Caltrain Business Plan

JANUARY 2020

WPLP

January 22, 2020

Caltrain

Agenda for Today

Process Overview

Making it Happen: Options for Caltrain Service Over the Next Decade

- CalMod: Improved Service in the 2020s
- Going beyond CalMod
- Ridership Forecasts (2020-2030)

Work in Progress & Next Steps

Caltrain

Process Overview

What is the Caltrain Business Plan?

What Addresses the future potential of the railroad over the next 20-30 years. It will assess the benefits, impacts, and costs of different service visions, building the case for investment and a plan for implementation.

Why Allows the community and stakeholders to engage in developing a more certain, achievable, financially feasible future for the railroad based on local, regional, and statewide needs.

What Will the Business Plan Cover?

Technical Tracks

Service
- Number of trains
- Frequency of service
- Number of people riding the trains
- Infrastructure needs to support different service levels

Business Case
- Value from investments (past, present, and future)
- Infrastructure and operating costs
- Potential sources of revenue

Community Interface
- Benefits and impacts to surrounding communities
- Corridor management strategies and consensus building
- Equity considerations

Organization
- Organizational structure of Caltrain including governance and delivery approaches
- Funding mechanisms to support future service

Timeline

July 2018 – July 2019
Development and Evaluation of Growth Scenarios

October 2019
Adoption of Long-Range Service Vision

Fall 2019

Winter 2019-2020
Rounding Out the Vision and Implementation Planning

Spring 2020
Completion of Business Plan

Remaining Technical Analysis

Making it Happen

With a 2040 Service Vision adopted, what will the next 10 years look like for Caltrain? What are the key actions and steps we need to focus on next?

Additional technical and policy analysis is underway to focus on what Caltrain can achieve over the next decade and they key near term steps and work that will be needed to make it happen

- **Building towards the Vision with service concepts for initial electrification and options for growth and investment through 2020s**
- **Accompanying financial projections and funding plan**
- **Identification of a program of key planning, policy and organizational next steps**

Remaining Technical Analysis

Rounding Out the Vision

With a 2040 Service Vision adopted, how can Caltrain "Round Out" its vision for the future?

Additional technical and policy analysis are underway with a focus on areas that that were highlighted as important through stakeholder outreach and help complete the picture of the railroad Caltrain hopes to become

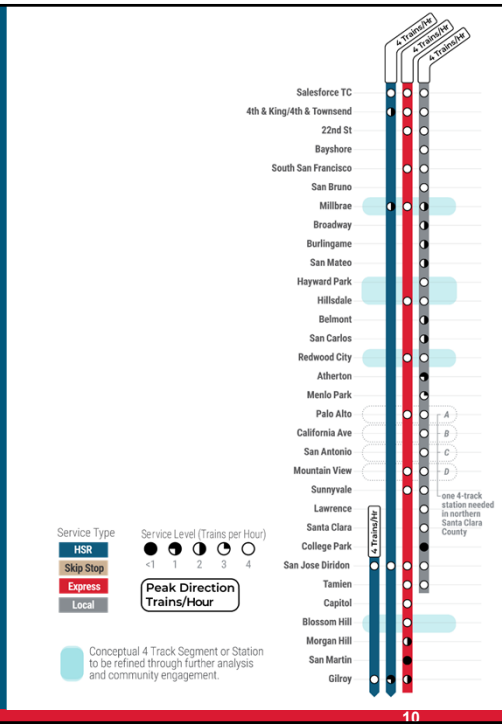
- **Analysis of connections to other systems & station access options**
- **Equity analysis & focus on making Caltrain accessible to all**
- **Review of funding options and revenue generation opportunities to support the Vision**

Making it Happen

Caltrain's 2040 Service Vision

Illustrative Service Details

Trains per Hour, per Direction	Peak: 8 Caltrain + 4 HSR Off-Peak: Up to 6 Caltrain + 3 HSR
Stopping Pattern	Local / Express with timed transfer in Mid Peninsula
Travel Time, STC-Diridon	61 Min (Express) 85 Min (Local)
New Passing Tracks	Millbrae, Hayward Park-Hillsdale, Redwood City area, Northern Santa Clara County, Blossom Hill
Service Plan Description	• Local and Express trains each operating at 15-minute frequencies with timed cross-platform transfer at Redwood City • All trains serve Sales For Transit Center • Trains serve Capitol and Blossom Hill every 15 minutes and Morgan Hill and Gilroy every 30 minutes • Skip stop pattern for some mid-Peninsula stations



Caltrain's 2040 Service Vision - Investments

CAPITAL COSTS

$23 BILLION
TOTAL CAPITAL COSTS*

Capital costs include all projects from SF to Gilroy, knitting together a connected corridor with greatly improved service.

$9.4B
GRADE SEPARATIONS

$7.8B
TERMINAL IMPROVEMENTS

$3.3B
RAIL INFRASTRUCTURE AND SYSTEMS

$1.4B
STATION IMPROVEMENTS

$1.1B
FLEET UPGRADES

OPERATING COSTS

$370 MILLION
2040 ANNUAL OPERATING COSTS*

Caltrain is one of the leanest, most efficient transit services in the country. Today's annual operating and maintenance costs are $135 million, and 73% is covered by fares. The vision would benefit from a similarly high farebox recovery ratio.

$266M
OPERATING COSTS COVERED BY FAREBOX (72%)

$104M
ANNUAL OPERATING INVESTMENT NEEDED (28%)

Getting to the 2040 Vision

The "path" of milestone service improvements and investments used in initial Business Plan work was based on a simplified version of the existing plans of Caltrain and its partner agencies

Amount of Investment / Number of Trains

2018
Diesel Fleet

- 5 Caltrain trains per hour, per direction (phpd), existing varied schedule
- Hourly off peak service

2022
Start of Electrified Operations

- 6 Caltrain trains phpd, skip stop service
- Expansion to 7-car trains
- 30 minute off peak service

2029
HSR Valley to Valley & Downtown Extension

- 6 Caltrain trains phpd, skip stop service
- Full electrification and expansion to 8- car trains
- 30 minute off peak service
- Service to Downtown SF via DTX
- Up to 2 HSR phpd

2033
High Speed Rail Phase 1, SF to LA

- 6 Caltrain trains phpd
- 8- car trains
- Skip stop service
- 30 minute off peak service
- Service to Downtown SF via DTX
- Up to 4 HSR phpd

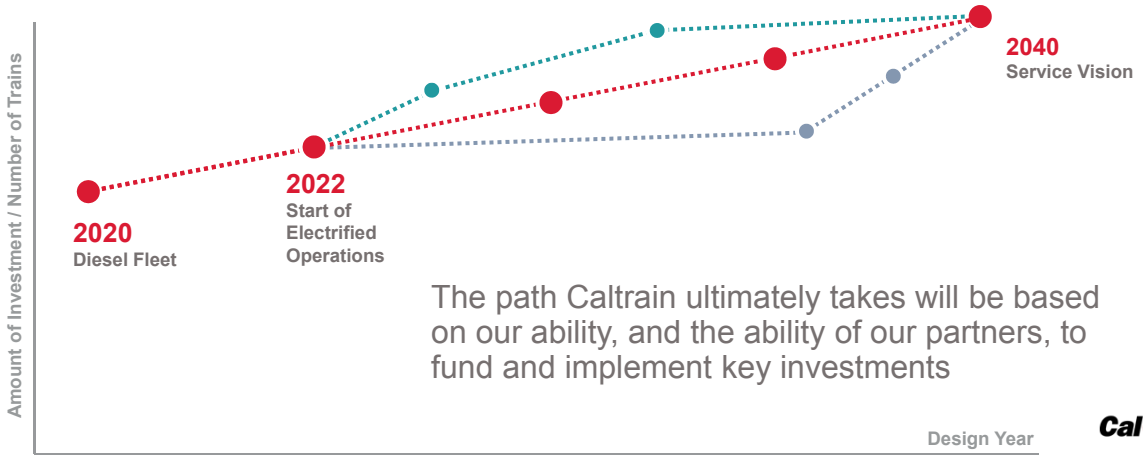
2040
Service Vision

- 8 Caltrain trains phpd, regular express + local service
- Up to 10-car train lengths
- Up to 10 min off peak service
- Service to Downtown SF via DTX
- Significantly increased service to South San Jose and South Santa Clara County
- Up to 4 HSR phpd

Design Year

Getting to the 2040 Vision

With a long-range Service Vision established, we can optimize our approach. We can explore different "paths" or incremental steps that allow us to deliver improved service sooner



The path Caltrain ultimately takes will be based on our ability, and the ability of our partners, to fund and implement key investments

Key Questions for the Next Decade

What is the potential market demand for Caltrain service over the next 10 years – how can we grow to satisfy it?

Which benefits of the 2040 Service Vision could Caltrain deliver before 2030?

- How can we use the initial electrified system (CalMod) to deliver near-term service benefits and best meet market demand?
- How could we improve service further through subsequent incremental investments?

CalMod: Improved Service in the 2020s

Market Analysis

Additional Slides Included In Appendix

1. **Market Analysis**
2. Planning Priorities
3. Service Concepts & Evaluation
4. Service Levels at Stations
5. Illustrative Service Plans

Understanding Demand

Daily ridership demand for Caltrain service will likely exceed 90,000 passengers in the next decade. This growth is driven by several factors:

Latent Demand

Improving Caltrain service and increasing capacity will make Caltrain more appealing for a wider range of trips

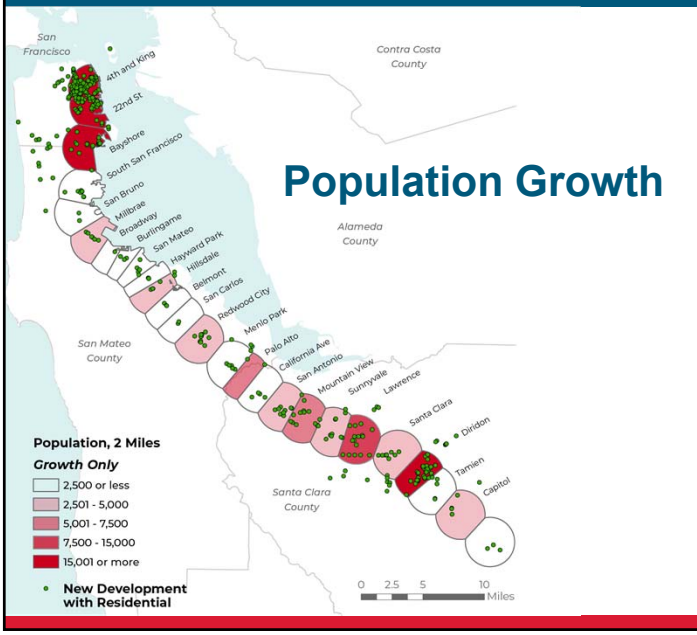
Population and Employment Growth

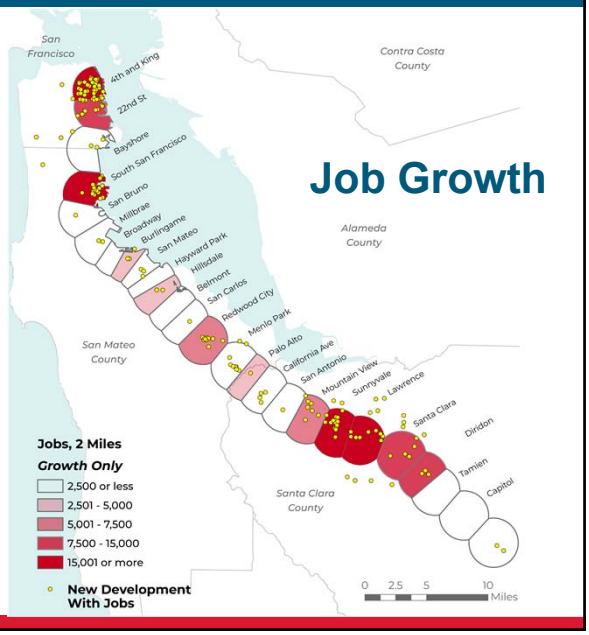
Station areas will add over 100,000 new residents and employees within ½ mile of Caltrain stations, a ~30% increase over existing

Improved Connectivity

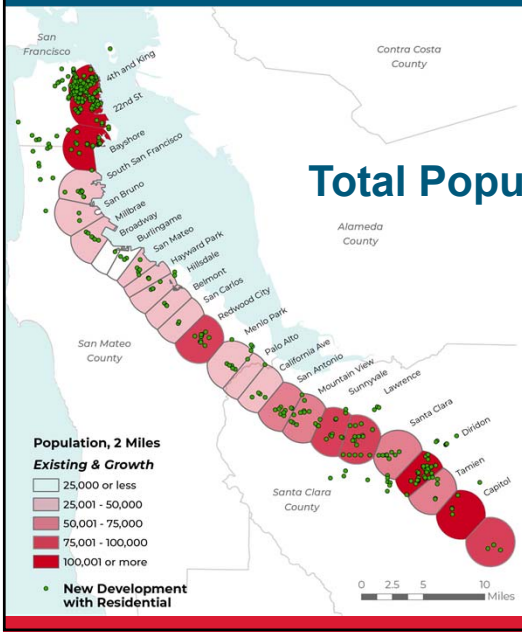
New connections like the Central Subway will extend Caltrain's reach

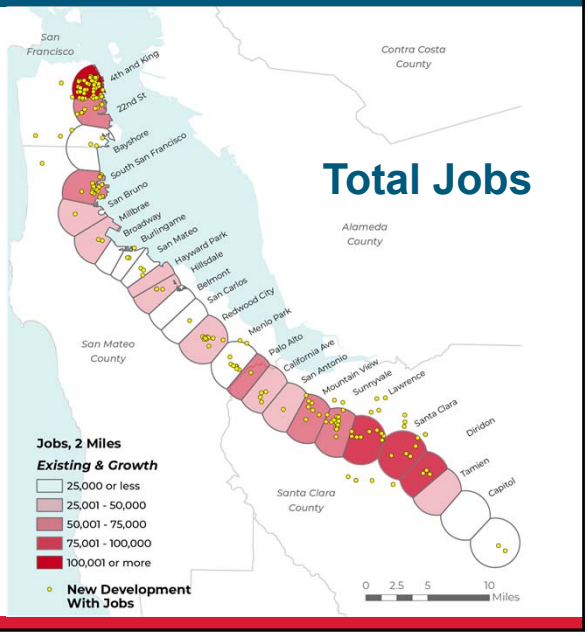
Caltrain Corridor – Approved Growth





2020s Outlook





2020s Outlook – South of Tamien

Unmet Demand

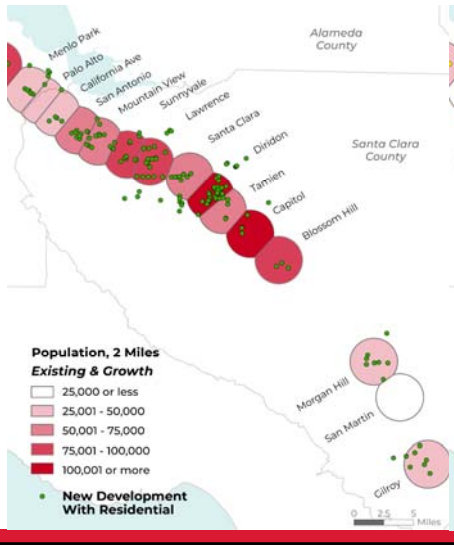
Capitol and Blossom Hill have large populations that are underserved by Caltrain, while Morgan Hill, San Martin, and Gilroy have comparatively lower demand.

Operational Constraints

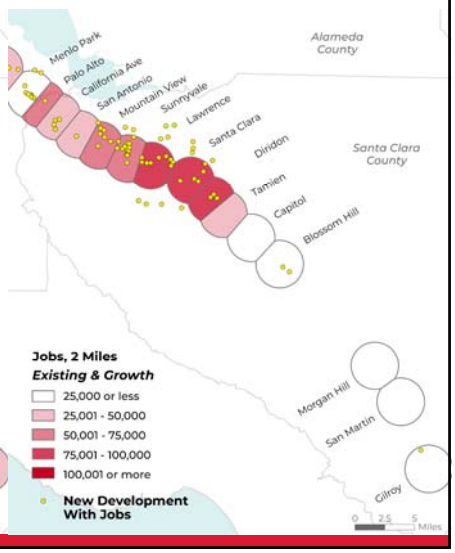
Under the current agreement with Union Pacific, Caltrain can add up to two additional roundtrips to Gilroy to reach five trips per day. There is limited flexibility in when these trips can be added without affecting mainline service.

Two of these roundtrips could be extended south to Salinas subject to further planning and agreement by both the Caltrain Board and Union Pacific.

Total Population



Total Jobs



Existing Ridership by Station

5
Highest Ridership
>4,000
Daily Riders

- 4th & King
- Redwood City
- Palo Alto
- Mountain View
- San Jose Diridon

4
Moderate Ridership
2,000 – 4,000
Daily Riders

- Millbrae
- San Mateo
- Hillsdale
- Sunnyvale

20
Lower Ridership
<2,000
Daily Riders

- 22nd Street
- Bayshore
- South San Francisco
- San Bruno
- Broadway
- Burlingame
- Hayward Park
- Belmont
- San Carlos
- Atherton
- Menlo Park
- California Ave
- San Antonio
- Lawrence
- Santa Clara
- Tamien
- Capitol
- Blossom Hill
- Morgan Hill
- San Martin
- Gilroy

Potential 2020s Demand by Station

8
Highest Ridership Potential
>4,000
Daily Riders

- 4th & King
- 22nd Street
- Millbrae
- Redwood City
- Palo Alto
- Mountain View
- Sunnyvale
- San Jose Diridon

9
Moderate Ridership Potential
2,000 – 4,000
Daily Riders

- Bayshore
- South San Francisco
- San Mateo
- Hillsdale
- Menlo Park
- California Ave
- San Antonio
- Lawrence
- Santa Clara

13
Lower Ridership Potential
<2,000
Daily Riders

- San Bruno
- Broadway
- Burlingame
- Hayward Park
- Belmont
- San Carlos
- Atherton
- Tamien
- Capitol
- Blossom Hill
- Morgan Hill
- San Martin
- Gilroy

Potential 2020s Demand by Station

Stations experiencing significant changes

8
Highest Ridership Potential
>4,000
Daily Riders

- 4th & King
- 22nd Street
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Lower Ridership Potential
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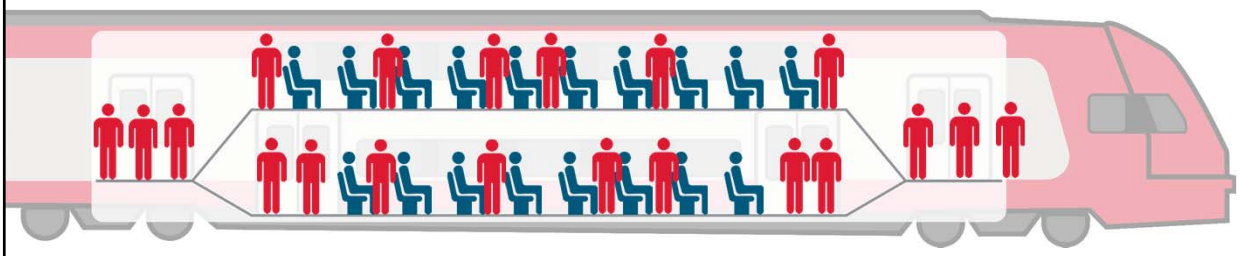
- Hayward Park
- Belmont
- San Carlos
- Atherton
- Tamien
- Capitol
- Blossom Hill
- Morgan Hill
- San Martin
- Gilroy

Train Capacity and Crowding

Even with increased service, crowding will continue to be an issue for Caltrain over the next decade as demand for service increases



- Caltrain provides approximately 3,800 seats per direction per peak hour today, which will increase to 4,144 with electrification.
- With standing room, Caltrain's hourly capacity peak hour capacity will increase from about 4,500 passengers per direction today to 5,400 with electrification, assuming even distribution of passengers between trains.

Planning Priorities

Market Analysis → **Planning Priorities** → Service Concepts & Evaluation → Service Levels at Stations → Illustrative Service Plans

How Can we Improve Service and Meet Market Demand Using CalMod?

The electrification of the Caltrain service between San Francisco and San Jose provides a transformative, near-term opportunity to improve service.

With this investment, Caltrain can begin delivering many, but not all, of the service improvements described 2040 Service Vision while also attempting to keep pace with growing market demand.

While CalMod provides an overwhelming improvement to the system as a whole we will still need to make choices about which service benefits and improvements we prioritize – there are tradeoffs

Increasing frequency at more stations ⟷ **Reducing travel times between major stations**

Standardized intuitive schedules ⟷ **Customized and tailored schedules**

Maximizing peak hour throughput ⟷ **Providing differentiated Service types**

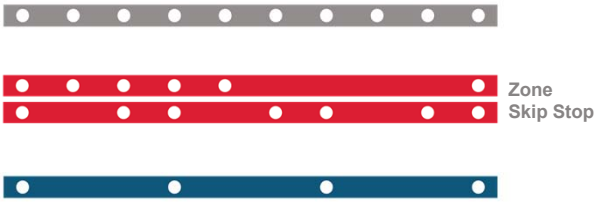
Building Blocks of Service Planning:
Mainline Stopping Patterns

Mainline times shown for San Francisco (4th & King) to San Jose (Diridon)

Local 80 Minutes
Connects all stations regardless of demand

Skip Stop or **Zone** 70-75 Minutes
Varied patterns connect some stations with higher demand

Express 60-67 Minutes
Connects a few stations with highest demand



Analytical Approach: Combinations of Skip Stop, Zone, and Express patterns were evaluated for peak service. While local service is part of the 2040 Service Vision, it is not yet viable during peak hours due to infrastructure and fleet limitations.

Building Blocks of Service Planning:
Travel Time vs. Frequency

Reduce Travel Times between Major Stations
- Minimize stops to save a few minutes in travel times for many passengers
- Demand in growing markets continues to be underserved

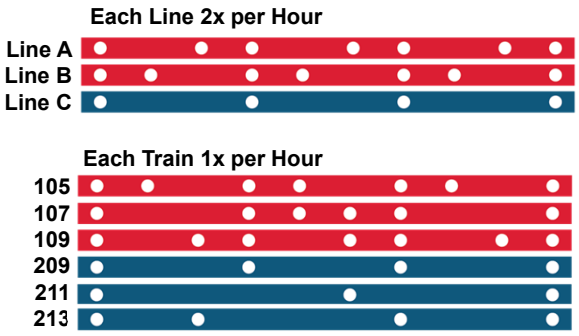
Increase Frequency at More Stations
- Add stops and keep travel times about the same
- Serve more demand in growing markets

Analytical Approach: Service concepts tend to prioritize improving frequency over travel time given recent and projected growth patterns along the Caltrain corridor.

Building Blocks of Service Planning:
Standardization vs. Customization

Standardized Schedule
- Repeating clockface patterns
- Symmetrical in both directions
- Typically communicated as "lines" (eg the "A Line")

Customized Schedule
- Complex patterns that may vary by time of day
- May not be symmetrical in both directions
- Typically communicated as individual train numbers



Analytical Approach: Concepts developed focus on standardized, bi-directional schedules to create a more user-friendly experience and facilitate coordination with the region's larger transit network.

Building Blocks of Service Planning:
Combining Service Patterns

Mixing Different Service Patterns
- Passengers choose between different train types
- Demand can be concentrated on some very crowded trains, while other trains may be half empty

Similar Service Patterns
- Train types are broadly similar in terms of overall stopping structure and time between major stations
- Demand is more evenly distributed between trains – helping maximize overall throughput

Analytical Approach: Both parallel and differentiated service patterns have been considered.

Service Concepts & Evaluation

Additional Slides Included In Appendix

Market Analysis → Planning Priorities → **Service Concepts & Evaluation** → Service Levels at Stations → Illustrative Service Plans

Caltrain

Introducing Four Service Concepts

Caltrain

Service Concept Evaluation Metrics

1 - Service Metrics

I. Travel Time

II. Maximum Wait Time

2 - Capacity Metrics

I. Crowding

II. Ability to Support Ridership Growth

3 - User Experience

I. Internal Connectivity

II. External Connectivity

Summary – Comparison to Existing Service

Metric	Two Zone with Express	Three Zone	Skip Stop with Express	Distributed Skip Stop
Travel Time	Similar	Similar	Similar	Similar
Maximum Wait Time	Slightly Better	Slightly Better	Slightly Better	Better
Throughput Capacity & Crowding	Slightly Better	Slightly Better	Similar	Better
Able to Support Significant Ridership Growth	Partially	Partially	No	Yes
Internal Connectivity	Similar	Similar	Similar	Similar
External Connectivity	Slightly Better	Slightly Better	Slightly Better	Better

Summary – Comparison to Existing Service

Metric	Two Zone with Express	Three Zone	Skip Stop with Express	Distributed Skip Stop
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Able to Support Significant Ridership Growth	Partially	Partially	No	Yes
Internal Connectivity	Similar	Similar	Similar	Similar
External Connectivity	Slightly Better	Slightly Better	Slightly Better	Better

Removed from Consideration

Service Levels at Stations

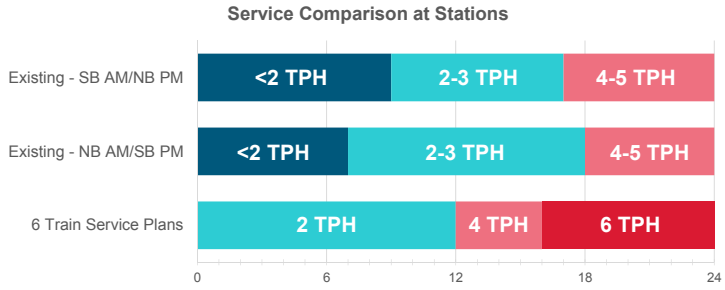
Market Analysis → Planning Priorities → Service Concepts & Evaluation → **Service Levels at Stations** → Illustrative Service Plans

Service Frequency Improvements

To aid in comparison, all of the service concepts have been developed using a *uniform* set of *illustrative* frequency assumptions (eg there is no difference between concepts in the number of stops a specific station receives)

All service concepts *double* the number of stations that receive at least four trains per hour, per direction.

All service concepts provide *at least* two trains per hour, per direction to all mainline, regularly served stations.



Illustrative Service Levels

Service levels shown *are illustrative*. Final service planning and schedule development for CalMod will involve consideration of additional data and public input and may include considerations related to:

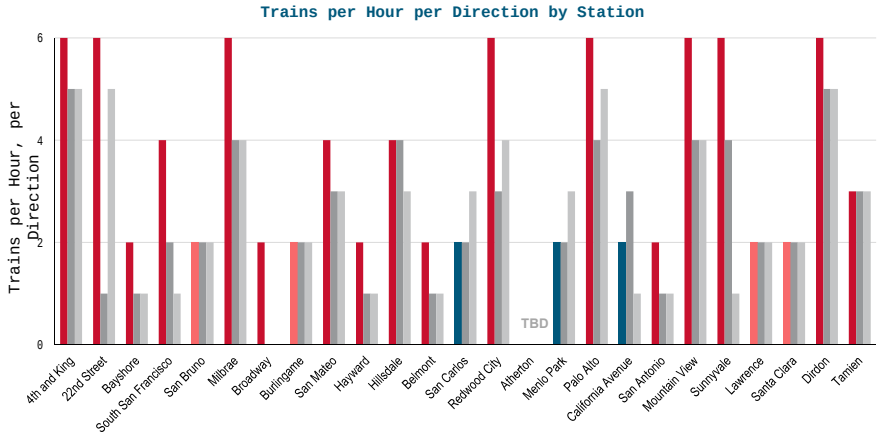
- **Current Market Demand and Ridership Patterns**
- **Approved Station Area Growth**
- **Station Access and Connectivity Opportunities**
- **Social Equity and Geographic Equality**
- **Transportation Demand Management Policies**

Illustrative Peak Period Service Levels by Station (Mainline)

Change in Peak Period Service Levels

- Service Increases (17 Stations)
- No Change (4 Stations)
- Service Reduction (3 Stations)
- Existing NB AM/SB PM
- Existing SB AM/NB PM

Hourly Service levels are the same for all service concepts



Illustrative Service Plans

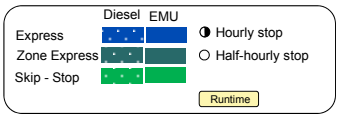
Market Analysis → Planning Priorities → Service Concepts & Evaluation → Service Levels at Stations → **Illustrative Service Plans**

Illustrative Service Plans

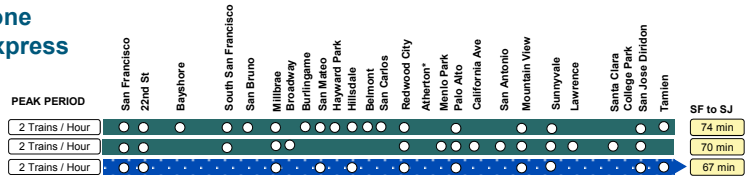
Caltrain has prepared two sets of illustrative service plans to carry forward for further analysis.

Two Zone with Express – two zone patterns (north and south of Redwood City) with a regional express pattern offering different travel times and wait times

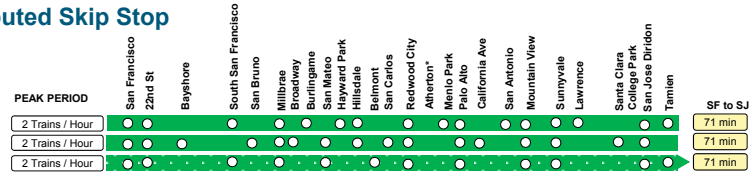
Distributed Skip Stop – three skip stop patterns offering similar travel times and regular wait times at major stations



Two Zone with Express



Distributed Skip Stop

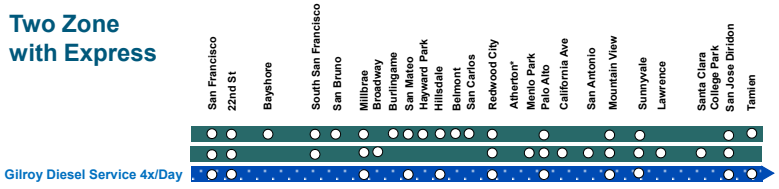


Service South of Tamien

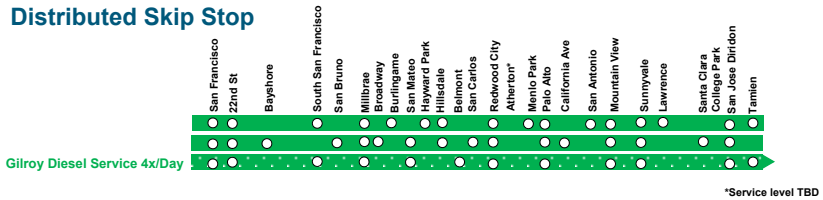
Caltrain will increase service to Gilroy to four roundtrips per day. Passengers from south of Tamien would have a one-seat ride to major stations and a transfer at Diridon Station to reach minor stations.

Arrival and departure times would be similar to today, with one later AM train and one later PM train. Service may be extended to Salinas, pending key agreements and funding, adding about one hour to travel times.

Two Zone with Express



Distributed Skip Stop



Off-Peak and Weekend Service

With electrification, Caltrain has the opportunity to increase off-peak and weekend service levels to better meet corridor demand.

However, operational and financial constraints may affect what kind of service Caltrain is able to provide and when.

Goals

- Increase Caltrain's market share during off-peak and weekend periods
- Offer competitive travel times between major stations
- Provide a legible schedule transition between peak and off-peak (Two Zone with Express concept has some advantages in this regard)
- Maintain flexibility to accommodate construction and maintenance windows

Example Off-Peak Pattern

Implementation Process and Next Steps

This analysis has been developed to provide updated concepts for how the investments currently being made as part of CalMod can be used to serve market demand and begin delivering some of the key benefits of the 2040 Service Vision

Preferred concepts shown will be used to continue planning for various aspects of CalMod implementation and launch of electrified service in 2022.

Developing a Final Service Plan for CalMod

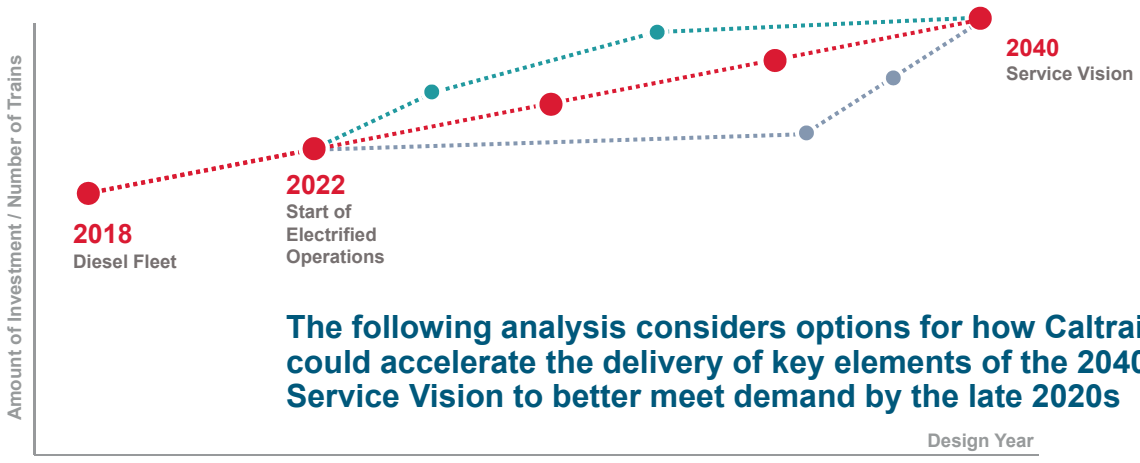
- Preferred Service Concepts shown are illustrative and are intended to help advance analysis and planning
- As the PCEP approaches completion, Caltrain will undertake a supplemental planning process to determine the final 6tph schedule that the railroad will operate – this will include;
  - Selecting the ultimate concept or "style" of service to be operated
  - Determining individual station service levels
  - Confirming off-peak and weekend service levels
- This process will include additional public and stakeholder input as well as analysis of updated ridership and survey data

Going Beyond CalMod

Paths to Incrementally Improving and Increasing Service

Getting to the 2040 Vision

CalMod will provide tremendous service benefits to the corridor. However regional growth projections suggest that there is medium-term demand for even more service and capacity



The following analysis considers options for how Caltrain could accelerate the delivery of key elements of the 2040 Service Vision to better meet demand by the late 2020s

Adding Capacity and Increasing Service to Grow Ridership

Toward the end of the 2020s, Caltrain is expected to reach capacity during peak hours.

Caltrain will not be able to accommodate additional ridership growth in the 2030s without adding capacity. This poses a challenge for accomodating land use growth, DTX, Dumbarton rail, and other potential changes on the corridor.

While smaller, interim improvements may ease capacity, the most significant improvement to service and capacity involves expanding service to eight trains per hour, per direction.

An Interim Step- Not the Full 2040 Service Vision

Increasing mainline service in the mid- to late 2020's would be an interim step- not the full implementation of the 2040 Service Vision.

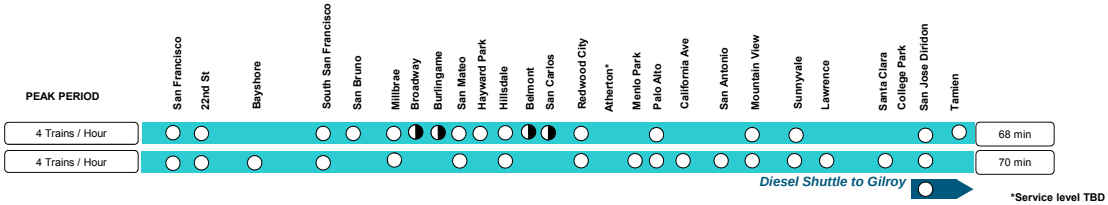
Major investments at terminals and in passing tracks infrastructure are not assumed.

Making near-term, tactical investments to increase service to 8 trains per hour per direction would *precede* the full buildout of the 2040 Service Vision. As such, many important aspects of the 2040 Service Vision would not yet be fully achieved, including:

- Ability to operate a peak-hour express / local service pattern with timed transfers
- Ability to lengthen trains to 8- or 10-cars
- Direct service to downtown San Francisco
- Greatly expanded and electrified service south of Tamien Station to Gilroy

Fully achieving the 2040 Service Vision would require the overall buildout discussed and documented in the Business Plan process to date.

8 Train Illustrative Service Plan

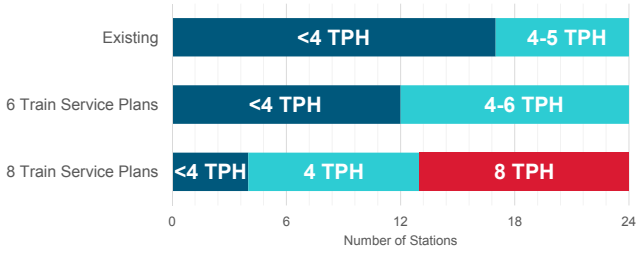


- An 8-train Caltrain service would likely look like a hybrid of the zone express and skip stop patterns with 8 trains per hour, per direction.
- There is limited flexibility in the service structure due to lack of new passing tracks and the constraints of Caltrain's existing signal system.
- Diesel service to/from Gilroy would terminate at San Jose with a timed transfer mainline service. This service could be increased to 5 round trips per day and would have more flexibility to customize departure and arrival times based on public input.

Increasing Service at Stations

Increasing service from six to eight trains per hour, per direction enables more frequent service to more stations.

With an interim 8 tphpd service, 20 of 24 mainline stations would receive at least four trains per hour, per direction, and nearly half of stations would receive eight trains per hour, per direction.

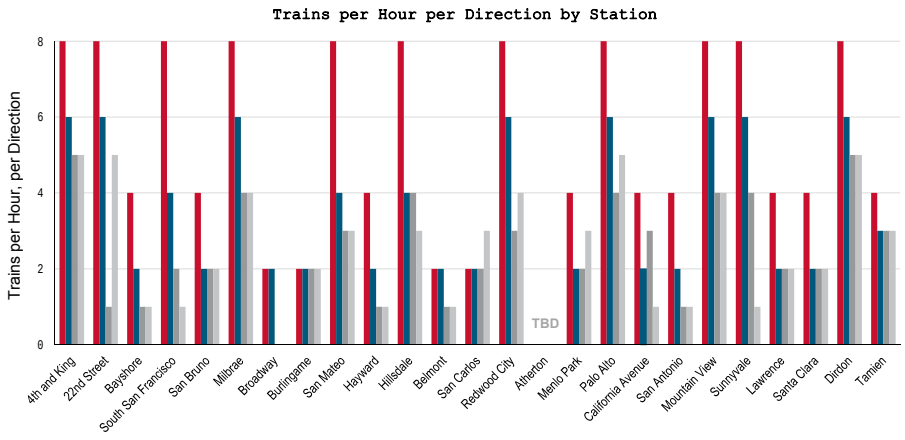


Increasing Service to Stations

20 stations could receive at least four trains per hour, per direction.

Illustrative Change in Peak Period Service Levels

- Illustrative service at expanded "8tph plan"
- Illustrative service at initial CalMod level
- Existing NB AM/SB PM
- Existing SB AM/NB PM



Overall Investments

The following parallel and programmatic investments are assumed to be occurring throughout the 2020's- they are needed to support the overall success of the system and the full implementation of the 2040 Service Vision

Grade Separations

Planning and construction of grade separations and grade crossing improvements

Station Improvements

Programmatic improvements to Caltrain stations and investments in station access and connectivity

Major Investments

Work on major terminal projects (including Diridon and DTX), major station investments, and partner projects including HSR

What Specific Incremental Investments and Changes Would be Needed?

The following key investments would specifically be needed to implement an interim 8-tph service. These investments are consistent with the overall program assumed in the 2040 Service Vision

Expanded EMU Fleet

To provide 8 tphpd direction mainline service, Caltrain will need to expand its EMU fleet

More Train Storage

The railroad will need to add storage capacity to accommodate additional trainsets

Holdout Rule Elimination

Once 8 trains per hour per direction are operating on the corridor, remaining "holdout" rule stations will need to be rebuilt or closed

What Specific Incremental Investments and Changes Would be Needed?

The following key investments would specifically be needed to implement an interim 8-tph service. These investments are consistent with the overall program assumed in the 2040 Service Vision

Level Boarding

Level boarding is needed to ensure reliability and to keep dwell times as short as possible

Gilroy-SJ Shuttle Service

Remaining diesel service south of Tamien would be converted to a shuttle service until the UP corridor is rebuilt and electrified. Service levels could be increased to 5 round trips per day under existing agreements with UP

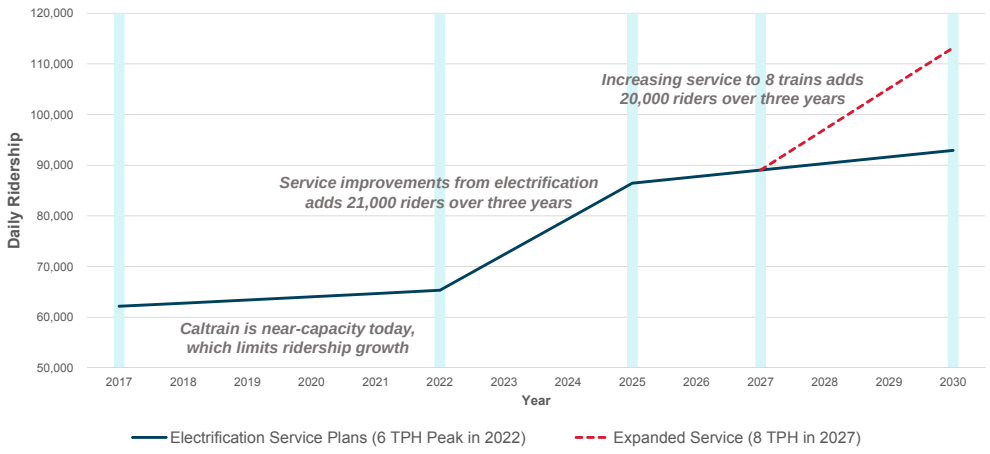
Minor Track Work

Minor track work would be needed to accommodate increased train volumes around Diridon Station

Ridership Forecasts

2020-2030

Change in Weekday Ridership Over Time



Ridership Forecasts, 2019-2030

Ridership Unit	2019 5 TPH	2025 6 TPH	2030 6 TPH	2030 8 TPH
Average Weekday	63,400	86,500	92,900	113,200
Average Weekend Day	11,800	23,600	25,200	25,200
Annual	**18.4M**	**26.1M**	**28.1M**	**33.6M**

Note: Ridership forecasts are relatively comparable between zone express and skip stop patterns in 2025.
2030 Forecasts assume no DTX, which may add another 30,000 weekday riders (~9M annually) after opening.

Over the next decade, Caltrain could nearly double ridership by increasing service from five to eight trains and doubling to quadrupling service at many stations

By 2025, Caltrain could serve about 35% more passengers than today with either zone express or skip stop service

Caltrain

Work in Progress

Station Access Work Plan

The Business Plan presents an opportunity to evaluate Caltrain's current role in station access and how this role may need to change over time to support the service vision.

The Business Plan will provide a high-level assessment of potential paths forward at a system-level, but will not address investment needs at individual stations.

What role does Caltrain play in station access?

- Review existing programs and investments

What is Caltrain's station access vision?

- Consider several paths forward:
  a. A hands-off approach
  b. A proactive investment in parking
  c. A proactive investment in multimodal access

How do we get there?

- Identify most pressing access needs and priorities

Equity Assessment Work Plan

The equity assessment is intended to help us understand how the Service Vision could improve equitable access to Caltrain and develop a series of policy interventions that would improve equitable access further.

Opportunities & Challenges

- Review of existing plans
- Stakeholder interviews
- Market assessment

Analysis of the Service Vision

- Qualitative & quantitative evaluation of the Service Vision

Recommendations

- Context-specific recommendations as outcomes from the analysis of the Service Vision and opportunities and challenges.

Funding Work Plan

Service Vision includes $25.3 Billion in corridor investments by Caltrain, cities and partner agencies and operating costs of $370 M/year by 2040

This phase of work will identify new funding and revenue sources to support the increase in capital and operating costs.

The funding work plan will develop:

- 10-year Funding Plans to support incremental increases in service from 2019-2029
- A Funding and Revenue Strategy to support the full implementation of the Service Vision by 2040

FOR MORE INFORMATION

WWW.CALTRAIN2040.ORG

BUSINESSPLAN@CALTRAIN.COM

650-508-6499

Appendix

Market Analysis

Additional Slides Included In Appendix

Market Analysis | Planning Priorities | Service Concepts & Evaluation | Service Levels at Stations | Illustrative Service Plans

Near-Term Growth: County-Level Findings

County	Population Growth Pipeline	Job Growth Pipeline	Total Population + Job Growth	% Growth over Existing	*% of Growth within ½ mile of Caltrain*	*% of Growth within 2 miles of Caltrain*
San Francisco	99,600	78,000	177,600	11%	*23%*	*82%*
San Mateo	30,400	56,700	87,100	7%	*37%*	*87%*
Santa Clara	82,700	122,600	205,300	7%	*17%*	*64%*
Total	**212,700**	**257,300**	**470,000**	**8%**	***23%***	***75%***

Inventory of all development projects that are approved or under construction in cities along the Caltrain Corridor to assess mid-2020s demand:

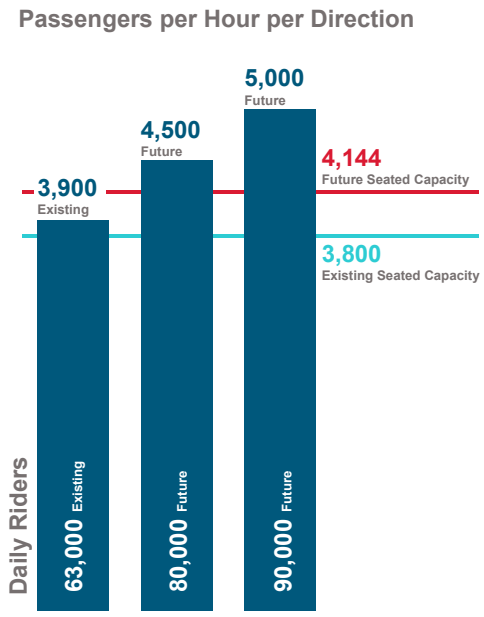
- Based on review of City planning websites
- Excludes developments proposed/under review and growth allowed under specific plans that has not resulted in individual project entitlements
- Prorates major SF developments like Candlestick Point based on latest information on phasing

Near-Term Growth: Corridor-Level Findings

Distance	Category	Existing	Under Construction	Approved	Total Growth	Mid-2020s Estimate	% Growth over Existing
Within ½ Mile of Stations	Population	195,000	24,600	32,100	56,800	**251,800**	+29%
	Jobs	196,300	28,200	28,500	56,700	**253,000**	+29%
	Population + Jobs	**391,300**	**52,800**	**60,600**	**113,400**	**504,800**	**+29%**
Within 2 Miles of Stations	Population	1,599,700	85,000	98,500	183,500	**1,783,100**	*+11%*
	Jobs	1,423,100	132,800	68,600	201,400	**1,624,500**	*+14%*
	Population + Jobs	**3,022,700**	**217,900**	**167,100**	**384,900**	**3,407,600**	***+13%***

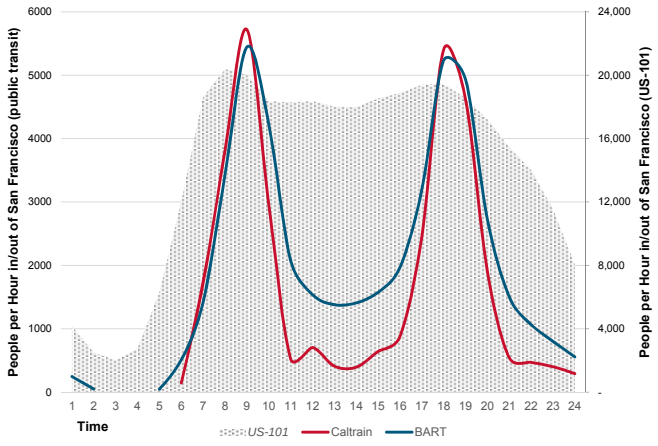
Existing & Future Crowding Capacity

- Today, Caltrain carries up to 3,900 passengers per hour at its peak load points. 7 trains exceed a comfortable crowding level of 900 passengers during peak periods
- Caltrain would need to accommodate 4,500-5,000 passengers per peak hour at 80,000-90,000 daily riders, which approaches the throughput capacity of a six-train mixed fleet (5,400)
- The effective capacity of the system may be lower depending on the degree to which trains are differentiated:
  - Differentiating faster and slower trains reduces Caltrain's effective capacity by concentrating demand on a few trains
  - Similar service patterns across all trains maximizes the effective capacity by spreading demand evenly across all trains



Off-Peak & Weekend Service

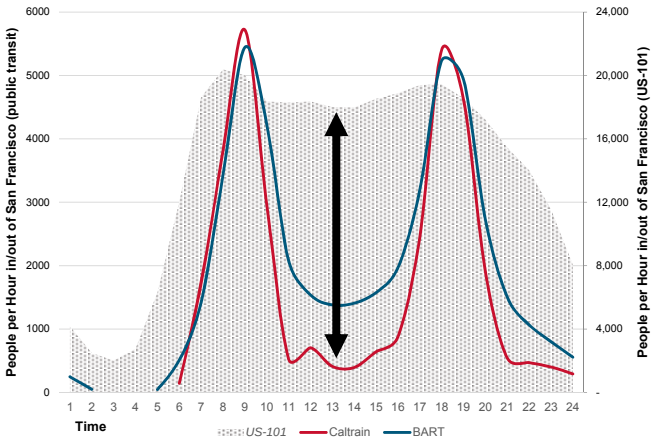
There is substantial unmet demand for midday and weekend Caltrain service, although this demand is difficult to measure



Off-Peak & Weekend Service

Measured Against US-101 Trips
Traffic volumes on US-101 no longer experience peak periods; there is all-day bidirectional travel and intermittent congestion.

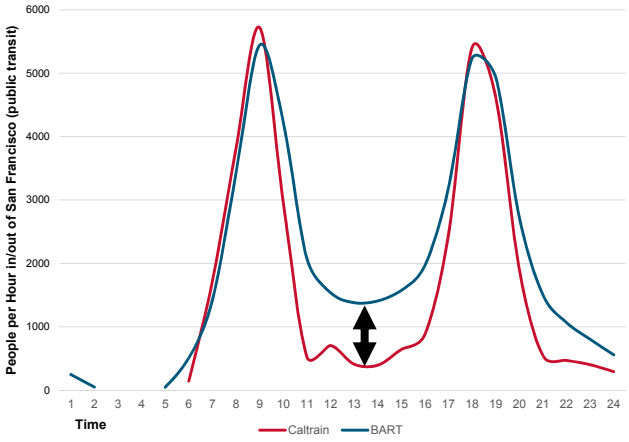
Yet, Caltrain's share of US-101 in/out of San Francisco is 10 times higher during peak periods than off-peak and weekend periods.



Off-Peak & Weekend Service

Measured Against BART Ridership
Caltrain serves more peak period passengers than BART traveling between the Peninsula and San Francisco, but BART serves three times more passengers during off-peak times.

BART provides six times more service than Caltrain during off-peak times, but connects fewer people and jobs on the Peninsula than Caltrain.



Service Concepts & Evaluation

Additional Slides Included In Appendix

Market Analysis → Planning Priorities → **Service Concepts & Evaluation** → Service Levels at Stations → Illustrative Service Plans

Caltrain

Introducing Four Service Concepts

Caltrain

Service Concept Evaluation Metrics

1 - Service Metrics

I. Travel Time

II. Maximum Wait Time

2 - Capacity Metrics

I. Crowding

II. Ability to Support Ridership Growth

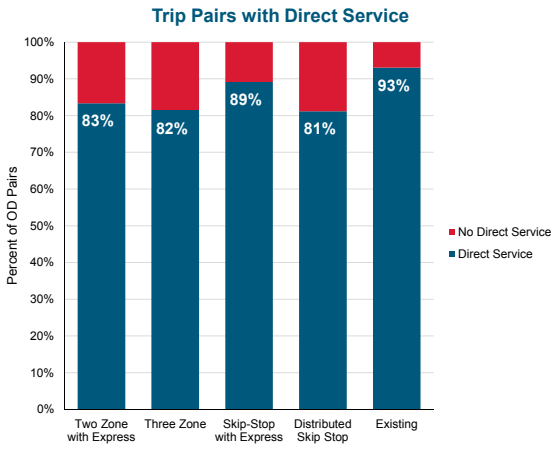
3 - User Experience

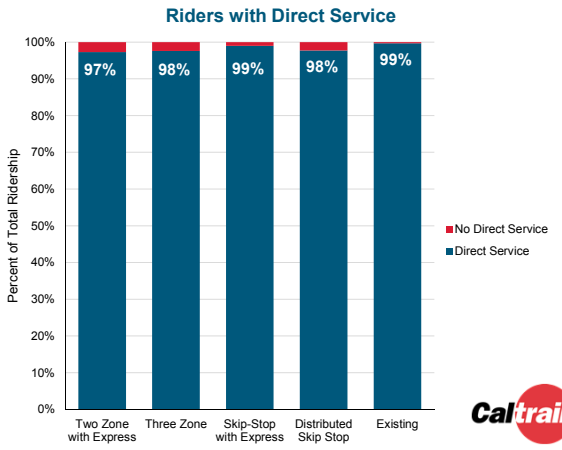
I. Internal Connectivity

II. External Connectivity

Detailed Slides Included In Appendix

Internal Connectivity





1 - Travel Time to/from San Francisco

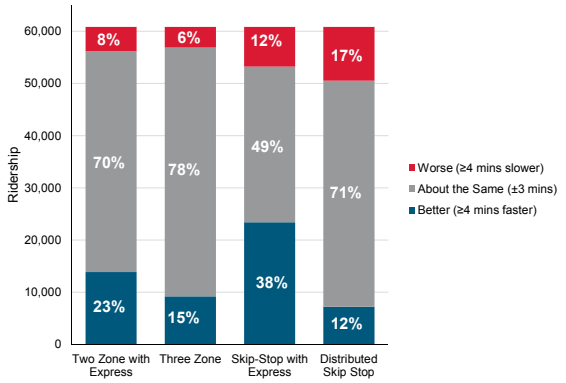
All four concepts offer mostly similar travel times to San Francisco compared to the 'typical best' existing travel time

Typical best defined as the median fastest time in the current timetable. For example, 4th & King to Diridon Baby Bullet travel times vary from 62 to 69 minutes, with a median time of 66 minutes.

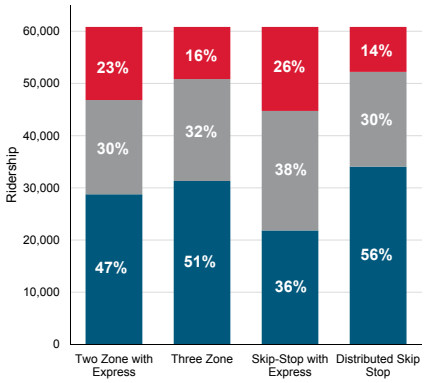
Change in Travel Time by Station	Two Zone with Express	Three Zone	Skip Stop with Express	Distributed Skip Stop
Better (≥4 mins faster)	5	4	3	4
About the Same (+- 3 mins)	15	16	14	17
Worse (≥4 mins slower)	3	3	6	2

1 - Change in Travel Time and Wait Time by Existing Ridership

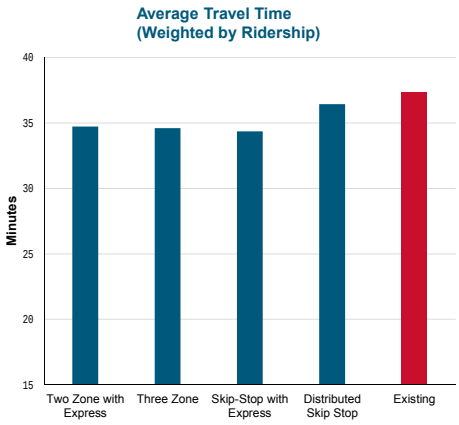
Change in Average Travel Time by OD Pair (By Total Ridership)

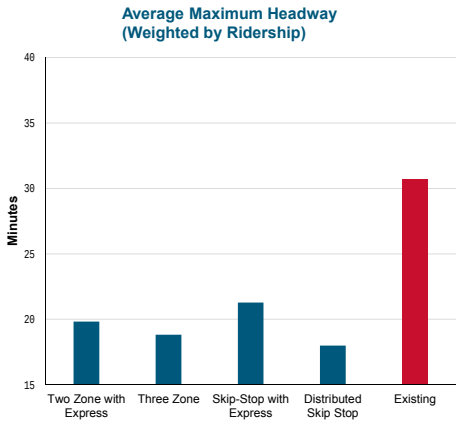


Change in Maximum Headway by OD Pair (By Total Ridership)



1- Travel Time & Wait Time Systemwide





1 – Service Comparison to Existing

Metric	Two Zone with Express	Three Zone	Skip Stop with Express	Distributed Skip Stop
Travel Time	Similar	Similar	Similar	Similar
Maximum Wait Time	Slightly Better	Slightly Better	Slightly Better	Better

Travel Times
All concepts provide similar travel times to existing, although each pattern preferences different station pairs

Maximum Wait Times
All concepts provide a similar reduction in maximum wait times, although the Distributed Skip Stop is the only concept to provide regular intervals at major stations

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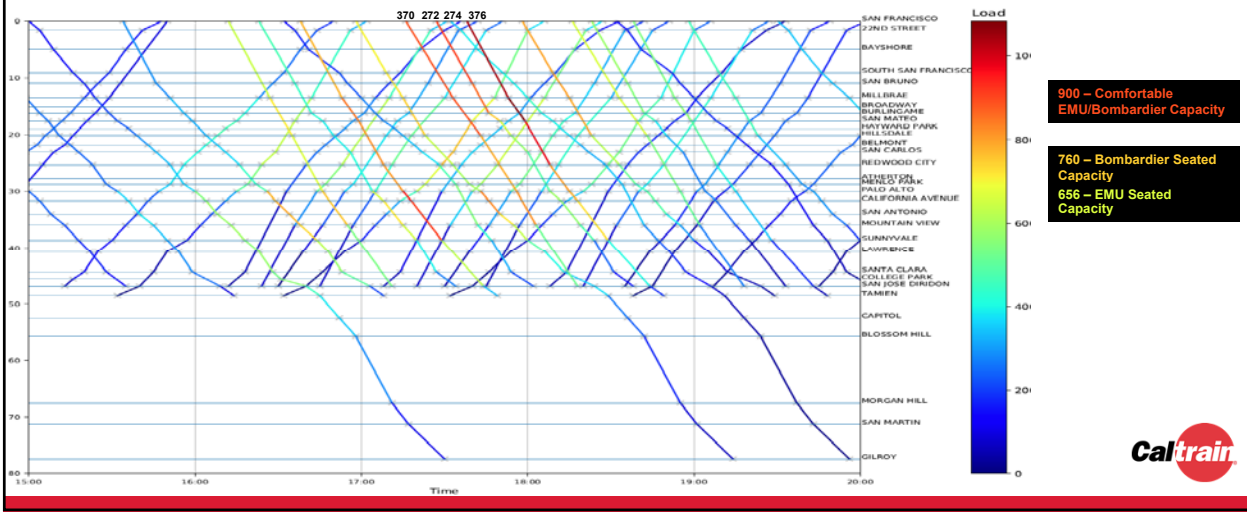
2 – Capacity Metrics

Internal Connectivity

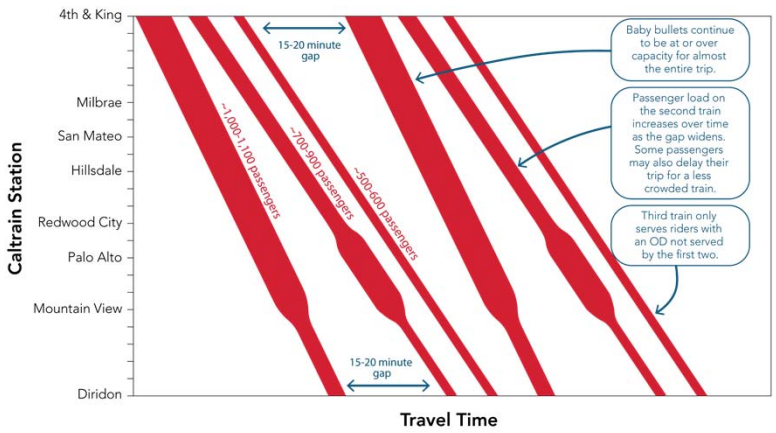
External Connectivity

2 – Crowding Effects of Irregular Wait Times and Differentiated Service

Passenger Loads: PM Peak

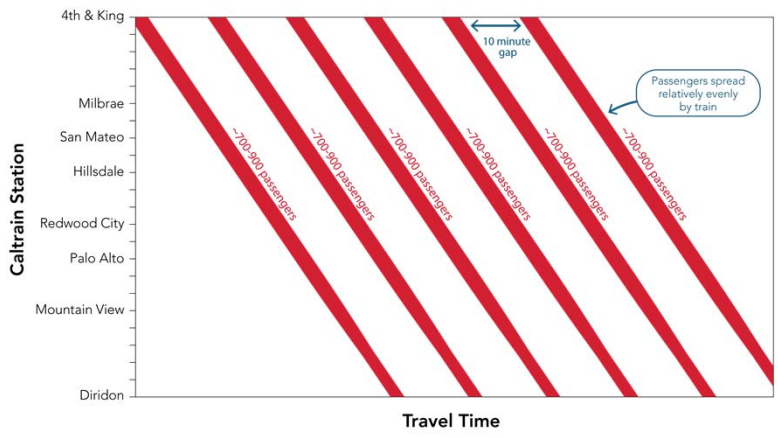


Crowding Effects – Skip Stop with Express



Skip Stop with Express has the lowest effective capacity and least room for ridership growth.

Crowding Effects – Distributed Skip Stop

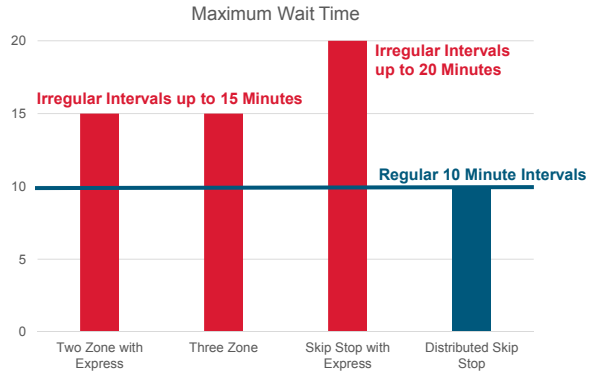


Distributed Skip Stop has the highest effective capacity and most room for ridership growth.

Wait Times at Major Stations

Depending on the service concept, Caltrain may still experience irregular wait times at major stations served by all trains. This has ramifications for Caltrain's ability to manage crowding for trains and stations, coordinate transfers, and provide a user-friendly experience.

Only the Distributed Skip Stop concept would maintain regular 10 minute intervals serving all major stations.



2 – Crowding Comparison to Existing

Metric	Two Zone with Express	Three Zone	Skip Stop with Express	Distributed Skip Stop
Throughput Capacity & Crowding	Slightly Better	Slightly Better	Similar	Better
Ability to Support Significant Ridership Growth	Partially	Partially	No	Yes

- The Two Zone with Express and Three Zone concepts would spread riders somewhat evenly across trains, but would still experience some capacity issues due to bunching
- The Skip Stop with Express would concentrate riders on express trains, which will not alleviate current crowding conditions or provide room for growth
- The Distributed Skip Stop would spread riders across trains relatively evenly and maximize effective capacity

3 - Rider Experience Metrics

Internal Connectivity

External Connectivity

Photo credit SPUR

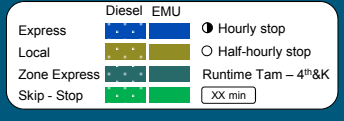
3 - User Experience Comparison to Existing Service

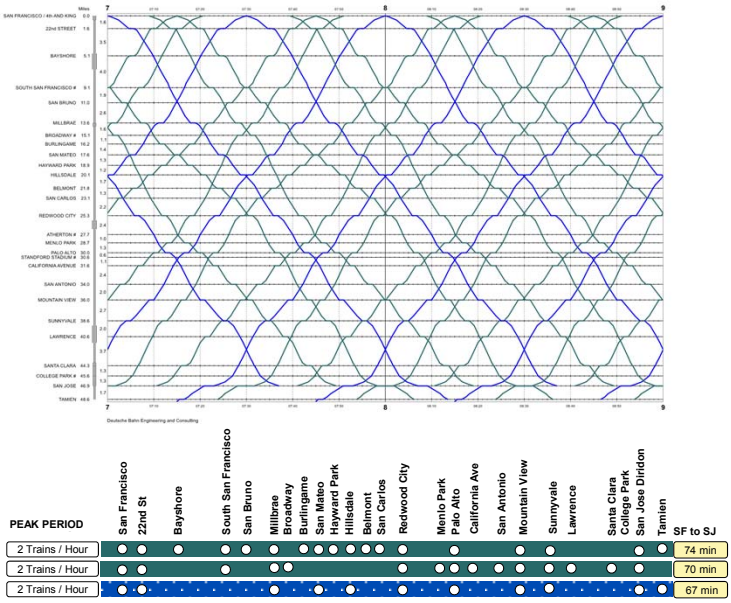
Metric	Two Zone with Express	Three Zone	Skip Stop with Express	Distributed Skip Stop
Internal Connectivity	Similar	Similar	Similar	Similar
External Connectivity	Slightly Better	Similar	Similar	Better

Existing Riders
All concepts serve nearly all existing riders with more frequent direct service, although none serve all existing riders

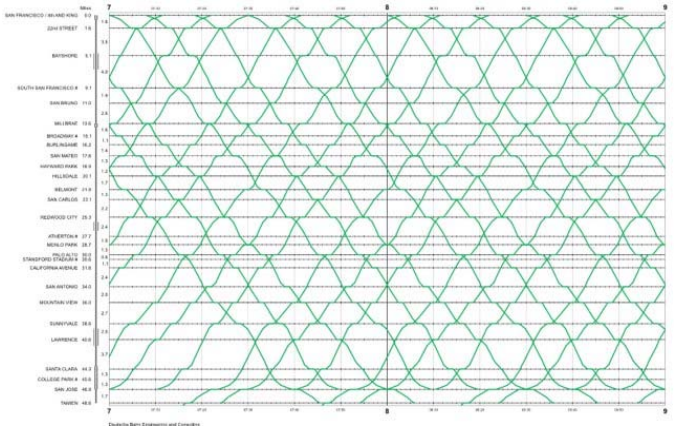
Intermodal Transfers
The Distributed Skip Stop provides efficient transfers at key intermodal stations, while the Two Zone Express provides a good transfer to BART at Millbrae

Two Zone with Expresss





Distributed Skip Stop



	Diesel	EMU	
Express			◑ Hourly stop
Local			○ Half-hourly stop
Zone Express			Runtime Tam – 4th&K
Skip - Stop			XX min

PEAK PERIOD	San Francisco	22nd St	Bayshore	South San Francisco	San Bruno	Millbrae	Broadway	Burlingame	San Mateo	Hayward Park	Hillsdale	Belmont	San Carlos	Redwood City	Menlo Park	Palo Alto	California Ave	San Antonio	Mountain View	Sunnyvale	Lawrence	Santa Clara	College Park	San Jose Diridon	Tamien	SF to SJ
2 Trains / Hour	○	○		○		○	○	○		○	○			○	○	○		○	○	○	○			○	○	71 min
2 Trains / Hour	○	○	○		○		○	○	○		○		○	○		○	○		○	○			○	○		71 min
2 Trains / Hour	○	○		○		○			○		○	○	○	○	○			○	○	○			○		○	71 min