Starting to Build a Business Case
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
Where Are We in the Process?

2018
- Board Adoption of Scope
- Initial Scoping and Stakeholder Outreach

2019
- Stanford Partnership and Technical Team Contracting
- Technical Approach Refinement, Partnering, and Contracting
- Part 1: Service Vision Development

2020
- Board Adoption of 2040 Service Vision
- Part 2: Business Plan Completion
- Board Adoption of Final Business Plan
- Implementation

We Are Here
2040 Service Scenarios: Different Ways to Grow

- **2018**: Current Operations
- **2022**: Start of Electrified Operations
- **2023**: HSR Valley to Valley & Downtown Extension
- **2033**: High Speed Rail Phase 1
- **2040**: Service Vision

**Baseline Growth**, **Moderate Growth**, **High Growth**
Features

- Blended service with up to 10 TPH north of Tamien (6 Caltrain + 4 HSR) and up to 10 TPH south of Tamien (2 Caltrain + 8 HSR)
- Three skip stop patterns with 2 TPH – most stations are served by 2 or 4 TPH, with a few receiving 6 TPH
- Some origin-destination pairs are not served at all

Passing Track Needs

- Less than 1 mile of new passing tracks at Millbrae associated with HSR station plus use of existing passing tracks at Bayshore and Lawrence

Options & Considerations

- Service approach is consistent with PCEP and HSR EIRs
- Opportunity to consider alternative service approaches later in Business Plan process
Features

• A majority of stations served by 4 TPH local stop line, but Mid-Peninsula stations are serviced with 2 TPH skip stop pattern
• Express line serving major markets – some stations receive 8 TPH
• Timed local/express transfer at Redwood City

Passing Track Needs

• Up to 4 miles of new 4-track segments and stations: Hayward Park to Hillsdale, at Redwood City, and a 4-track station in northern Santa Clara county (Palo Alto, California Ave, San Antonio or Mountain View. California Ave Shown)

Options & Considerations

• To minimize passing track requirements, each local pattern can only stop twice between San Bruno and Hillsdale - in particular, San Mateo is underserved and lacks direct connection to Millbrae
• Each local pattern can only stop once between Hillsdale and Redwood City
• Atherton, College Park, and San Martin served on an hourly or exception basis
High Growth Scenarios (12 Caltrain + 4 HSR)

**Features**
- Nearly complete local stop service – almost all stations receiving at least 4 TPH
- Two express lines serving major markets – many stations receive 8 or 12 TPH

**Passing Track Needs**
- Requires up to 15 miles of new 4 track segments: South San Francisco to Millbrae, Hayward Park to Redwood City, and northern Santa Clara County between Palo Alto and Mountain View stations (shown: California Avenue to north of Mountain View)

**Options & Considerations**
- SSF-Millbrae passing track enables second express line; this line cannot stop north of Burlingame
- Tradeoff between infrastructure and service along Mid-Peninsula - some flexibility in length of passing tracks versus number and location of stops
- Flexible 5 mile passing track segment somewhere between Palo Alto and Mountain View
- Atherton, College Park, and San Martin served on an hourly or exception basis
Terminal Analysis
Terminal Planning Context

Terminal Planning Context

San Francisco Terminal

San Jose Terminal

Next Steps
Purpose and Process

Purpose

• Extend initial service planning analysis to identify how each growth 2040 growth scenario will function at and around terminals

• Establish initial service plans as a basis for estimating ridership, identifying areas of operational risk and clarifying needed investments

Process

• Initial staff discussions with partner agencies at each terminal regarding goals and planning parameters

• Initial planning analysis

• Follow up discussion and review with partner agencies at each terminal

• Move to detailed simulation analysis and continued coordination
# Service Planning Parameters

The following rail operating parameters are used as the starting point for 2040 service planning. Some variation to these parameters may be explored as service planning progresses.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>HSR</th>
<th>Caltrain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum headway between trains*</td>
<td>2 minutes</td>
<td>2 minutes</td>
</tr>
<tr>
<td>Turnaround time at terminal</td>
<td>20 minutes</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Minimum station dwell time**</td>
<td>2 minutes</td>
<td>1.0 (high-ridership stations) 0.7 (low-ridership stations)</td>
</tr>
<tr>
<td>Train equipment</td>
<td>High speed trainset</td>
<td>8-car electric multiple unit trainset</td>
</tr>
<tr>
<td>Speed limit</td>
<td>110 MPH</td>
<td>110 MPH</td>
</tr>
<tr>
<td>Recovery time</td>
<td>10% distributed</td>
<td>10% distributed</td>
</tr>
</tbody>
</table>

*Assumes investment in new signal system

**Assumes investment to achieve level-boarding
San Francisco Terminal
San Francisco Terminal

Key Points and Findings

• In the Baseline and Moderate Scenarios preliminary analysis suggests that all train service can utilize Sales Force Transit Center. In the High Growth Scenario the additional 4 trains would terminate at 4th & King.

• Some platform availability preserved at 4th & King in all scenarios to account for event, disruption, and/or regular revenue service.

• Direct sharing of platforms between Caltrain and HSR as part of scheduled revenue service provides no direct capacity benefits in any of the scenarios studied at either terminal. The importance of platform interoperability to system reliability is under study through ongoing analysis.

• All findings will be further tested and evaluated through simulation analysis.
Some conflict potential into/out of STC, but plan works within the planning parameters and will be subject of more detailed analysis with dynamic simulation.

Turn times at STC above minimum requirements are achievable with HSR assigned to two tracks and Caltrain assigned to four tracks. Three and three is also achievable with tighter turns for Caltrain.
SF Terminal: Moderate Growth

15-minute repeating pattern allows two additional trains to STC without creating additional conflicts. Turns at STC are tighter for both HSR and Caltrain compared to the Baseline, but are still within minimum parameters with two HSR and four Caltrain platforms faces for normal operations. Three and three in normal operation would result in unacceptably short turns for Caltrain.
Potential conflicts exist with trains routed between the two terminals (4th & King and STC). Conflicts could be resolved through adjustment to service patterns and/or construction of additional infrastructure including:

• Sending locals to 4th & King and Express to STC
• Other adjustments to 16 tph operating plan
• Construction of significant, vertically separated junction

16 trains to STC is not possible due to unrealistic turn times for all operators.
San Jose Terminal

Key Points and Findings

• Work developed in conjunction with Diridon Integrated Station Concept Plan and some analysis is ongoing
• Solutions were found for all three Growth Scenarios that are consistent with ongoing Diridon planning efforts
• For Caltrain, the ability to “turn” trains south of Diridon is important and will require investments
• Analysis of “diesel” system including freight and intercity operators (Amtrak, ACE, and CCJPA) is ongoing
• All findings will be further tested and evaluated through simulation analysis
San Jose Terminal Area

1. Existing
San Jose Terminal Area

2. HSR-PEPD
San Jose Terminal Area

3. HSR-PEPD + Generalized Initial Diridon Integrated Station Concept Plan (DISC) Concepts
San Jose Terminal Area

4. HSR-PEPD + DISC Concepts + Potential Additional Infrastructure
Scenario generally works within infrastructure currently contemplated with some level of operational risk that will be tested with simulation in next round of Business Plan.

Operational challenges result from turning six Caltrain and three HSR trains in the Diridon/Tamien area. Possible mitigations for operational risk in the Baseline include additional interlocking infrastructure and/or adjustment to turn locations for HSR in San Jose.
Operating all Caltrain through Diridon and turning a maximum of four trains at Tamien broadly works in currently contemplated infrastructure in PEPD and assumed changes at Diridon contemplated in DISC analysis.
SJ Terminal: High Growth

Scenario works with San Jose terminal planning assumptions, but requires some trains to turn at new maintenance facility.
Next Steps

Terminal Planning Context
San Francisco Terminal
San Jose Terminal
Next Steps
Next Steps: Simulation

Process

• The primary objective for the simulation analysis is to determine whether the simulation model indicates a stable rush-hour operation absent any major disruptions (e.g. track outages or disabled trains) for the three growth scenarios subject to analysis.

• Of particular concern is the extent to which the variability of dwells at intermediate stations will affect the ability to deliver the proposed timetables within reasonable on-time performance parameters.
Next Steps: Storage & Maintenance Analysis

Process
• Analyze fleet, storage and maintenance needs associated with the fleet requirements for each of the growth scenarios considered
• Understand when and where new investments in storage and maintenance facilities may be required and analyze how these may impact or benefit overall system operations
Next Steps: Explorations

Examples:
- High Growth stopping pattern tradeoffs
- Dumbarton service connection in Redwood City
- East Bay run-through service via second Transbay Tube
- 22nd St Station relocation
Ridership Forecasts
Ridership Context

Ridership Context
Ridership Forecasts
Capacity & Crowding
Existing Ridership

Today, Caltrain serves bidirectional and polycentric ridership demand
• 62,000 daily boardings¹
• 64%-36% NB-SB split during AM peak period
• Half of trips occur outside of San Francisco

Ridership is highly concentrated around stations with fastest & most frequent Service
• 73% of ridership at 8 Baby Bullet stations served by 4 or more trains per hour, per direction
• There is substantial latent demand, particularly at stations with low service

Train occupancy varies by service type
• Many Baby Bullet trains carry 100%-140% of their seated capacity during peak periods, while limited trains vary from about 50% to 120% of seated capacity

¹Based on 2017 ridership data
Ridership Growth Over Time

Change in Ridership (Thousands)
1998 – 2017

Source: 1998-2017 Passenger Counts

Top 8 Stations
4th & King, Millbrae, Hillsdale,
Redwood City, Palo Alto,
Mountain View, Sunnyvale,
San Jose Diridon

Middle 8 Stations
22nd Street, Burlingame,
San Mateo, San Carlos,
Menlo Park, California Ave,
Santa Clara, Tamien

Bottom 8 Stations
Bayshore, South San Francisco,
San Bruno, Hayward Park,
Belmont, San Antonio,
Lawrence, College Park

Gilroy Service
Capitol, Blossom Hill,
Morgan Hill, San Martin,
Gilroy
Ridership Forecasts
Objectives

Update the Caltrain Ridership Model to forecast changes associated with Growth Scenarios
• System, station, and origin-destination forecasts
• Weekday and weekend forecasts
• Breakdown by time period for weekdays (AM peak, midday, PM peak, and evening)

Incorporate sensitivity to regional and local factors influencing ridership
• Regional transportation changes
• Station area land use
• Differentiated service patterns
• Socioeconomic characteristics

Understand implications of train crowding
• Align ridership against capacity provided
• Consider extent to which service will be able to fully “capture” market given potential train crowding
Ridership Model Structure

Modeling Process

1. VTA-C/CAG Travel Model
2. Caltrain Ridership Model
3. HSR Ridership Adjustment
4. Crowding-Constrained Forecasts

Demand Forecasts

+ HSR Access Trips
- HSR Overlap Trips

Crowding-Constrained Forecasts

- Train Crowding Constraints

Caltrain Ridership Forecasts

Modeling Objectives

1. Forecast for changes in regional travel behavior over time
2. Refine Caltrain regional distribution & account for micro travel behavior related to Caltrain
3. Account for HSR influence on Caltrain ridership
4. Constrain capacity to a comfortable crowding load of 1.35 at each segment

- Net Effect: adjusts ridership by station and reduces overall ridership forecast
+ Net Effect: Subtracts riders on HSR ODs; adds riders as HSR access mode
- Net Effect: Decrease overall Caltrain ridership for baseline and moderate growth scenarios
On its current, baseline path, Caltrain would experience demand of 161,000 daily riders by 2040. The Moderate and High Growth scenarios would increase demand to 185,000 and 207,000 riders, respectively.
Early 2020s: Demand increases 20% with electrification, though some trips shift to express buses and managed lanes.

Late 2020s: Demand increases 25% with DTX while HSR, Dumbarton, and BART to SJ enable improved connections.

2030s: Land use growth fuels continued ridership gains over time.

Baseline Change over Time – Weekday

However, ridership demand exceeds a comfortable crowding level shortly after the completion of DTX.

Nearby development activity increases Caltrain ridership demand by about 2% per year – or 40% of growth by 2040.
Peer Comparison: Ridership Demand

Caltrain’s 2040 ridership demand is more balanced (directionally and geographically) than peer corridors.

### System Daily  
<table>
<thead>
<tr>
<th></th>
<th>Peak Hour, Max Load Point</th>
<th>Peak % - Reverse Peak %</th>
<th>Peak Hour, Peak Direction Max Load Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>62,000</td>
<td>6,500</td>
<td>60% - 40%</td>
</tr>
<tr>
<td>2040 Baseline</td>
<td>161,000*</td>
<td>15,300*</td>
<td>57% - 43%*</td>
</tr>
<tr>
<td>2040 Moderate</td>
<td>185,000*</td>
<td>17,700*</td>
<td>56% - 44%*</td>
</tr>
<tr>
<td>2040 High</td>
<td>207,000</td>
<td>20,600</td>
<td>56% - 44%</td>
</tr>
<tr>
<td>BART (All Lines)</td>
<td>414,000</td>
<td>28,400</td>
<td>88% - 12%</td>
</tr>
<tr>
<td>Metro North</td>
<td>176,000</td>
<td>27,900</td>
<td>94% - 6%</td>
</tr>
<tr>
<td>Long Island Railroad (All Lines)</td>
<td>350,000</td>
<td>35,900</td>
<td>94% - 6%</td>
</tr>
</tbody>
</table>

*Excludes capacity constraining for Baseline and Moderate
Ridership vs. Population/Jobs within ½ Mile, Existing Caltrain vs. Existing BART

- Caltrain Stations:
  - 4th & King
  - Palo Alto
  - Redwood City
  - San Mateo

- BART Stations:
  - Downtown Oakland, Downtown Berkeley, & Mission District
  - Glen Park
  - Balboa Park
  - Downtown

Weekday Boardings vs. Population + Jobs within 1/2 Mile
Ridership vs. Population/Jobs within ½ Mile, 2040 Caltrain High Growth Ridership vs. Existing BART

Population + Jobs within 1/2 Mile

Weekday Boardings

Caltrain Stations

BART Stations

Palo Alto
Salesforce Transit Center
4th & King
Mountain View
San Jose
Redwood City
22nd Street
Lawrence
South San Francisco
San Mateo
Hillsdale
Millbrae
Sunnyvale
San Francisco
Key Findings

1. Ridership demand could exceed 200,000 riders by 2040
   i. Under the Baseline Growth condition, Caltrain would attract 161,000 riders by 2040
   ii. Increasing to 8 TPH would increase ridership to 185,000 for the Moderate Growth scenario
   iii. Increasing to 12 TPH would increase ridership to 207,000 for the High Growth scenario

2. PCEP will provide near-term crowding relief, but growing demand will lead to overcrowded conditions during peak hours upon completion of DTX around 2029
   i. Caltrain could reach 100,000 riders over the next decade with electrification and land use growth alone
   ii. The Completion of DTX increases Caltrain ridership demand by about 25 percent (27,000 riders)
   iii. While new trains will enable better standing conditions for passengers, the level of crowding expected will be uncomfortable and may not be a competitive option for choice riders

3. By 2040 the Baseline and Moderate Growth scenarios face crowding challenges, while the High Growth does not.
   i. By 2040 the Baseline and Moderate Growth scenarios exceed a comfortable crowding condition by about 30 to 40 percent for peak hour, peak direction travel.
1. **STC Surcharge**
   i. Assumed average surcharge of $2.50 (or $3 in 2029 dollars) per trip, roughly equivalent to a separate fare zone
   ii. STC would serve about 25,000 daily boardings, but some potential riders may shift to other modes
   iii. Ultimate surcharge amount and mechanism will influence ridership outcomes at STC

2. **Location of 22nd Street Station**
   i. Ridership forecasts suggest 6,000-10,000 daily station boardings by 2040, but may be higher or lower depending on potential station relocation

3. **Intra-SF Ridership**
   i. With opening of DTX Caltrain could offer substantial time savings for intra-SF trips and as connection to BART, Transbay buses, and ferries
   ii. Ridership forecasts suggest 4,000-7,000 trips, but could be 20,000-30,000 if similar to BART

<table>
<thead>
<tr>
<th>Origin-Destination Pair</th>
<th>Estimated Travel Time (Frequency by Growth Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Muni</strong></td>
</tr>
<tr>
<td>4th &amp; King – STC/Montgomery Station</td>
<td>15 minutes (6 trains per hour)</td>
</tr>
<tr>
<td>22nd Street – STC/Montgomery Station</td>
<td>25 minutes (6 trains per hour)</td>
</tr>
<tr>
<td>Bayshore – STC/Montgomery Station</td>
<td>37 minutes (8 buses per hour)</td>
</tr>
</tbody>
</table>
South of Tamien Ridership

Findings

• There is reasonably strong demand for service in southern San Jose, where Capitol and Blossom Hill would serve 3,000-4,000 new boardings per day with service every 15 minutes

• There is lower demand in Morgan Hill and Gilroy with half-hourly peak period service and hourly off-peak service
  • Smaller markets with less housing growth
  • HSR is attractive option at Gilroy due to higher frequency service to San Jose and faster travel times to San Francisco and Millbrae

<table>
<thead>
<tr>
<th>Topic</th>
<th>Existing</th>
<th>2040 Baseline</th>
<th>2040 Moderate</th>
<th>2040 High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitol &amp; Blossom Hill</td>
<td>300</td>
<td>700</td>
<td>3,500</td>
<td>4,300</td>
</tr>
<tr>
<td>Morgan Hill &amp; Gilroy</td>
<td>400</td>
<td>600</td>
<td>1,300</td>
<td>1,600</td>
</tr>
</tbody>
</table>

*Excludes capacity constraining for Baseline and Moderate*
### Off-Peak & Weekend Ridership

<table>
<thead>
<tr>
<th>Topic</th>
<th>Existing</th>
<th>2040 Baseline</th>
<th>2040 Moderate</th>
<th>2040 High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-Peak Boardings (Early AM, Midday, and Evening)</td>
<td>7,300</td>
<td>23,000</td>
<td>34,700</td>
<td>35,900</td>
</tr>
<tr>
<td>Weekend Boardings</td>
<td>12,400</td>
<td>43,300</td>
<td>58,800</td>
<td>61,200</td>
</tr>
</tbody>
</table>

**Findings**

- There is strong potential for growth during off-peak and weekend periods, although there is particularly high uncertainty given data and model limitations.
- However, station demand is highly sensitive to service frequency. Demand is highest at stations receiving service every 15 minutes or greater, and lower at stations receiving service every 30 or 60 minutes.
2040 Capacity & Crowding
Crowding

How crowded will trains be? Will they still be a competitive choice? Will they be able to serve their full potential market demand?

• The underlying ridership model projects demand based on land use and service levels- it does not take comfort and crowding into account

• If Caltrain is highly crowded and uncomfortable will it still be a competitive mode? Is there a portion of future demand that we may not capture if the trains are uncomfortably full?

For the purposes of Business Planning, Caltrain is assuming that it can competitively serve passenger loads of up to 135% of seated capacity during regular service. At higher levels of crowding the service may not be competitive for choice riders and Caltrain may not be able to fully capture potential demand.
Today, 15 of 28 peak commute direction trains exceed seated capacity during peak periods. Baby Bullet trains are usually beyond their seated capacities (averaging 115%), while Limited trains are typically near capacity (averaging 92%). Max train loads vary from 40% to 140%.

At 100% seated capacity, everyone gets a seat.
Train Capacity and Crowding

50% Occupancy – Many seats available
Train Capacity and Crowding

100% Occupancy – Everyone gets a seat

This level of occupancy is the planning standard used for commuter rail by FTA.
Train Capacity and Crowding

135% Occupancy – Most are seated and everyone else can stand comfortably

This level of occupancy roughly equates to the planning standard used for commuter rail lines into London and on S-Bahn (commuter) trains in Germany. Depending on the specific train design this level of occupancy generally equates to less than two standees per square meter of space.
Train Capacity and Crowding

More than 135% Occupancy – Many are standing and may be uncomfortable

While occupancy loads well over 150% can be safely accommodated, passengers will feel crowded and uncomfortable and the service may not be attractive to choice riders.
Baseline & Moderate scenarios exceed comfortable crowding level during peak hours.

Assumes 8 car trains in Baseline and 10 car trains in Moderate and High scenarios.

135% - Comfortable crowding level.

Occupancy Load

Baseline
Moderate
High

AM (Reverse Peak Direction)

Baseline
Moderate
High

PM (Peak Direction)

Baseline
Moderate (Average)
Moderate (Express)
High

0% 25% 50% 75% 100% 125% 150% 175% 200%

STC 4th & King 22nd St Bayshore SSF San Bruno Millbrae Broadway Burlingame San Mateo Hayward Park Hillsdale Belmont San Carlos Redwood City Atherton Merlo Park Palo Alto California Ave San Antonio Mountain View Sunnyvale Lawrence Santa Clara San Jose Diridon Tamien Capitol Blossom Hill Morgan Hill San Martin Gilroy

2040 Crowding by Scenario
Under the Baseline Scenario, demand exceeds crowding capacity by 10,000 riders during peak hours by 2040.
Under the Moderate Scenario, demand exceeds crowding capacity by 7,500 riders during peak hours by 2040.
High Growth Demand over Time – Weekday

Caltrain is able to fully accommodate 2040 demand

Crowding challenges in 2030s until service expansion complete

Business Plan Growth Scenarios
## System Forecasts: Constrained for Crowding

### Systemwide Boardings: Weekday Ridership

<table>
<thead>
<tr>
<th>Model Year</th>
<th>Service Plan</th>
<th>Demand</th>
<th>Capacity Constrained</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>2017</td>
<td>5 TPH</td>
<td>62,100</td>
<td>62,100</td>
<td></td>
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<tr>
<td>2022</td>
<td>5 TPH</td>
<td>69,700</td>
<td>69,700</td>
<td></td>
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<tr>
<td>2022</td>
<td>6 TPH</td>
<td>85,000</td>
<td>85,000</td>
<td></td>
</tr>
<tr>
<td>2029</td>
<td>5 TPH</td>
<td>6 TPH</td>
<td>103,100</td>
<td>103,100</td>
</tr>
<tr>
<td>2029</td>
<td>6 TPH (+ DTX)</td>
<td>130,600</td>
<td>124,900</td>
<td></td>
</tr>
<tr>
<td>2029</td>
<td>6 TPH (+ DTX and 2 HSR)</td>
<td>132,900</td>
<td>128,900</td>
<td></td>
</tr>
<tr>
<td>2033</td>
<td>6 TPH (+ 2 HSR)</td>
<td>141,700</td>
<td>135,700</td>
<td></td>
</tr>
<tr>
<td>2033</td>
<td>6 TPH (+ 4 HSR)</td>
<td>143,800</td>
<td>137,600</td>
<td></td>
</tr>
<tr>
<td>2040</td>
<td>Baseline 6 TPH (+ 4 HSR)</td>
<td>161,200</td>
<td>151,700</td>
<td></td>
</tr>
<tr>
<td>2040</td>
<td>Moderate 8 TPH (+ 4 HSR)</td>
<td>184,800</td>
<td>177,200</td>
<td></td>
</tr>
<tr>
<td>2040</td>
<td>High 12 TPH (+ 4 HSR)</td>
<td>207,300</td>
<td>207,300</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Electrification increases service and capacity. Combined with the Central Subway, significant latent demand is unlocked within the system. After the completion of DTX, peak Caltrain ridership demand would exceed capacity. Ridership continues to grow during shoulder peak and off-peak periods.
- Demand for express trains would exceed a comfortable crowding level. While local trains could serve some excess capacity, some riders would choose other modes in lieu of a longer local travel time.
- Sufficient peak capacity and more connected local service serving off-peak and weekend demand.
Caltrain’s peak load point occurs around the mid-Peninsula. Today, Caltrain serves about 3,900 riders per direction during its busiest hour at this peak load point. This is equivalent to 2.5 lanes of freeway traffic.

The **Baseline Growth Scenario** increases peak hour ridership to about 6,400 riders at the peak load point – equivalent to widening US-101 by 2 lanes. Peak hour demand exceeds capacity by about 40%.

The **Moderate Growth Scenario** increases peak hour ridership to about 7,500 riders at the peak load point – equivalent to widening US-101 by 2.5 lanes. Peak hour demand exceeds effective capacity by about 35% due to higher demand for express trains.

The **High Growth Scenario** increases peak hour ridership to over 11,000 at the peak load point – equivalent to widening US-101 by 5.5 lanes. All ridership demand is served.

Assumes 135% max occupancy load.
Next Steps
Next Steps

Upcoming Work & Updates

• Service Planning
  • Explorations and Variations
  • Simulation analysis

• Business Case Development
  • Corridor Investments and Capital Costs
  • Operating Costs and Revenues
  • Mobility and Environmental Benefits

• Community Interface Assessment
  • Grade Separation Update
## 2040 Station Demand: Top 12

**Notes:**
- Excludes capacity constraining.
- San Francisco ridership may vary depending on location of 22nd Street station and Salesforce Transit Center surcharge.
- Future SFCHAMP modeling may better inform intra-SF ridership demand.

<table>
<thead>
<tr>
<th>Station</th>
<th>Existing</th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th &amp; King</td>
<td>15,200</td>
<td>20,600</td>
<td>23,800</td>
<td>27,300</td>
</tr>
<tr>
<td>Salesforce Transit Center</td>
<td>0</td>
<td>21,600</td>
<td>26,800</td>
<td>25,000</td>
</tr>
<tr>
<td>Palo Alto</td>
<td>7,400</td>
<td>14,900</td>
<td>15,700</td>
<td>18,000</td>
</tr>
<tr>
<td>Mountain View</td>
<td>4,500</td>
<td>11,700</td>
<td>12,700</td>
<td>14,100</td>
</tr>
<tr>
<td>San Jose</td>
<td>4,700</td>
<td>11,100</td>
<td>12,000</td>
<td>13,400</td>
</tr>
<tr>
<td>Sunnyvale</td>
<td>3,300</td>
<td>7,700</td>
<td>10,000</td>
<td>11,700</td>
</tr>
<tr>
<td>Redwood City</td>
<td>3,900</td>
<td>8,300</td>
<td>9,400</td>
<td>11,500</td>
</tr>
<tr>
<td>Hillsdale</td>
<td>3,000</td>
<td>8,400</td>
<td>9,000</td>
<td>10,400</td>
</tr>
<tr>
<td>22nd Street</td>
<td>1,700</td>
<td>5,800</td>
<td>7,100</td>
<td>9,500</td>
</tr>
<tr>
<td>Millbrae</td>
<td>3,400</td>
<td>8,900</td>
<td>7,900</td>
<td>8,100</td>
</tr>
<tr>
<td>Lawrence</td>
<td>900</td>
<td>5,400</td>
<td>4,700</td>
<td>6,100</td>
</tr>
<tr>
<td>South San Francisco</td>
<td>500</td>
<td>2,100</td>
<td>5,500</td>
<td>5,600</td>
</tr>
</tbody>
</table>
### 2040 Station Demand: Largest Gains

#### Weekday Boardings – 2040 High Growth vs. Existing

<table>
<thead>
<tr>
<th>Station</th>
<th>Existing</th>
<th>2040 High Growth</th>
<th>Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitol</td>
<td>55</td>
<td>1,700</td>
<td>1,600</td>
<td>2,909%</td>
</tr>
<tr>
<td>Blossom Hill</td>
<td>107</td>
<td>2,600</td>
<td>2,500</td>
<td>2,336%</td>
</tr>
<tr>
<td>Bayshore</td>
<td>240</td>
<td>3,200</td>
<td>3,000</td>
<td>1,250%</td>
</tr>
<tr>
<td>South San Francisco</td>
<td>496</td>
<td>5,600</td>
<td>5,100</td>
<td>1,028%</td>
</tr>
<tr>
<td>Hayward Park</td>
<td>376</td>
<td>2,900</td>
<td>2,500</td>
<td>665%</td>
</tr>
<tr>
<td>Lawrence</td>
<td>907</td>
<td>6,100</td>
<td>5,200</td>
<td>573%</td>
</tr>
<tr>
<td>22nd St</td>
<td>1,687</td>
<td>9,500</td>
<td>7,800</td>
<td>462%</td>
</tr>
<tr>
<td>Morgan Hill</td>
<td>181</td>
<td>900</td>
<td>700</td>
<td>387%</td>
</tr>
<tr>
<td>Gilroy</td>
<td>173</td>
<td>700</td>
<td>600</td>
<td>347%</td>
</tr>
<tr>
<td>Tamien</td>
<td>1,264</td>
<td>5,100</td>
<td>3,900</td>
<td>309%</td>
</tr>
<tr>
<td>Hillsdale</td>
<td>2,963</td>
<td>10,400</td>
<td>7,500</td>
<td>253%</td>
</tr>
<tr>
<td>San Antonio</td>
<td>904</td>
<td>3,000</td>
<td>2,100</td>
<td>232%</td>
</tr>
</tbody>
</table>

**Notes:**
- Excludes Salesforce Transit Center.
- 22nd Street Station ridership may vary depending on station location and Salesforce Transit Center surcharge.
## 2040 County to County Demand

### Daily County to County Ridership Demand

<table>
<thead>
<tr>
<th>County OD Pair</th>
<th>Existing</th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco-San Mateo</td>
<td>11,500</td>
<td>36,500</td>
<td>37,200</td>
<td>37,700</td>
</tr>
<tr>
<td>San Francisco-Santa Clara</td>
<td>22,600</td>
<td>57,400</td>
<td>71,200</td>
<td>74,800</td>
</tr>
<tr>
<td>San Mateo-Santa Clara</td>
<td>15,800</td>
<td>29,700</td>
<td>35,500</td>
<td>46,400</td>
</tr>
<tr>
<td>Within San Francisco</td>
<td>100</td>
<td>4,400</td>
<td>7,000</td>
<td>7,100</td>
</tr>
<tr>
<td>Within San Mateo</td>
<td>4,900</td>
<td>13,300</td>
<td>11,900</td>
<td>16,000</td>
</tr>
<tr>
<td>Within Santa Clara</td>
<td>7,200</td>
<td>19,900</td>
<td>21,900</td>
<td>24,500</td>
</tr>
</tbody>
</table>

**Notes:**
- Excludes capacity constraining.
- Future SFCHAMP modeling may better inform intra-SF ridership demand and implications of STC fare surcharge.
- Southern Santa Clara County stations account for 1,300 riders in Baseline Scenario, 4,800 in Moderate Scenario, and 5,900 in High Scenario.
- HSR, Dumbarton Rail, and BART to San Jose each account for an increase of about 1,000-2,000 daily trips over existing.
## Top 5 Station OD Pairs, Including Downtown San Francisco

<table>
<thead>
<tr>
<th>Station-Station OD Pair</th>
<th>Existing</th>
<th>Baseline Growth</th>
<th>Moderate</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>STC/4th &amp; King-Palo Alto</td>
<td>4,300</td>
<td>9,100</td>
<td>12,300</td>
<td>12,300</td>
</tr>
<tr>
<td>STC/4th &amp; King-Mountain View</td>
<td>4,100</td>
<td>8,100</td>
<td>9,200</td>
<td>9,300</td>
</tr>
<tr>
<td>STC/4th &amp; King-Sunnyvale</td>
<td>3,700</td>
<td>6,900</td>
<td>8,400</td>
<td>8,600</td>
</tr>
<tr>
<td>STC/4th &amp; King-San Jose</td>
<td>3,700</td>
<td>5,000</td>
<td>5,900</td>
<td>6,500</td>
</tr>
<tr>
<td>STC/4th &amp; King-Lawrence</td>
<td>500</td>
<td>4,600</td>
<td>4,700</td>
<td>5,200</td>
</tr>
</tbody>
</table>

## Top 5 Station OD Pairs, Excluding Downtown San Francisco

<table>
<thead>
<tr>
<th>Station-Station OD Pair</th>
<th>Existing</th>
<th>Baseline Growth</th>
<th>Moderate</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Jose-Palo Alto</td>
<td>1,500</td>
<td>4,200</td>
<td>3,500</td>
<td>3,600</td>
</tr>
<tr>
<td>San Jose-Mountain View</td>
<td>400</td>
<td>2,900</td>
<td>3,500</td>
<td>3,600</td>
</tr>
<tr>
<td>Redwood City-Palo Alto</td>
<td>600</td>
<td>2,200</td>
<td>2,000</td>
<td>3,100</td>
</tr>
<tr>
<td>22nd Street-Palo Alto</td>
<td>1,400</td>
<td>1,700</td>
<td>2,000</td>
<td>2,600</td>
</tr>
<tr>
<td>Redwood City-Hillsdale</td>
<td>300</td>
<td>1,500</td>
<td>2,100</td>
<td>2,400</td>
</tr>
</tbody>
</table>

*Excludes capacity constraining*
Land Use/Transportation Context: ½-Mile Area

600,000 people and jobs within 1/2 mile of Caltrain stations

1 million people and jobs within 1/2 mile of Caltrain stations

Indicates a station where substantial growth beyond Plan Bay Area forecasts is anticipated, but not yet approved
Land Use/Transportation Context: 2-Mile Area

**Existing**

- 3 million people and jobs within 2 miles of Caltrain stations

**2040**

- 4.2 million people and jobs within 2 miles of Caltrain stations

Indicates a station where substantial growth beyond Plan Bay Area forecasts is anticipated, but not yet approved.