campaigns, interior train advertising, station events.	
Public Funding	Carbon Credits: Participate in CARB's low carbon credits program.	
	Member Contributions: Keep member contributions steady, increase with inflation.	Regional Measure: Support and position for a new regional funding measure.



09

WHAT THE BUSINESS PLAN MEANS FOR THE CALTRAIN ORGANIZATION

9.1 CALTRAIN'S ORGANIZATIONAL CONTEXT

This Chapter describes the findings of the Business Plan Organizational Assessment. The Caltrain Business Plan Organizational Assessment addresses three related areas where decisions are required: service delivery, internal organization, and governance.

It then lays out choices, focus areas, and recommendations for consideration by Caltrain and its partners as they prepare for the work ahead. 2040 is a long way away and organizations can evolve in many ways; Caltrain anticipates a process of change that occurs over time.

Caltrain's organizational structure will need to evolve to manage the requirements of transformational change at the scale proposed in the Business Plan. Caltrain needs an organization that is adequately resourced and structured so that it can meet both its immediate and future challenges.

Since assuming its current institutional form in the early 1990s, Caltrain has experienced nearly three decades of successful growth. In this period, Caltrain has become the country's seventh largest commuter railroad by ridership and it has proudly emerged as the most efficient major passenger railroad in the country. Now, recently made decisions have set the railroad on a path of fundamental change; the most critical being the electrification of the Peninsula Corridor and the agreement to share the corridor with High-Speed Rail service.

This change is happening with a unique and complex governing structure (described below). Caltrain is also facing uncertain future funding availability as well as a difficult cost sharing arrangement amongst the JPA members. Total partner funding has been significantly reduced over the

past decade and the individual partner agencies appear to have impending financial issues that will continue or possibly exacerbate the problem. These funding challenges affect both annual operating costs as well as capital costs:

- On the operating side, there is no dedicated funding source nor mutually agreed upon funding levels.
- On the capital side, there is inadequate funding for state of good repair investments, no mutually agreed upon funding levels and no funded multi-year capital investment plan except for the electrification project.

While Caltrain is facing all these issues, it is implementing the electrification program, which is an extremely complex, high profile project

that is critical to Caltrain's future service and organizational credibility. Furthermore, this is happening on the heels of the challenging implementation of positive train control, which is causing concerns both at Caltrain and at many other railroads throughout the country.

Finally, this is happening simultaneously with an evolving relationship with CHSRA. As noted above, the relationship with CHSRA is critical to the future of Caltrain. In a general sense, CHSRA provides both challenges regarding service integration, service delivery, infrastructure planning, cost sharing, as well as major opportunities related to the development of corridor-wide grade crossing and operational strategies, funding, political support, and interlining services.



9.2 THE CALTRAIN ORGANIZATION TODAY

Railroads are complex entities. Defining their organizational structure, both generally, and specifically at Caltrain, was undertaken as a foundational piece of analysis to support the Business Plan’s organizational assessment. Most railroads have the same functions: the executive team; operations; safety and security; finance; real estate and commercial activities; administration; planning; capital program management/ engineering; communications; and government relations.

Caltrain fulfills all the functions of a major railroad but does so within a complicated framework for many key activities. Given the size, history, complexity, and structuring of Caltrain’s operations, many of the functions are shared by different organizational entities.

The Caltrain JPA designates the San Mateo County Transit District (SMCTD) as Caltrain’s “managing agency.” SMCTD employees manage and administer the Caltrain system, either as part of a Caltrain-dedicated department or through a shared services arrangement with other SMCTD operations.

In all cases, responsibility is assigned to one or more of six different groups:

Caltrain Management

- Rail Division/CalMod
- San Mateo County Transit District (i.e., “District”) Shared Services

Caltrain Contractor

- Transit America Services Inc. (TASI)
- Other

Non Caltrain

- Outside public partners
- Outside private partners

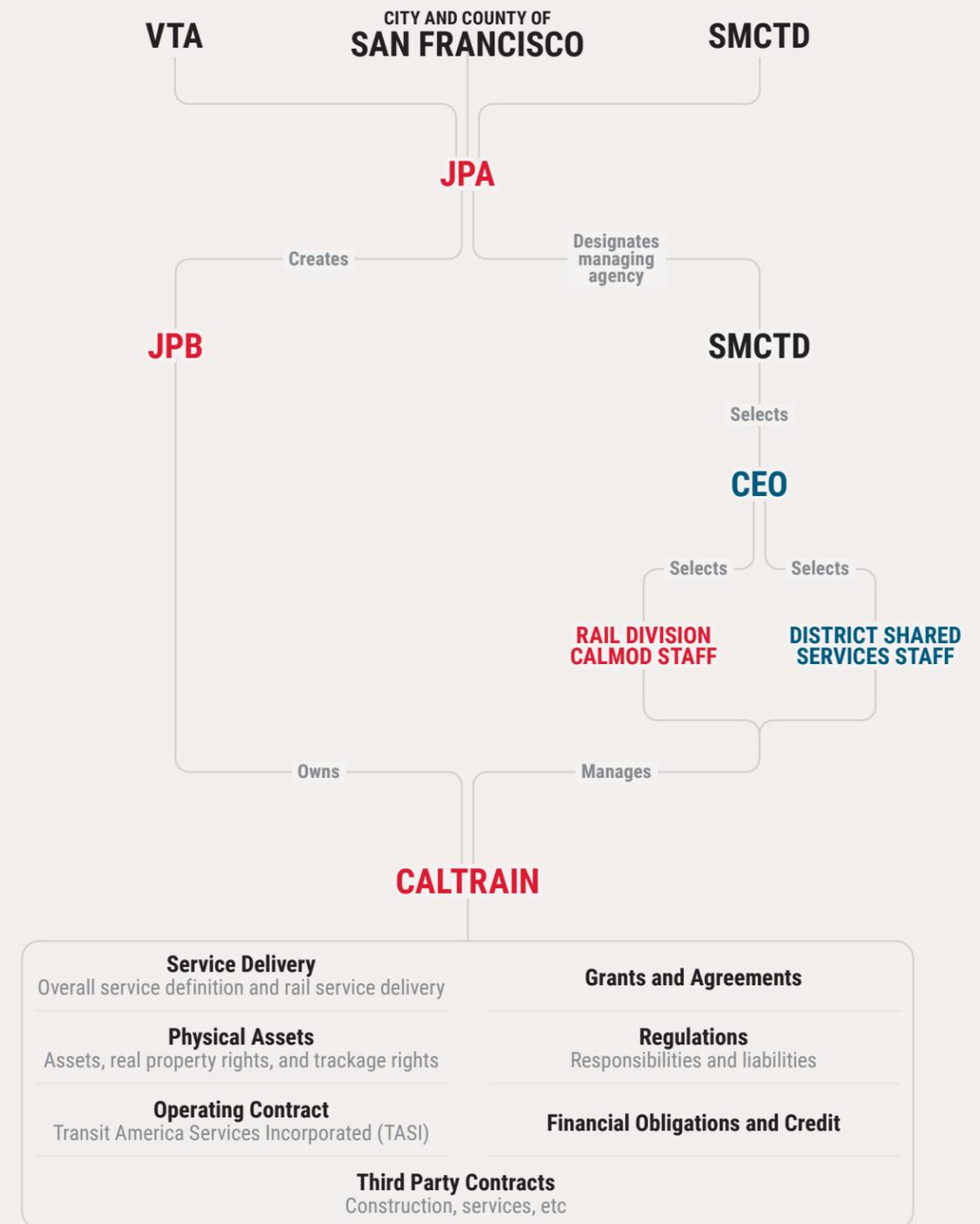
Beyond its rail service, Caltrain currently plays many roles in the corridor; for example, it acts as a partial mobility manager in that it supports bus shuttle services connecting to the system. A critical issue for Caltrain is determining to what extent the organization will more fully engage these different roles. Caltrain’s posture relative to these roles will underlie future relationships and agreements with CHSRA, partner agencies, local jurisdictions, private businesses, the development community, and other external constituencies.

¹⁵ This mapping is based on an analysis of Caltrain’s organizational chart, the TASI organizational chart and contract as well as numerous interviews with Caltrain staff during the summer of 2018 and further discussions with senior staff in March 2019.

CALTRAIN ORGANIZATION TODAY

Option A, in reference to pg.158-159

● CALTRAIN ● SHARED



Caltrain fulfills all the functions of a major railroad but does so within a complicated framework that creates redundant responsibilities for many key activities. The Caltrain JPA designates the San Mateo County Transit District (SMCTD) as Caltrain’s “managing agency.”

9.3 SERVICE DELIVERY

Service Delivery is defined as how Caltrain operates and manages its services, both on and off the corridor. For example, service delivery defines how Caltrain fulfills its various functions such as train operations, rolling stock maintenance, track maintenance, and implementation of infrastructure improvements.

Presently, Caltrain contracts with a private company, Transit America Services Inc. (TASI) to provide rail services, including track maintenance, rolling stock maintenance, and operating services. The current contract was initiated in 2011 and is managed by SMCTD. Caltrain uses the same contracting model as most commuter railroads in North America – using a third-party service provider.

The confluence of the completion of the electrification project and the end of the TASI contract provide Caltrain with the opportunity to redefine how it provides its service.¹⁶ The most basic management choice ahead will revolve around the extent of the use of in-house forces as compared to third-party contractors. A third-party could be a private operator such as TASI or an operator/maintainer procured through a partner agency. These contracts can be for operations or maintenance or financing, or combinations thereof. A combination of different approaches can be used for transportation, maintenance of way, maintenance of

equipment, administrative functions, and real estate development. Caltrain's future service delivery options are:

Extension of TASI contract with modifications

Caltrain's existing operating contract expires in 2022 and includes a one-year option to extend; there is an opportunity to negotiate a five-year extension pending the Federal Transit Administration's (FTA) concurrence. The TASI contract has been in place during a period when the amount of service (number of trains, number and type of rail cars and extent of system) has remained relatively constant. Caltrain is now entering a period of significant transformation and expansion.

Solicitation of a service provider through the conventional procurement process

In this instance, Caltrain would go to the market to solicit a service provider. Initially, Caltrain would have to determine what structure that is desired. Once this was

completed, Caltrain would initiate the procurement process and develop an appropriate Request for Information / Qualifications or Proposals as needed, evaluate proposals, select a vendor and manage a transition period if TASI were not re-selected. There are two main questions:

Bundled or unbundled contract

Bundled is where the agency contracts with a single entity to provide the primary operations and maintenance functions. Caltrain's relationship with TASI is an example of a bundled contract. Unbundled is where the agency has two or more contracts to provide these functions, usually divided between train operations and rolling stock/infrastructure maintenance. Metrolink's historic use of four different contractors is an example of an unbundled contract.

Gross cost or net cost models

In the gross cost model (also referred to as the cost-plus model), the service provider has its approved costs fully reimbursed and is typically paid an additional profit and/or accepts an incentive regime. This roughly

corresponds with the current TASI contract cost model. The other model is the net cost model is where the operator takes on a portion or the entire amount of the revenue and cost risk. This type of contract has sometimes been used in Europe but has not been used in the U.S.¹⁷

It is estimated that the procurement of a new contract and the associated transition period would take two to three years depending upon the selected contracting model with the bundled contract likely requiring the shorter time implementation period.

Provision of services with in-house forces

With an in-house model, an agency uses its own workforce to provide the primary functions of the railroad. Examples of this are Metro-North Railroad (New York MNR), New Jersey Transit (NJT) and the Southeastern Pennsylvania Transportation Authority (SEPTA).¹⁸ The in-house model is most common with the older and larger legacy properties in the Northeastern United States, though the Utah Transit Authority (UTA) and the Sonoma-Marín Area Rail Transit District (SMART) have selected this model within the last 15 years.

Caltrain needs to consider a number of factors outlined below to determine which model is the one that will best enable the agency to achieve its 2040 Service Vision, to provide excellent service during the coming decades, and to navigate its immediate changes over the next five to ten years. It is also important to note that the model can change over the next 20 years to reflect Caltrain's situation at any

point in time; incremental evolution over time is a possibility and has been used by many railroads throughout the world (the UK experience with Railtrack being transformed into Network Rail being a prime example). Caltrain's choice for Service Delivery will primarily be informed by organizational bandwidth and capacity. It will also be informed by:

- Caltrain's organizational bandwidth
- The degree to which the model helps achieve Caltrain corporate objectives
- The ability to accommodate the Service Vision outlined in the Business Plan with the significant expansion of service and the operation of electric trains
- Flexibility to address possible future regional developments: service expansion, operation of High-Speed Rail in the corridor, and development of regional rail governance models
- Balancing reputational and financial risk, control and cost
- Anticipated market response and associated cost
- Implications for labor agreements and federally mandated labor protection provisions commonly known as 13c labor protections
- Ease of transition and associated risk.

The importance to Caltrain of selecting the most cost-effective model for its current situation cannot be overstated. The way in which Caltrain provides its services will have a critical impact on the overall success of Caltrain going forward. It will affect all elements of the organization including

customer service, finances, capital improvements, safety and internal organizational structure.

In comparison to other US railroads, Caltrain has significantly greater flexibility in determining its service delivery model as it owns the right-of-way from San José to San Francisco; it determines train schedules and dispatches the trains; it currently is and will continue to be the predominant user of the corridor; and its governance structure gives the JPB complete discretion in selecting a service delivery model.

There is no universally "correct" model Caltrain should adopt, as each model in use across North America reflects the specific circumstances that the commuter railroad agency faced when it made its decision. As Caltrain begins the process to determine its future service delivery model, there are many lessons to be learned from other railroads. Regardless of the model selected, the agency retains ultimate responsibility for the service delivered, and the political environment will expect that. Contractor failure will not mitigate reputational responsibility and risk.

¹⁶ Prior to this, Caltrain contracted with Amtrak to provide the services for nearly 20 years.

¹⁷ An example of an operator taking revenue risk is the case of the Buenos Aires Metro. In this instance, the concessionaire was required to project demand, revenue (with fares specified), operating costs, and the timing and cost of a specified investment program. The government chose the combination of required operating support and capital costs that minimized the total public cost.

¹⁸ The portions of the NJT and SEPTA systems not on the Northeast Corridor are operated by in-house personnel; the Northeast Corridor is operated by Amtrak.

9.4 INTERNAL ORGANIZATION

Internal organization is defined as the way Caltrain has structured itself; like all agencies, there is a continual process of organizational evolution underway. While there is significant overlap between this concept and the discussion of both service delivery and governance, there are many key areas of internal focus (resources, departmental functionality, and supporting/shared services) which should be independently evaluated and addressed regardless of the selected governance structure or delivery method.

Caltrain is an efficient and complex organization which, despite limited resources due to funding constraints, has had significant success providing high-quality services to a growing ridership base, implementing major capital programs, and undertaking a comprehensive business planning process. At the same time, many of its staff members have identified its limited resources as a major and pressing problem. Furthermore, it is facing a series of major immediate challenges in a rapidly evolving environment, including the introduction of expanded electrified railroad service and the need to determine the future

structure of its third-party operating contract. In the longer term, there will likely be major changes in the corridor including the implementation of a significant grade separation program, the total reconstruction of two terminals, and the blending of service with High-Speed Rail. To address these challenges, the organization must grow and will need to identify the funding and resources to do so.

A very high-level analysis comparing Caltrain to the six largest US commuter railroads, shown in the table on the next page, found that Caltrain is the most productive major

US railroad as measured by the amount of car miles operated per employee and passenger miles carried per employee. In addition, Caltrain produces 22% more car miles per employee and 107% more passenger miles per employee than the average of all the other systems.¹⁹ While these data demonstrate Caltrain's efficiency, they also illustrate the degree to which Caltrain's staffing is beneath the industry norm. As an illustration, if Caltrain were to meet the average staffing level of the other railroads, it would add at least 100+ positions.²⁰

¹⁹ This understates the difference, as all the other major railroads except Metro North and Metra have certain major maintenance and station functions performed by Amtrak, whose staffing is not included in these numbers.
²⁰ This is the most conservative calculation as it is based on car miles per employee and does not account for the significant number of Amtrak staff that perform infrastructure and station maintenance on the Northeast Corridor.

COMPARISON OF CALTRAIN TO LARGE US COMMUTER RAILROADS

AGENCY NAME	TOTAL EMPLOYEES	CAR MILES	CAR MILES PER EMPLOYEE	PASSENGER MILES	PASSENGER MILES PER EMPLOYEE	FOOTNOTE
NJ TRANSIT	4,850	61,500,000	12,700	2,077,100,000	428,300	Staffing excludes Northeast Corridor and Penn Station Infrastructure Maintenance.
LONG ISLAND RAIL ROAD	7,331	67,100,000	9,200	2,996,900,000	408,800	Staffing excludes Penn Station Infrastructure Maintenance.
METRO-NORTH RAILROAD	6,461	68,600,000	10,700	2,271,000,000	351,500	
METRA	4,797	43,700,000	9,200	1,577,400,000	328,900	Staffing excludes services not directly operated by Metra (BNSF and UP).
MBTA	2,394	25,000,000	10,500	697,700,000	291,500	Staffing excludes Northeast Corridor and South Street Station Infrastructure Maintenance.
SEPTA	1,921	19,500,000	10,200	426,200,000	221,900	Staffing excludes Northeast Corridor, 30th Street Station, and Harrisburg Line Infrastructure Maintenance.
AVERAGE	4,626	47,600,000	10,400	1,674,400,000	338,500	Average excludes Caltrain.
CALTRAIN	580	7,400,000	12,700	406,100,000	700,000	Missing footnote?
CALTRAIN PERFORMANCE VS. AVERAGE			+22%		+107%	

Sources: Metrics and Service Data Tables, National Transit Database, 2017, Federal Transit Administration. Employees Data Tables, National Transit Database, 2017, Federal Transit Administration. MBTA Commuter Rail Fact Sheet.

There have been positive organizational changes over the past few years including the hiring of skilled staff, greater transparency, and increased Board involvement. Pertaining to the internal organization, there are four broad elements which will need to be addressed:

Shortage of Resources

Shared Services: Caltrain has a significant amount of bifurcated responsibility due to the use of a third-party contractor to provide rail operations as well as the historical arrangements between the member agencies. This has led to a large amount of shared services

between the Caltrain Rail Division and TASI, as well as those shared between the Rail Division and the San Mateo County Transit District. As the railroad grows in scope and complexity a key issue is which services can effectively be shared with other organizations (such as member agencies or organizations which share JPB tracks), and which ones will require dedicated focus and rail specialization. Changes to specific service sharing arrangements should reflect consideration of:

- The degree to which specialized railroad skills are necessary;
- The financial savings (or costs) generated through

- sharing arrangements;
- The need for clear lines of responsibility and authority within the organization;
- The selected service delivery model; and,
- The selected governance model.

Critical Interfaces

A second area of focus is the extent to which different departments and individuals have clearly defined lines of authority and responsibility and how well key interfaces are working. The following critical interfaces were identified as worthy of examination:

- Interface between operations and construction;
- Interface between operations and administrative staff;
- Construction oversight;
- Design standards;
- Budget development; and,
- Capital planning.

To ensure successful outcomes, the organizational infrastructure (i.e., reporting responsibilities, decision-making processes, etc.) needs to be well defined and each part of the organization needs to understand and follow its role.

Functions and Processes

As it enters a period of major transformation, Caltrain will require a different type and level of output from key functional areas. Functional areas that require focus are:

- Planning Department
- Contracts and agreements with external parties
- Rail Activation Plan
- Information Technology
- Procurement and Human Resources
- Performance Management
- First Mile/Last Mile at stations
- Capital Project Implementation

Attracting and Retaining Talent and Skills

Another common theme has been the need to attract and retain talent. Key issues related to talent and skill retention are

Addressing High Vacancy Rates: There are many very talented people at the senior levels of the organization, however there is also a high vacancy rate. This is undoubtedly due in part to the high cost of living

in the Bay Area; however, there may be additional issues making it difficult to attract and retain talented people: a lengthy and complicated hiring processes, organizational cultural reputation, wage and benefit scale, lack of Caltrain's participation in the railroad industry retirement system, internal training and development programs, etc.

- Large number of "seconded" consultant staff: This strategy is typically most effective when an organization has a known "bump" or increase in needed resources for a set period and then will reduce the organization to its prior size. However, this situation does not apply to Caltrain as it will be needing to increase its staff over the next decade to achieve its mission.

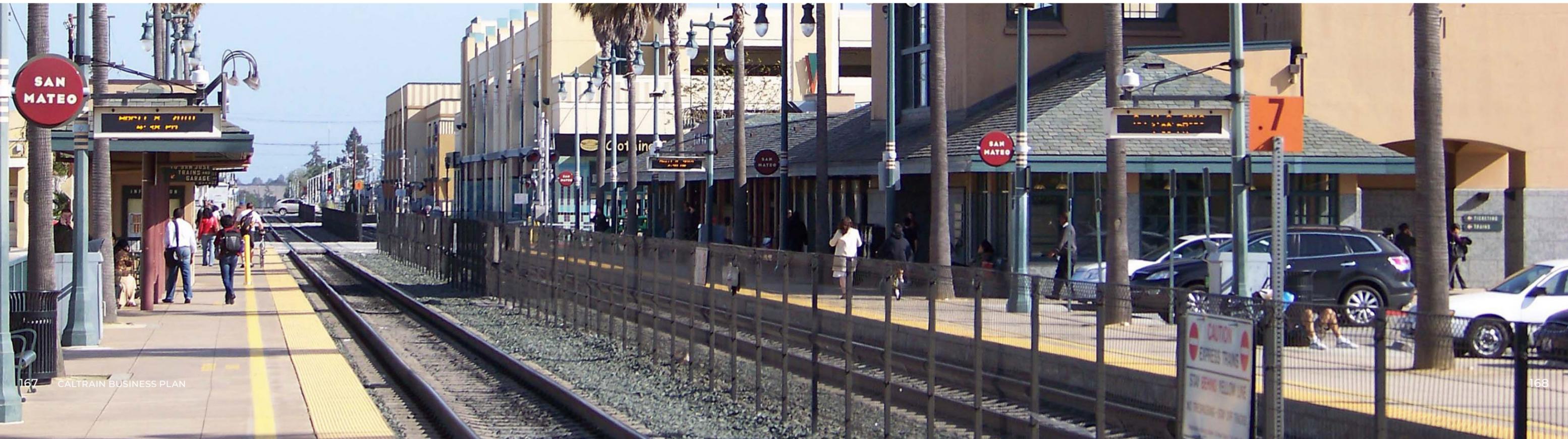
Need to attract skill-based workforce to deliver the Service Vision: The following skill sets will be critical:

- Analytical and financial skills to negotiate a new operator agreement as well as possible external agency agreements;
- Financial skills to develop and implement asset management systems;
- Operational and maintenance skills to run and manage, for the first time, an electrified railroad (a portion of which will be housed by the third-party contractor);
- Capital planning skills to develop long term investment plans and interface with other regional rail operators;

- Operational planning skills to develop expanded schedules that will likely be frequently changing to accommodate market demands, construction projects and ultimately High-Speed Rail services;
- Facility planning and business skills to represent Caltrain in complex projects such as DTX, Diridon Station and Dumbarton;
- Real estate/business skills to assist in the above major developments as well as to monetize other Caltrain assets;
- Administrative skills in the areas of human resources and procurement to support the Business Plan vision;
- Technological skills to support the new electrified railroad (including new power and signal systems) as well as customer facing services (ticketing, information);
- Community interface/political skills to assist in program and project definition, funding and implementation; and,
- Additional operational and business acumen to enable negotiation of more comprehensive agreements with CHSRA, other external parties, and the private sector. These agreements, in particular those with CHSRA as well as those pertaining to San Francisco 4th and King Station, Diridon Stations and the Dumbarton Corridor, are far more complex and at a much greater scale than the agreements completed to date.

¹⁹ This understates the difference, as all the other major railroads except Metro North and Metra have certain major maintenance and station functions performed by Amtrak, whose staffing is not included in these numbers.

²⁰ This is the most conservative calculation as it is based on car miles per employee and does not account for the significant number of Amtrak staff that perform infrastructure and station maintenance on the Northeast Corridor.



9.5 GOVERNANCE

Governance is defined as the way Caltrain is overseen by the JPB and JPA members. It focuses on the agency's decision-making processes and the Board's oversight of the Caltrain organization. The decision as to the optimal structure will be driven by several factors including the basic determination of Caltrain's future role in the region.

Governance is an extremely complex issue as it involves setting policies, decision-making, oversight of the CEO and their team, and the nature of funding arrangements between the parties. There is a wide range of options and the decision ought to reflect the priorities of the JPA members. Typically, key factors include cost sharing, control over decision-making, implementation ability (what is required legally, what is politically acceptable, etc.) and transparency.

9.5.1. ABOUT TODAY'S CALTRAIN GOVERNANCE

Today's Caltrain governance originated in the 1980s. The acquisition of the peninsula rail corridor was facilitated by a JPA created in 1988 known as the Peninsula Corridor Study Joint Powers Board. This agency initially limited its powers and purposes to the undertaking of planning studies for the eventual takeover of the Caltrain system governance from the State of California, the agency that had overseen and managed the system pursuant to a contract with the Southern Pacific Transportation Company (SP) that commenced in 1980. Among the planning objectives of the JPA was the acquisition of the rail corridor then owned by SP.

It was upon the successful acquisition of the rail corridor in 1991 that the member agencies of the JPA reached a new agreement which, among other things, transformed

the agency from one that was limited to planning to one that assumed operating authority and responsibility. This entity has remained intact since its establishment in 1991, although the joint powers agreement has been amended for various purposes on a few occasions, most recently in 1996.

Today, Caltrain is a Joint Powers Authority, formed through a Joint Powers Agreement (JPA) between three member agencies; California State Law authorizes the development of such Joint Powers Authorities. The Caltrain JPA is governed by a nine-member appointed board (JPB or Board) as follows:

- The Santa Clara Valley Transportation Authority (VTA) board appoints three representatives: (1) one must be a member of the VTA board representing the City of Santa Clara or the County of Santa Clara; (2) one must be a member

of the VTA board representing the County of Santa Clara or a city other than San José; and (3) a member who represents the County on the Metropolitan Transportation Commission (MTC), or if that person declines to serve, by the MTC representatives appointed by the Cities Selection Committee or if that person declines to serve, a member of the VTA board appointed by VTA;

- The SMCTD appoints three representatives who are SMCTD board members and who are then appointed, respectively, by the SMCTD board, the San Mateo County Board of Supervisors and the Cities Selection Committee;
- The City and County of San Francisco appoints three representatives, one of whom is appointed by the Mayor, another by the Board of Supervisors and another by the San Francisco Municipal Transportation Agency.

Caltrain's current governance is unusual by typical United States standards in the following ways:

- Unlike Caltrain, most public railroads are governed by a Board of Directors (elected or appointed) that has direct oversight of the railroad's management (at Caltrain, railway management performed by SMCTD);
- Unlike Caltrain, most governing board members are selected by their sponsors (in this case, the counties) for fixed terms in a similar or consistent manner;
- Unlike Caltrain, most Boards have standing committees;
- Most railroads' futures are not as intertwined with other State Agencies (CHSRA, Caltrans) as Caltrain; and

- The SMCTD plays two roles as both a JPA member and the managing authority, which is a unique approach

9.5.2. CORE GOVERNANCE OPTIONS

Looking forward, the best governance structure for Caltrain will be in part a function of the Service Vision as well as the service delivery option that is chosen. In addition, the structure should position Caltrain to successfully address known looming challenges such as need for new funding sources and the need for agreements with CHSRA. In the long run, if Caltrain service were to extend beyond the current three-county geographic area (i.e., toward the East Bay as part of

a Dumbarton extension or south into Monterey County), an alternative governing structure may be required or appropriate.

There are alternative structures by which the Caltrain organization could be governed by the JPB and JPA members or, in some options, by a potential successor agency. Several options were developed through the Business Plan process and are described here.

For all governance options, a critical fact is that all options require a dedicated source of revenues. Any modification of the existing Caltrain governance structure will not solve the financial challenges faced by the organization on its own.



SELF-DIRECTED OPTIONS

The following governance models are described as “self-directed” because their implementation could be initiated by agreement of Caltrain’s member agencies.

Option A: Retention of the Status Quo - JPB as currently structured and administered. This maintains the current situation whereby the JPB constitutes the entity responsible for all aspects of the Caltrain rail system including planning, operations and maintenance oversight, and undertaking of major capital improvement projects.

Option B: JPB as currently structured, coupled with modifications

relative to governing board oversight and the provision of managerial services by SMCTD. This includes different refinements to the way in which the JPB currently operates. These have been suggested for consideration by Board members, staff and other interested parties.

Option C: Retention of the JPA as currently structured but reorganized as a railroad authority that directly hires its management and administrative

employees. This option builds upon the previous option by retention of the JPA structure as the form of governance but is coupled with an internal reorganization process by which the JPB would hire its own staff or railroad employees in lieu of reliance upon the SMCTD organization exclusively.

Option D: Same as Option C except staffing is supplemented on an as-needed basis with expertise from JPA member agencies. A possible means

of mitigating cost impacts would be for the JPB to engage certain positions directly while relying on member agency staff to fulfill or to supplement the provision of various functions.

Option E: Creation of a Special District to Govern and Administer Caltrain: Peninsula Rail Transit District (PRTD). The provision of local and regional governmental services in California often is undertaken pursuant to a special district form of

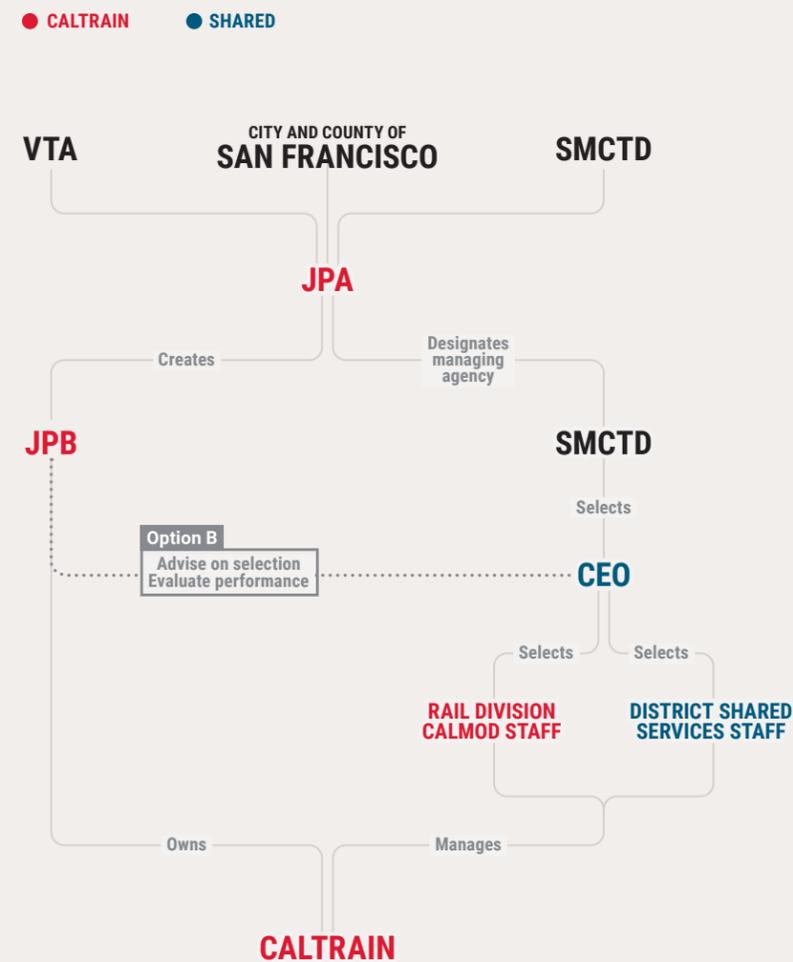
governance. A special district would, in theory, anticipate a more streamlined budget approval process falling within the sole province of the special district governing board, in contrast with the existing JPA structure that necessitates member agency action to approve annual operating and capital budgets. Option E has certain benefits as well as certain drawbacks compared to Option C and D. This option would require Legislative approval at the state level.

WHAT ARE CALTRAIN'S RESPONSIBILITIES

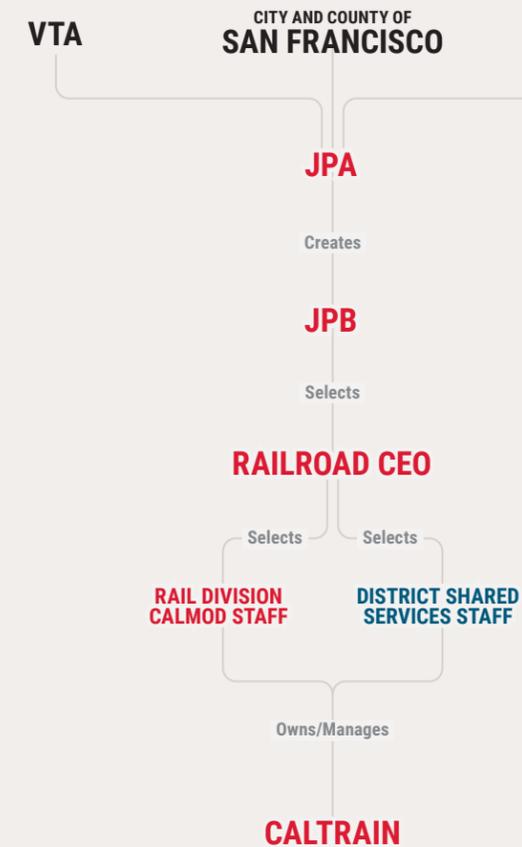
Under all organizational scenarios, Caltrain would be responsible for the following items:

- Service Delivery**
Overall service definition and rail service delivery
- Physical Assets**
Assets, real property rights, and trackage rights
- Operating Contract**
Transit America Services Incorporated (TASI)
- Third Party Contracts**
Construction, services, etc
- Grants and Agreements**
- Regulations**
Responsibilities and liabilities
- Financial Obligations and Credit**

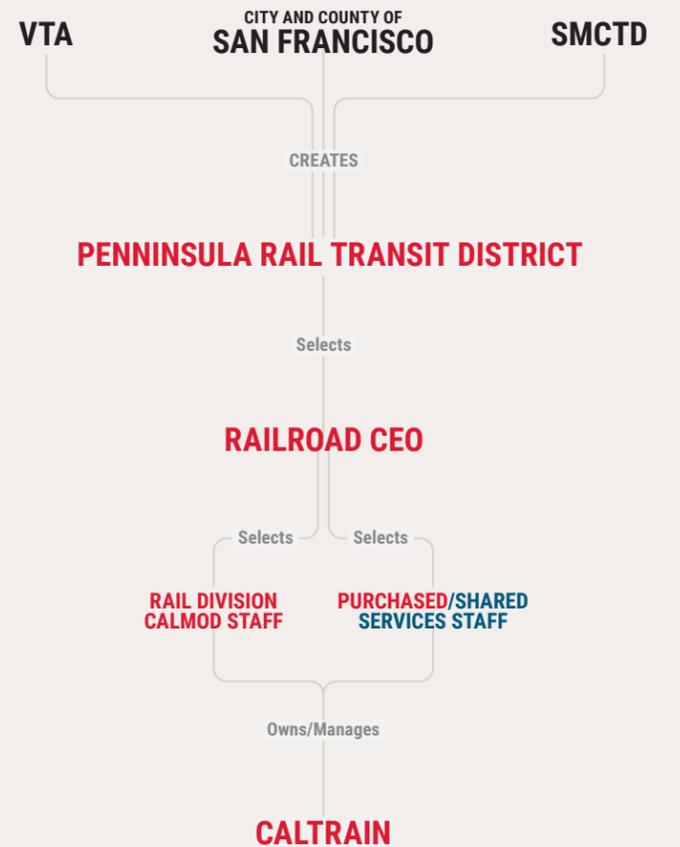
**Option A/B
CALTRAIN TODAY WITH JPA MODIFICATIONS**



**Option C/D
RAILROAD AUTHORITY**



**Option E
PENINSULA RAIL TRANSIT DISTRICT**



These governance models are described as “self-directed” because their implementation could be initiated by agreement of Caltrain’s member agencies.

NON-SELF DIRECTED OPTIONS

Caltrain is part of a larger question about rail governance in the Bay Area and in Northern California. The non-self-directed options described here include options for either the full or partial regional, or mega-regional integration of multiple railroads and agencies. The process to implement these options would be significantly more complex. At the same time, such options may be intrinsically tied to the funding and implementation of key portions of the Business Plan and initiatives being undertaken by other agencies. Very careful and comprehensive analysis must be done to understand the pros and cons as well as the implications regarding transferring authority and decision-making, funding, cost, and service delivery to another organization. The table to the right depicts non-self-directed governance options.

Option F: Existing agencies with expanded regional cooperation. This option describes a "sub governance" approach to regionalization that could be initiated directly by existing railroads and transit entities on either a bilateral or multi-lateral basis. Under this model, operators would agree, through MOUs or other agreement mechanisms, to coordinate key functions.

Option G: Existing agencies with regional integration of key functions. Building upon Option F is Option G, a regional approach where individual railroads and transit agencies would remain in place but where key organizational responsibilities would be "evolved up" to one or more regional entities.

Option H: Consolidated regional authority with subsidiary railroads. Option H, a consolidated regional authority with subsidiary railroads, is the next step toward increased consolidation and regional control. In this option, individual railroads would be governed and organized under a single regional authority. The regional authority would be responsible for the oversight of the subsidiaries, make critical decisions impacting the subsidiaries, be responsible for funding the subsidiaries, and provide broad governance.

Option I: Fully consolidated regional railroad. The most extreme approach to regional governance of rail would be through the direct and total consolidation of multiple railroads and their constituent functions into a single, regional organization which would be overseen by a single Board of Directors.

RAILROAD ORGANIZATIONAL APPROACHES

Today	Separate Railroad A	Separate Railroad B
	Service Planning Fares & Information Systems Stations Major Capital Projects Infrastructure Maintenance Train Operations Access & Egress Commercial Activities General Administrative Services	Service Planning Fares & Information Systems Stations Major Capital Projects Infrastructure Maintenance Train Operations Access & Egress Commercial Activities General Administrative Services
Option F Regional Cooperation	Service Planning Fares & Information Systems Stations Major Capital Projects Infrastructure Maintenance Train Operations Access & Egress Commercial Activities General Administrative Services	Service Planning Fares & Information Systems Stations Major Capital Projects Infrastructure Maintenance Train Operations Access & Egress Commercial Activities General Administrative Services
	Coordinated Activities by Agreement	
Option G Regional Integration of Key Functions Displacement Risk	Service Planning Fares & Information Systems Stations Major Capital Projects	Service Planning Fares & Information Systems Stations Major Capital Projects
	Separate Railroad A Infrastructure Maintenance Train Operations Access & Egress Commercial Activities General Administrative Services	Separate Railroad B Infrastructure Maintenance Train Operations Access & Egress Commercial Activities General Administrative Services

Discrete Government Entities ● **Regional Organization** ● **Sub-Regional Organization**

Organizational functions listed are illustrative only. They do not reflect Recommendations or specific proposals



10

AFTERWORD

In late 2019 and early 2020, following the adoption of the Long-Range Service Vision by the JPB, the Business Plan team pushed forward to round out the Plan with additional technical work focused on equity, system access and funding, as well as nearer-term planning for services and improvements that Caltrain could deliver over the coming decade.

FROM SERVICE VISION TO COVID-19 TO MEASURE RR

Even as the Business Plan process continued, implementation of the work was already underway. In November of 2019, the JPB held a dedicated workshop to discuss and advance recommendations from the Plan's Organizational Assessment report. In parallel, Caltrain's need for a permanent, dedicated source of funding (an underlying theme throughout the Business Plan process) moved to the fore as the policymakers from the JPB and its member agencies began to actively work through the steps needed to place what would later become Measure RR on the November 2020 ballot.

In March of 2020, the COVID-19 pandemic abruptly changed the conversation. As lockdowns fell into place across the world, Caltrain's ridership and revenues plummeted. Work on the Business Plan abruptly stopped as the staff and consultant team made a sharp pivot, refocusing the work and stakeholder venues that were cultivated during the Business Plan process toward an urgent program of scenario planning, financial modeling, service changes, and equity initiatives. Over the coming months, the flow of federal relief dollars gave Caltrain a temporary lifeline as efforts to place Measure RR on the ballot and provide

the railroad with a permanent source of support continued. In November of 2020, thanks to the voters of San Francisco, San Mateo, and Santa Clara counties and the tireless efforts of corridor elected officials, private sector supporters, and transit advocates, Measure RR passed. Together, the funding from the federal government and Measure RR saved Caltrain from imminent financial ruin in 2020 and 2021, and though Caltrain still faces significant financial challenges in the years to come, the railroad has started a new chapter in its history.

IMPLEMENTING THE BUSINESS PLAN IN A CHANGING WORLD

The policies, tools and collective knowledge developed through the Business Plan process have helped to drive a broad program of change across Caltrain, even as the railroad continues to adjust to a post-pandemic world. The rapid advancement and adaptation of various Business Plan

elements is a testament to both the breadth of process as well as the depth of engagement and buy-in the Plan achieved. The next sections briefly highlight a few of the many different ways the work of the Business Plan has been carried forward over the last two years.



SERVICE

ADVANCING THE SERVICE VISION

The policies, tools and collective knowledge developed through the Business Plan process have helped to drive a broad program of change across Caltrain, even as the railroad continues to adjust to a post-pandemic world. The rapid advancement and adaptation of various Business Plan elements is a testament to both the breadth of process as well as the depth of engagement and buy-in the Plan achieved. The below briefly highlights a few of the many different ways the work of the Business Plan has been carried forward over the last two years.

Caltrain's adopted Long-Range Service Vision has become foundational policy for the railroad, and its core principles have been carried forward both through ongoing long-range planning as well as near-term changes and improvements to the system.

Prior to COVID-19, Caltrain had not contemplated major service changes in advance of completion of the Peninsula Corridor Electrification Project. The onset of the pandemic and the near-immediate collapse of the railroad's core, white collar commute market compelled an urgent reshaping of the railroad's service toward the "regional rail" model envisioned in the Long-Range Service Vision. The work to make Caltrain's service more equitable, better connected to the regional transit network, and useful to a broader range of people and trip purposes built directly off of the Business Plan's service, equity, and

access analyses and was enshrined in Caltrain's Equity, Connectivity, Recovery and Growth Policy (adopted by the JPB in September of 2020).

Over the subsequent two years, Caltrain has significantly simplified its complicated pre-COVID schedule into a much smaller number of repeating service patterns that are easier for customers to understand and for other transit modes to connect to. Midday, weekend, and evening services have been increased above 2019 levels to better serve and build new markets for non-commute riders. Stopping patterns have been adjusted to adapt to new ridership patterns, to serve a diversity of trip types, and to improve access for equity priority communities. **The start of electrified service in 2024 will provide further opportunities for Caltrain to evolve and improve its service, build new markets, and strengthen its connections to the regional network.**

In spite of the dramatic events of the last two years, work on long-range planning has also continued both directly at Caltrain and in the context of the many regional and State projects and plans that include the railroad as a stakeholder. The adoption of the Long-Range Service Vision has provided a new and much-needed level of specificity about the railroad's future plans, enabling Caltrain to engage in these projects in a more consistent and focused manner. In particular, the work of the

Business Plan has been essential to ongoing efforts to advance the Downtown Extension in San Francisco, the reimagining of Diridon Station in San Jose, and the development of an expanded and grade-separated hub station in Redwood City.

Caltrain has also begun work in various venues to begin charting a path of incremental investments and improvements that can bridge the gap between initial electrification and implementation of the full Long-Range Service Vision. The Equity, Connectivity, Recovery and Growth Policy affirms Caltrain's goal of growing to an 8 trains per hour level of service, and Business Plan analysis presented publicly in early 2020 showed an alternative path to achieve such an expansion earlier with a more limited program of investments (while still remaining consistent with the overall program of works needed to achieve the Service Vision). This more limited scale expansion project (along with many other project component elements of the Service Vision) was ultimately included in the Plan Bay Area, the Regional Transportation Plan adopted by the MTC Commission in 2021. Finally, the Long-Range Service Vision provides a clear roadmap for Caltrain as it begins renewed work with the California High Speed Rail Authority and other regional and State partners to develop a process and set of agreements defining how future projects and services will be integrated on the corridor.



BUSINESS CASE

BETTER UNDERSTANDING OUR BUSINESS

The Business Plan process and the adoption of the Long-Range Service Vision were centered on the question of how best to balance the value of expanded Caltrain service against the investments and costs required to achieve it. Answering this question involved the application of a modified “Business Case” methodology and the development of new models and tools to better understand the complex relationships between the railroad’s future service aspirations, operating requirements, cost structure, and funding opportunities.

The Business Case methodology – widely used to both plan and justify public investments in Commonwealth countries but less frequently employed

in the United States – proved to be an apt and powerful tool for analyzing complex decisions and communicating choices to policymakers. In the last two years, Caltrain has expanded the use of this best practice methodology by initiating business cases focused on both the potential reconfiguration and redevelopment

of the 4th & King Railyard as well as advancing the Diridon Integrated Station Concept Plan.

The tools and approaches developed in the Business Plan have also been critical to helping Caltrain understand and manage its financial future. During the Business Plan process, the agency developed and refined an integrated

business model that allowed for the dynamic modeling of different service scenarios and investments across a multi-decade timeframe. In the context of COVID, this tool has been adapted to allow Caltrain to rapidly assess the future financial implications of different near-term service scenarios and decisions – a critical need at a time when many variables (ridership, costs, funding sources, service levels) have been suddenly thrown into flux. In a related way, the adoption of the Long-Range Service Vision coupled with the passage of Measure RR have finally given Caltrain the consistent direction and basic stability needed to begin development of a detailed, multi-year capital improvement plan.



COMMUNITY INTERFACE

MANAGING THE RAILROAD COMMUNITY INTERFACE

Since work on the Business Plan stopped, Caltrain and its partners have also taken significant steps in the management of key corridor- community interface issues. Of these, the most prominent has been the many efforts underway to advance grade separation projects and separated crossings along the corridor. Grade separations were a clear priority for communities during the Business Plan process, and in the intervening two years, corridor stakeholders have successfully worked to increase their prominence in the Regional Transportation Plan and to lobby for the expansion of both federal and State funding for these efforts. In parallel, Caltrain has continued to partner with cities on individual grade separation projects as they advance

through various stages of planning and design. Finally, as of the fall of 2022, Caltrain has also begun work on a long promised (but pandemic delayed) corridor wide grade separation strategy.

The clarity provided by the Long-Range Service Vision has also given Caltrain the ability to manage its land assets in a more sophisticated and active manner. Prior to the adoption of the Service Vision, uncertainty about the need to preserve railroad-owned land for future infrastructure was a major impediment that prevented Caltrain from pursuing significant transit-oriented development on many sites. The Rail Corridor Use Policy, adopted in early 2020, addresses this challenge

and identifies which JPB properties will be needed for the future expansion of rail infrastructure contemplated in the Service Vision and which could be available for development. The adoption of the RCUP was paired with the adoption of a Transit Oriented Development Policy defining the railroad’s policy goals and objectives for development. The combination of these efforts has allowed Caltrain to more aggressively pursue development across the corridor with multiple parcels now in various stages of discussion and planning.



ORGANIZATION

EVOLVING THE ORGANIZATION

A major component of the Business Plan was an organizational assessment focused on the future of the railroad's operating contract, management structure, and governance. This work was presented and discussed at a dedicated workshop in late 2019, where the Board affirmed the report's recommendation to extend Caltrain's existing operating contract and to pursue a more detailed study of internal organization and resourcing – both of which moved forward over the subsequent months. Additionally, the Board initiated a formal governance review process, establishing an initial 6-month timeline to engage in further fact finding and directing staff to bring on special counsel to assist in the effort.

The JPB ultimately extended its operating contract with TransitAmerica Services Inc. through 2027, incorporating new oversight and incentive structures and ensuring continuity through the completion and launch of electrified service. Similarly, Caltrain's management has spent the last two years evolving its organizational structure and processes to better reflect the railroad's expanding needs.

This has included restructuring relationships within the Rail Division, filling

key vacancies, and establishing new roles, as well as improving process and accountability both internally and to the Board.

Finally, the JPB and the Joint Powers Authority Member Agencies have taken a sequence of steps to evolve the overall governance of the railroad. During the latter half of 2020, the Board moved forward with procuring its own audit function and separate legal counsel, and in 2021, initiated an expanded review of governance. This process coincided with the 2021 departure of SamTrans General Manager and Caltrain Executive Director Jim Hartnett and his appointment of Michelle Bouchard as Caltrain's first, dedicated Acting Executive Director. After a series of negotiations, the governance process reached a key milestone in the summer of 2022, when the JPB and member agencies adopted a memorandum of understanding that effectuated the repayment of the San Mateo County Transit District for its historic investment in the railroad, affirmed and clarified various aspects of the District's managing agency role, and established a dedicated permanent Executive Director position for Caltrain, directly accountable to the JPB.



LOOKING DOWN THE TRACKS

SEPTEMBER 2022

Caltrain emerged from the Business Plan process equipped with new tools, knowledge, relationships, and policies. These have clarified the organization's long-term focus and have also strengthened its ability to manage through multiple types of change. While the COVID-19 Pandemic was a sharp reminder of the unknown, the railroad was able to survive, adapt, and continue building toward the future. In the coming years, Caltrain will launch its long-awaited electrified service, but it must also work to recover from the pandemic and prepare for a long-term future that looks increasingly volatile, uncertain, complex, and ambiguous.

In the face of uncertainty, Caltrain can take heart knowing that the railroad has already weathered a long history of booms, busts, shocks, and changes. Passenger rail service on the Peninsula Corridor has been an essential part of the region's fabric for nearly 160 years, even as the world around it has transformed many times over. By continuing to build its self-knowledge and develop its adaptive capacity, and by remaining relentlessly focused on providing value to both customers and the larger public, Caltrain can ensure its success and importance for decades to come.



