Caltrain Business Plan

MAY 2019

QUARTERLY UPDATE

Caltrain CAC

Agenda Item 8

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

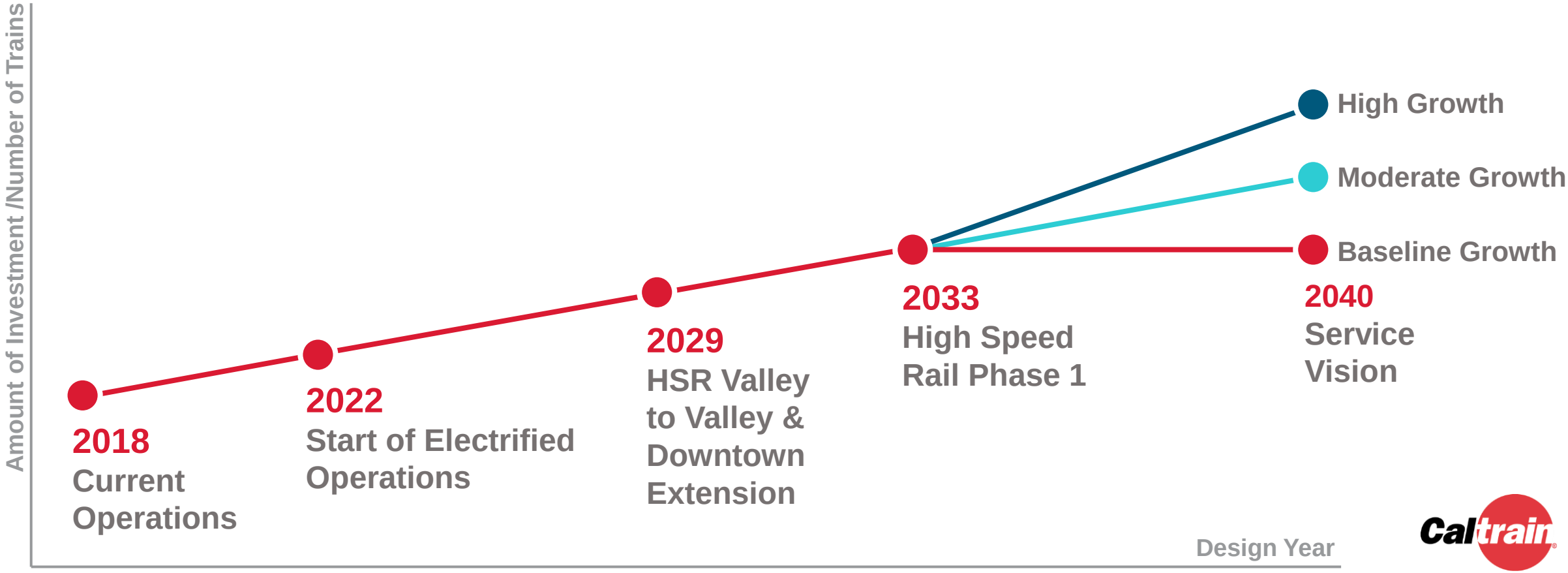
- Benefits and impacts to surrounding communities
- Corridor management strategies and consensus building
- Equity considerations

Organization

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

Where Are We in the Process?

2040 Service Scenarios: Different Ways to Grow



2040 Baseline Growth Scenario (6 Caltrain + 4 HSR)

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

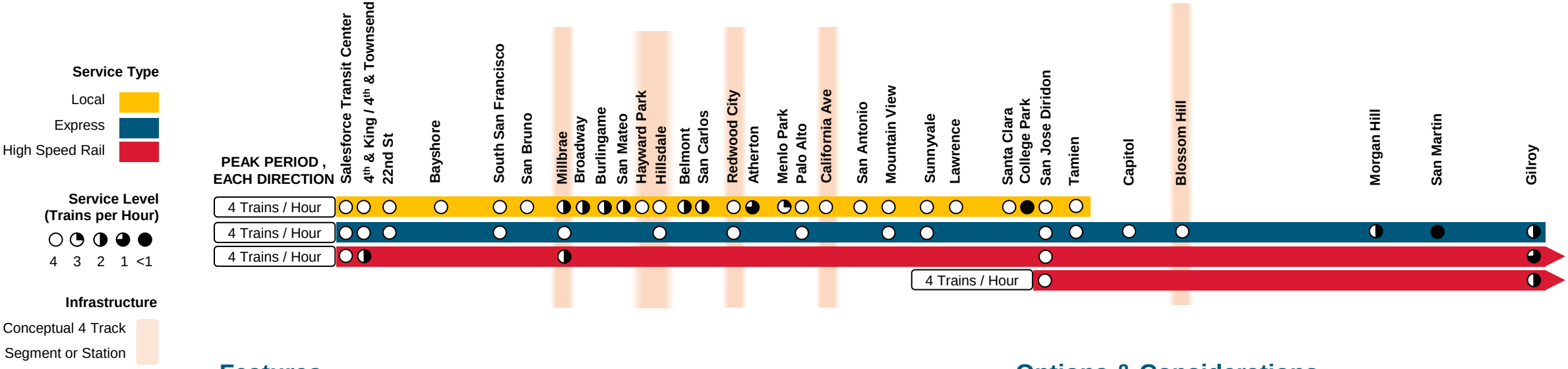
Passing Track Needs

- 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

Moderate Growth Scenario (8 Caltrain + 4 HSR)



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

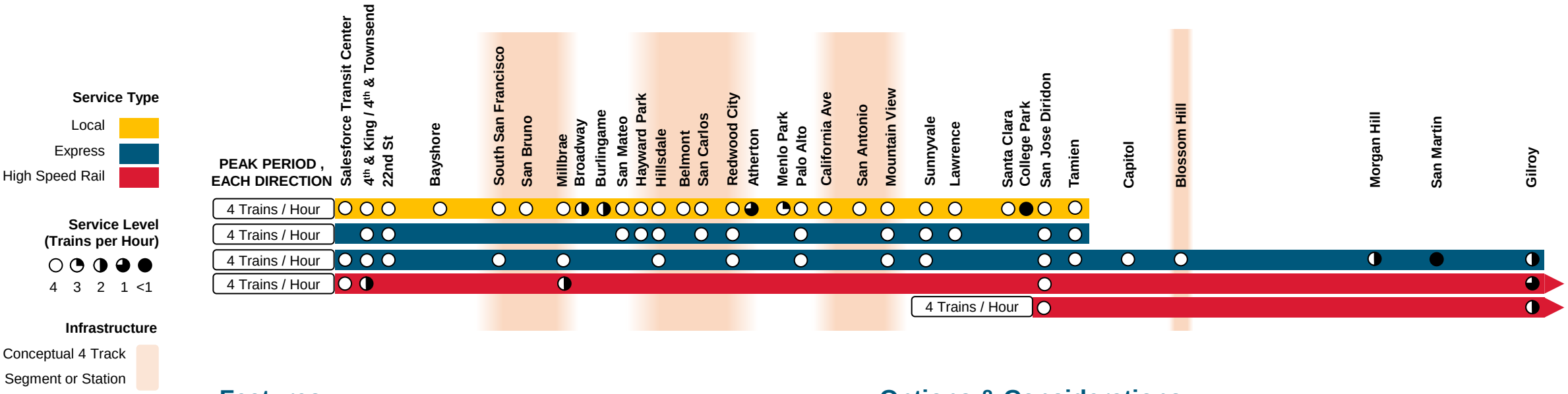
Passing Track Needs

- 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

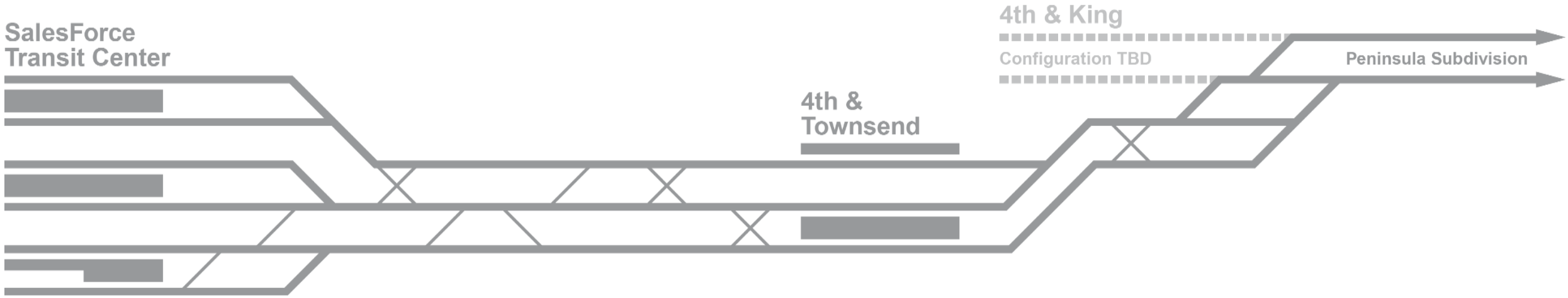
San Francisco Terminal

Key Points and Findings

- The Downtown Extension from the existing 4th & King Terminal to the Salesforce Transit Center is planned for operation in 2029 and will allow Caltrain and HSR to directly serve downtown San Francisco
- Under the Baseline Scenario all 10 trains can serve the Sales Force Transit Center
- Under the Moderate Scenario all 12 trains can serve the Salesforce Transit Center
- Under the High Growth Scenario, 12 trains can serve the Salesforce Transit Center and the remaining 4 trains would terminate at 4th & King
- All findings will be further tested and evaluated though simulation analysis

San Francisco Terminal Area

Planned Track Layout



Source: TJPA Draft Preliminary Engineering Track Plans for Phase 2 Downtown Rail Extension (October 25, 2018)

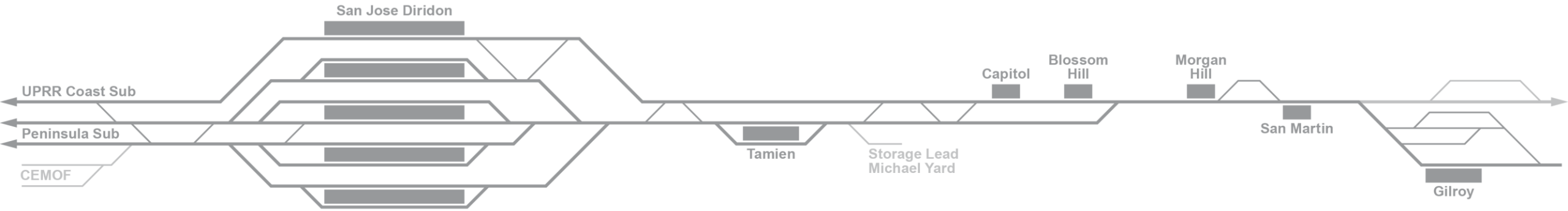
San Jose Terminal

Key Points and Findings

- Work developed in conjunction with Diridon Integrated Station Concept (DISC) Plan - some analysis is still ongoing
- All three Growth Scenarios work within concepts being considered in DISC proccess
- 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

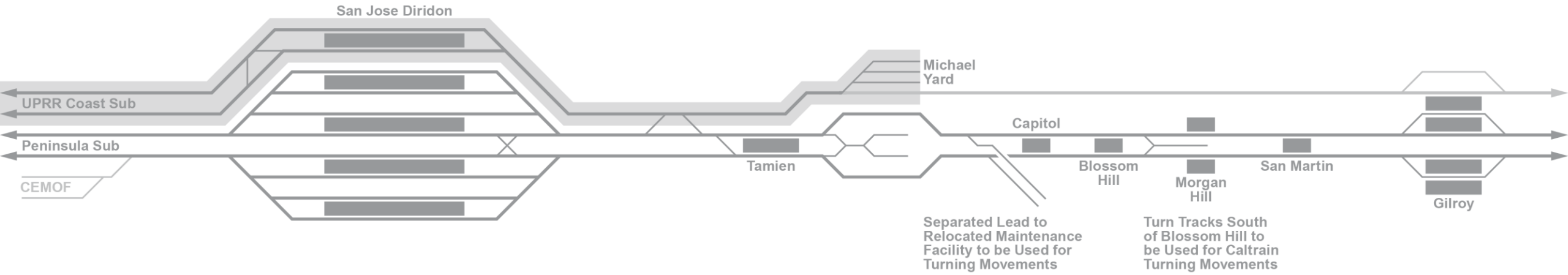
San Jose Terminal Area

Existing Infrastructure



San Jose Terminal Area

Potential Future Infrastructure (Includes changes related to HSR, Diridon Concepts + Potential infrastructure related to Business Plan)

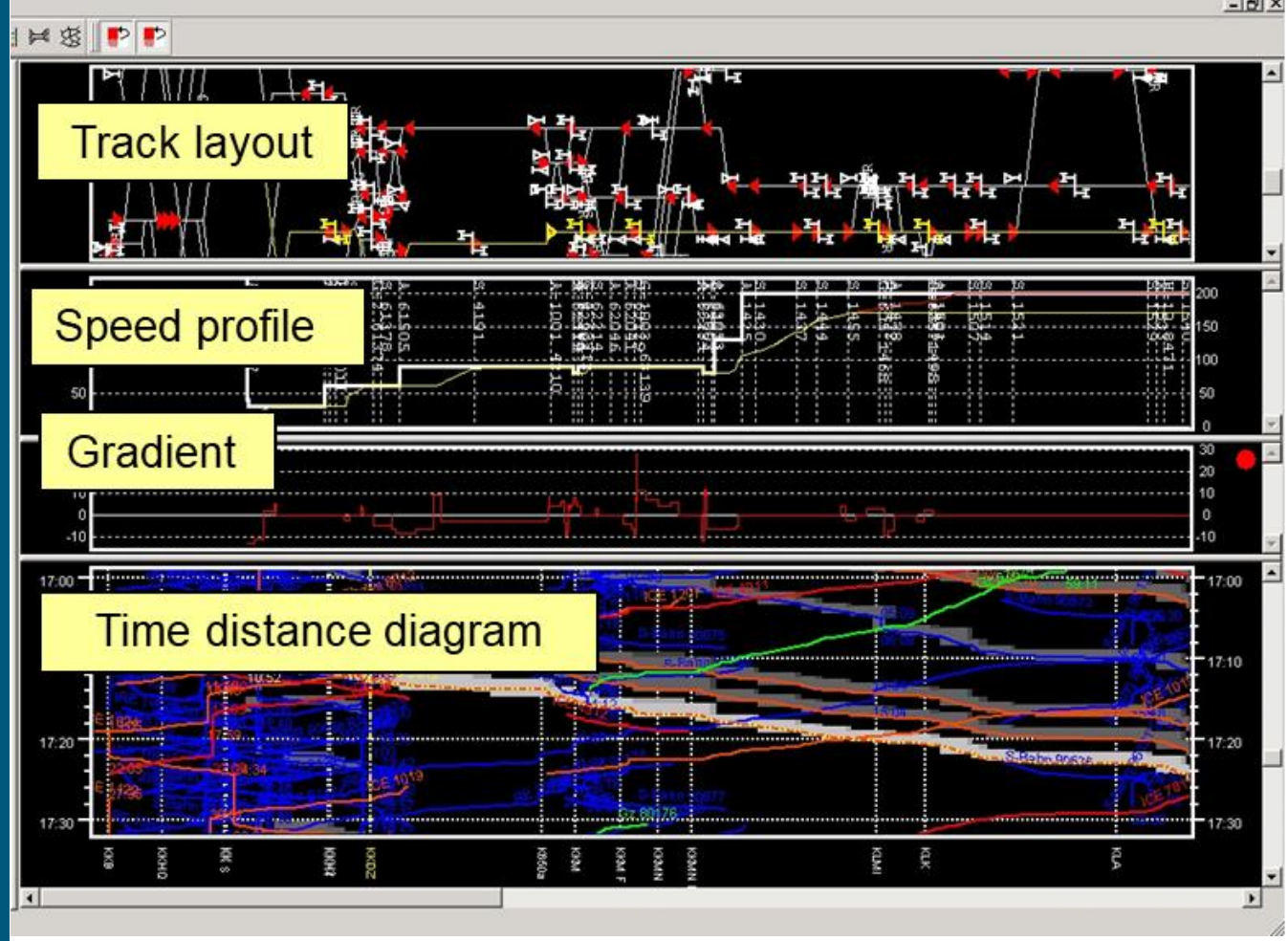


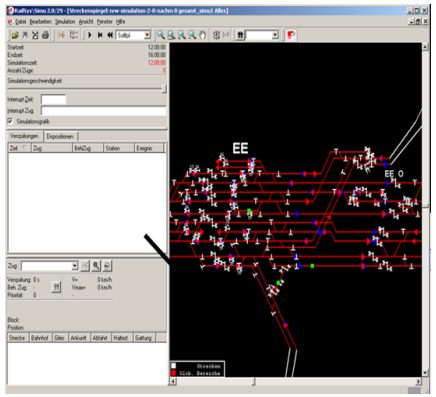
UPRR and Diesel Passenger Service Tracks (Analysis Ongoing through DISC Process)

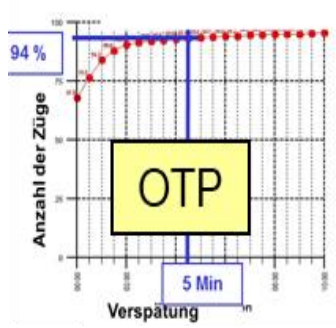
Next Steps: Simulation

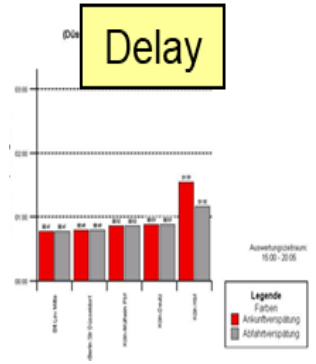
Process

- 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

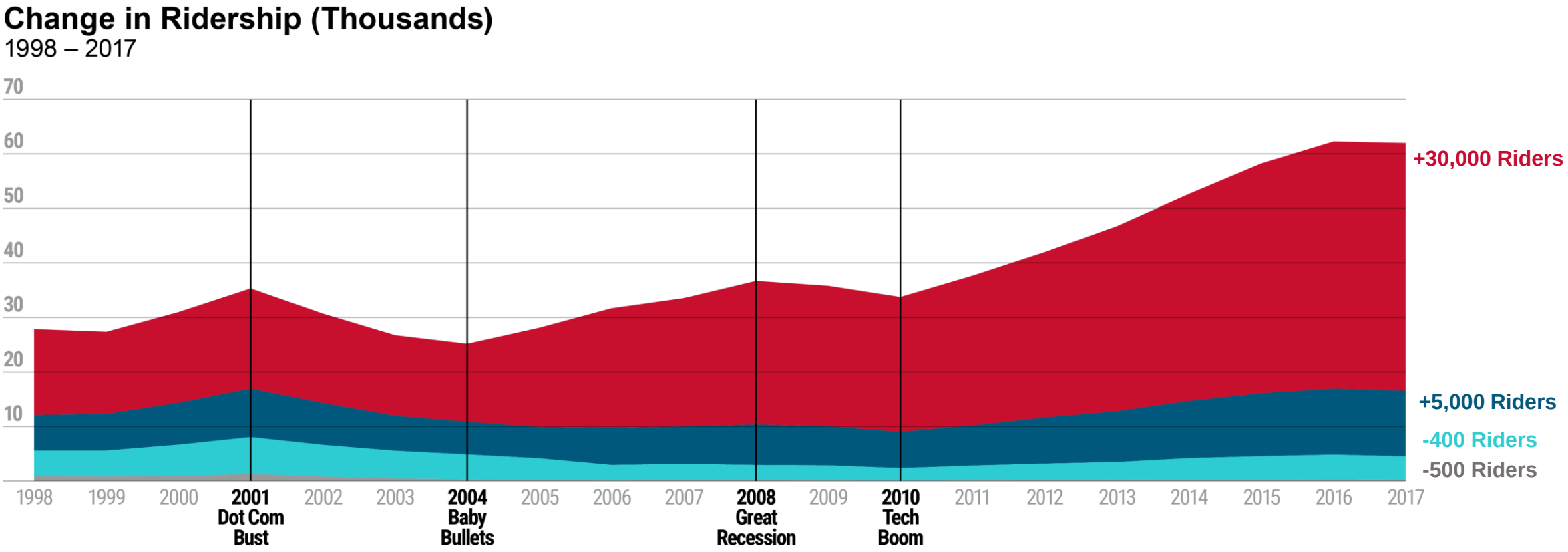
Next Steps: Explorations

Examples;

- Stopping pattern options and tradeoffs
- Dumbarton service connection in Redwood City
- East Bay run-through service via second Transbay Tube

Ridership Forecasts

Ridership Growth Over Time



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

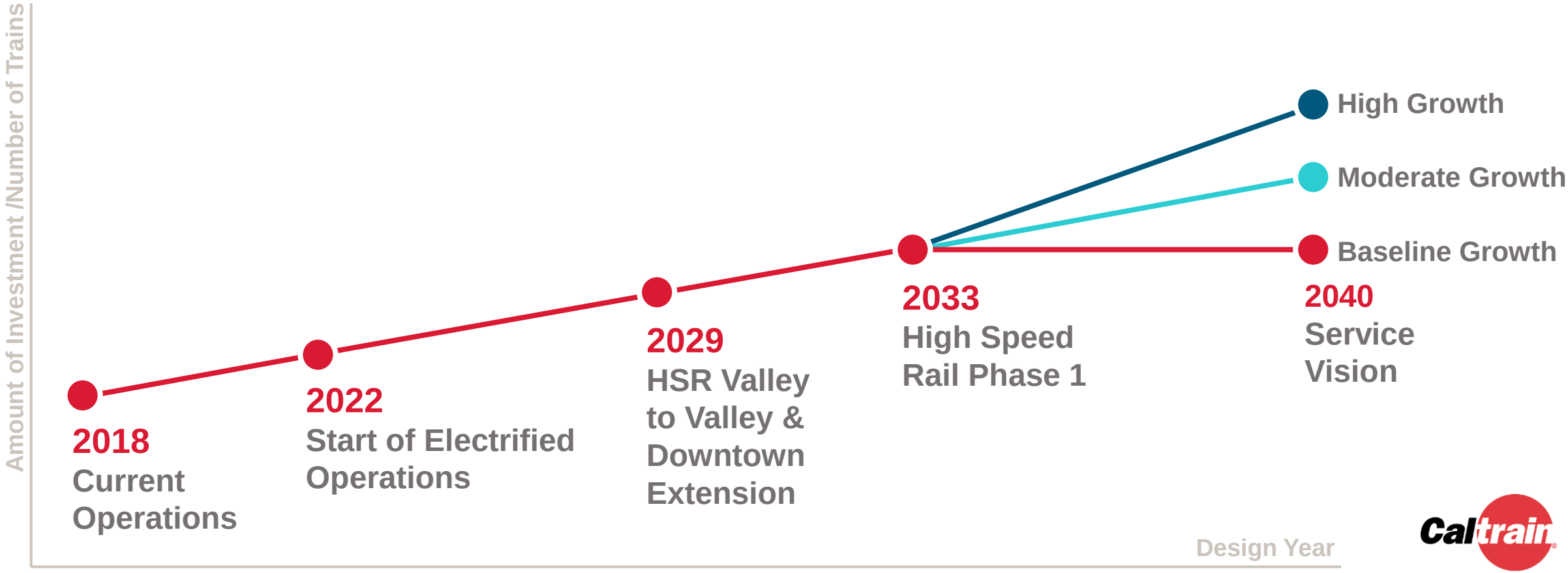
Middle 8 Stations
22nd Street, Burlingame, San Mateo, San Carlos, Menlo Park, California Ave, Santa Clara, Tamien

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

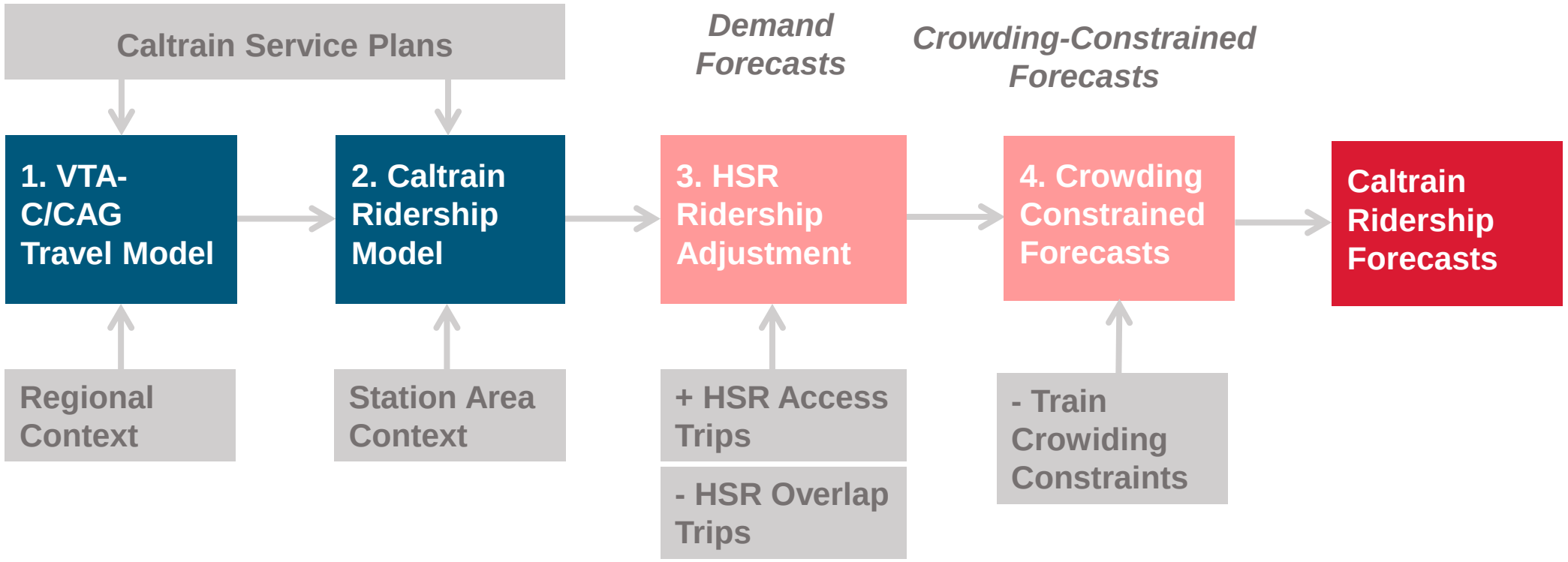
Source: 1998-2017 Passenger Counts

2040 Service Scenarios



Ridership Model Structure

Modeling Process



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

- Net Effect: adjusts ridership by station and reduces overall ridership forecast

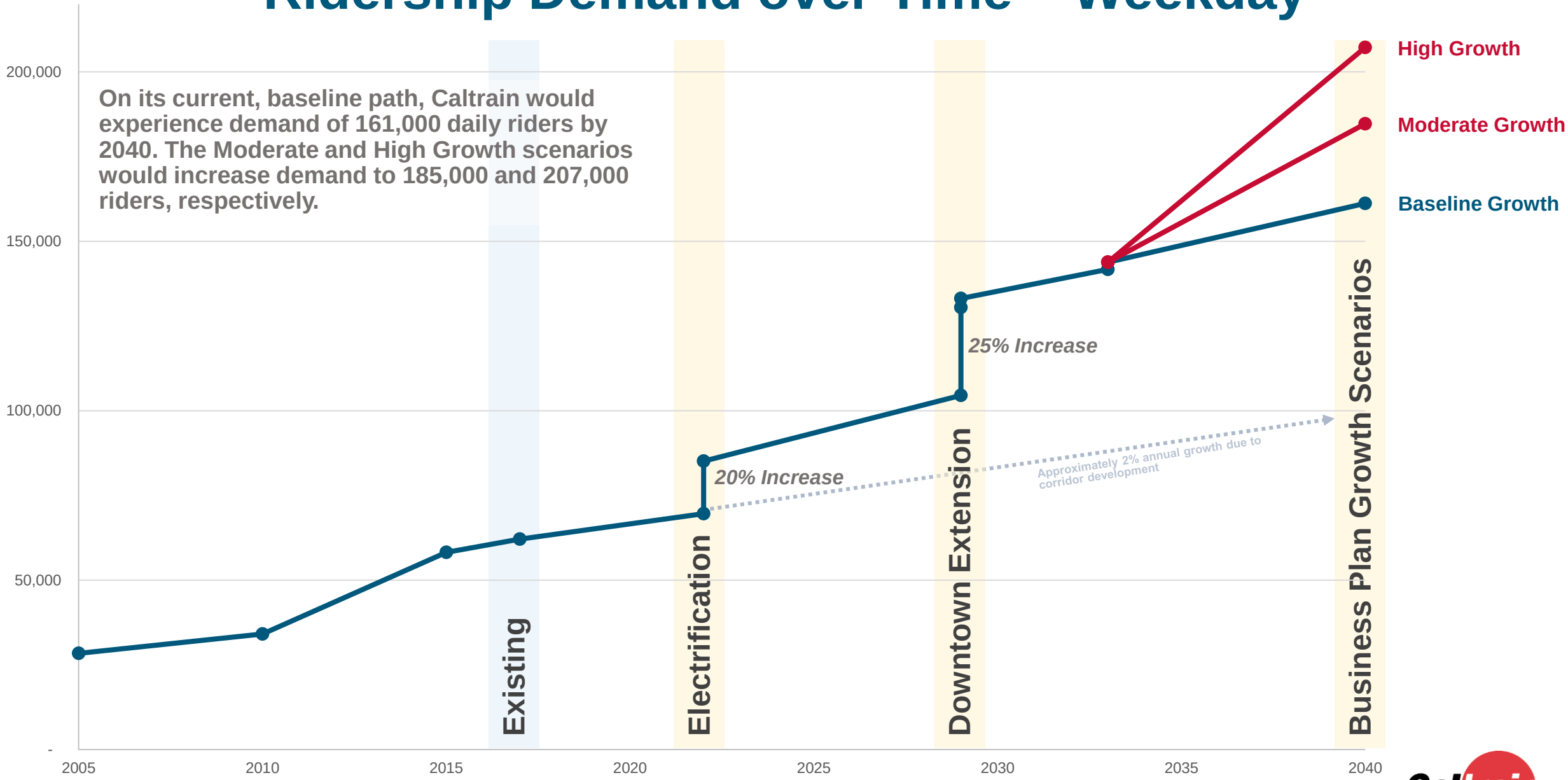
3. Account for HSR influence on Caltrain ridership

+ Net Effect: Subtracts riders on HSR ODs; adds riders as HSR access mode

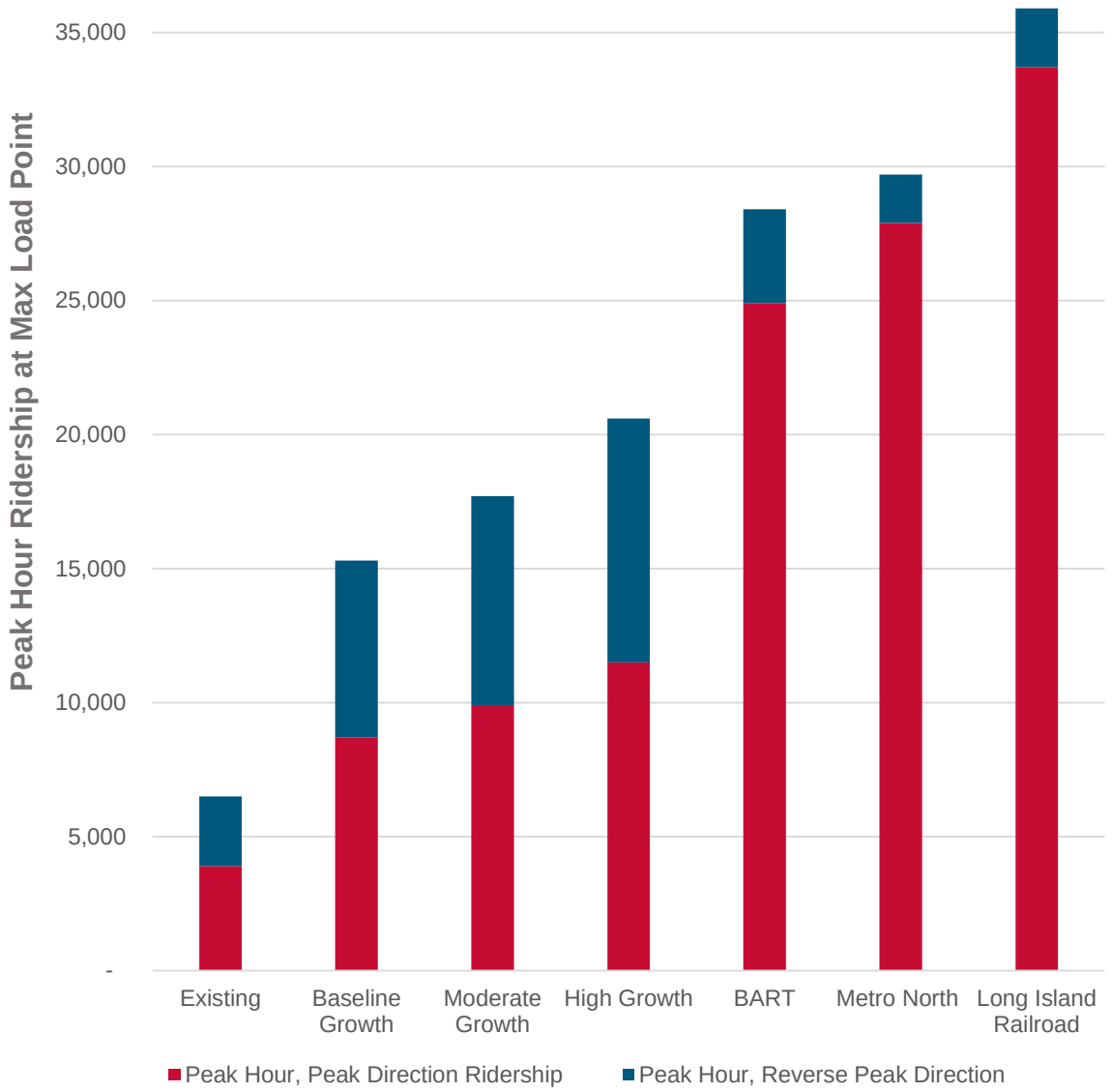
4. Constrain capacity to a comfortable crowding load of 1.35 at each segment

- Net Effect: Decrease overall Caltrain ridership for baseline and moderate growth scenarios

Ridership Demand over Time – Weekday



Peer Comparison: Ridership Demand



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

System		Daily	Peak Hour, Max Load Point	Peak % - Reverse Peak %	Peak Hour, Peak Direction Max Load Point
Caltrain	Existing	62,000	6,500	60% - 40%	3,900
	2040 Baseline	161,000*	15,300*	57% - 43%*	8,700
	2040 Moderate	185,000*	17,700*	56% - 44%*	9,900
	2040 High	207,000	20,600	56% - 44%	11,500
BART (All Lines)		414,000	28,400	88% - 12%	24,900
Metro North (Harlem & New Haven Lines)		176,000	27,900	94% - 6%	26,200
Long Island Railroad (All Lines)		350,000	35,900	94% - 6%	33,700

**Excludes capacity constraining for Baseline and Moderate*

Crowding

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

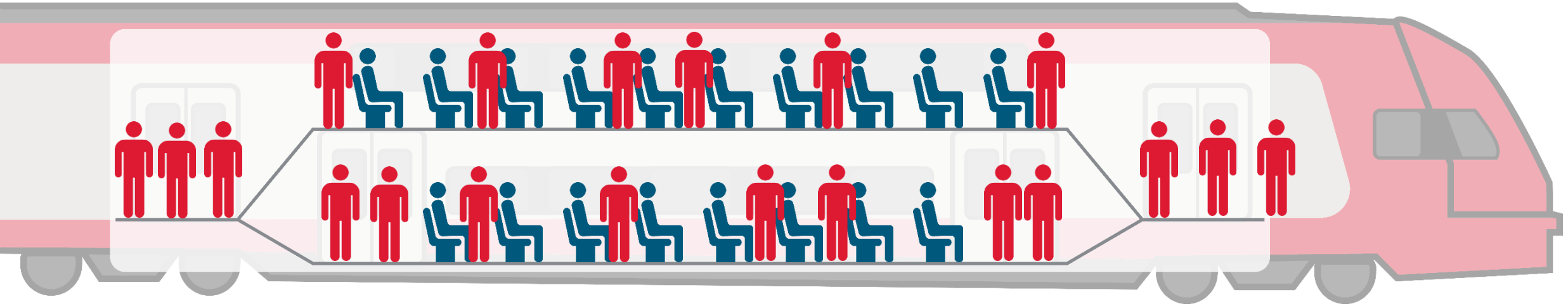
- The underlying ridership model projects demand based on land use and service levels- it does not take comfort and crowding into account

- 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 <u>Business Planning,</u> 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

Train Capacity and Crowding

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

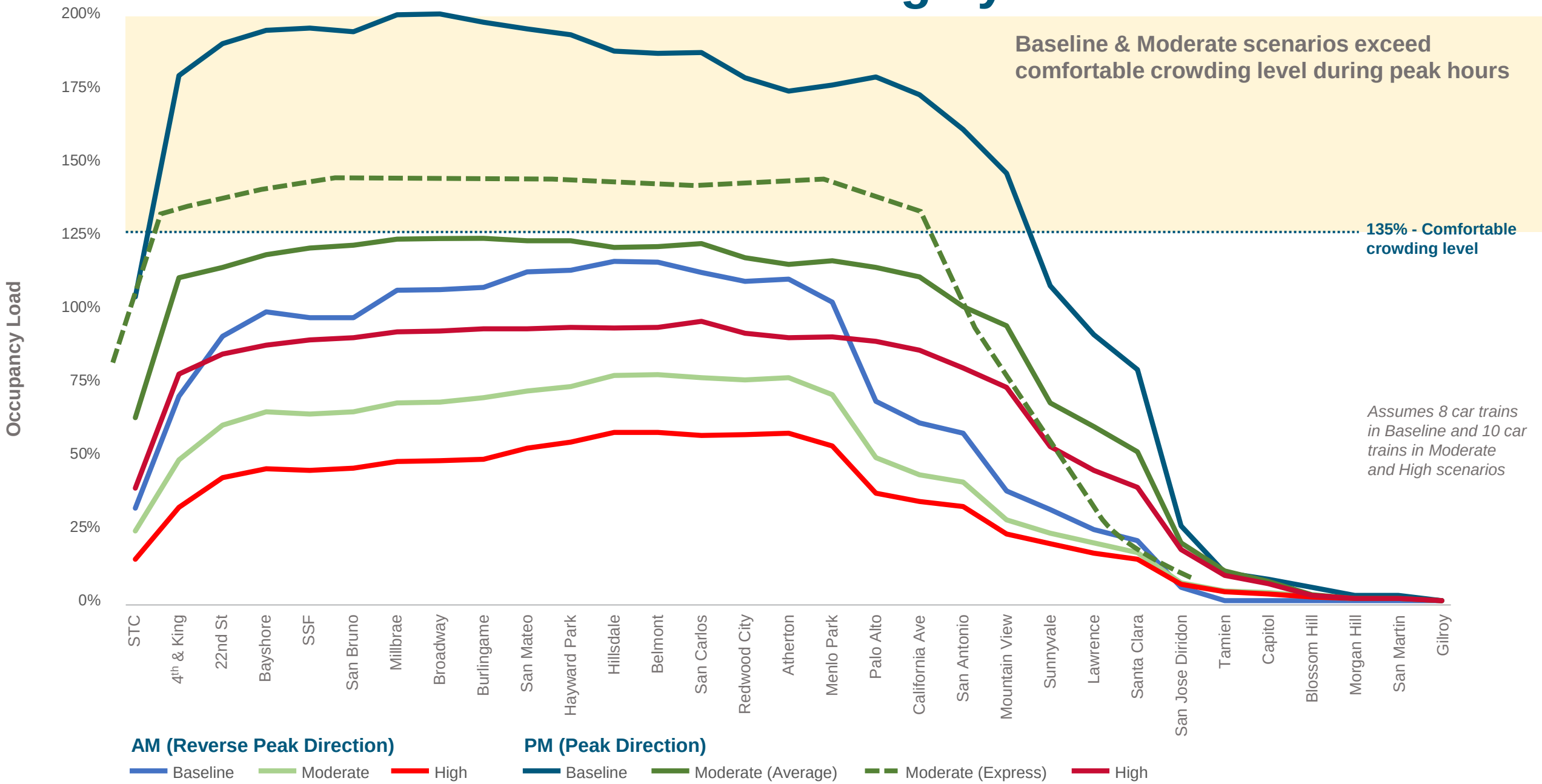


This level of occupancy roughly equates to the planning standard used for commuter rail lines into London and on S-Bahn (commuter) trains in Germany. Depending on the specific train design this level of occupancy generally equates to less than two standees per square meter of space

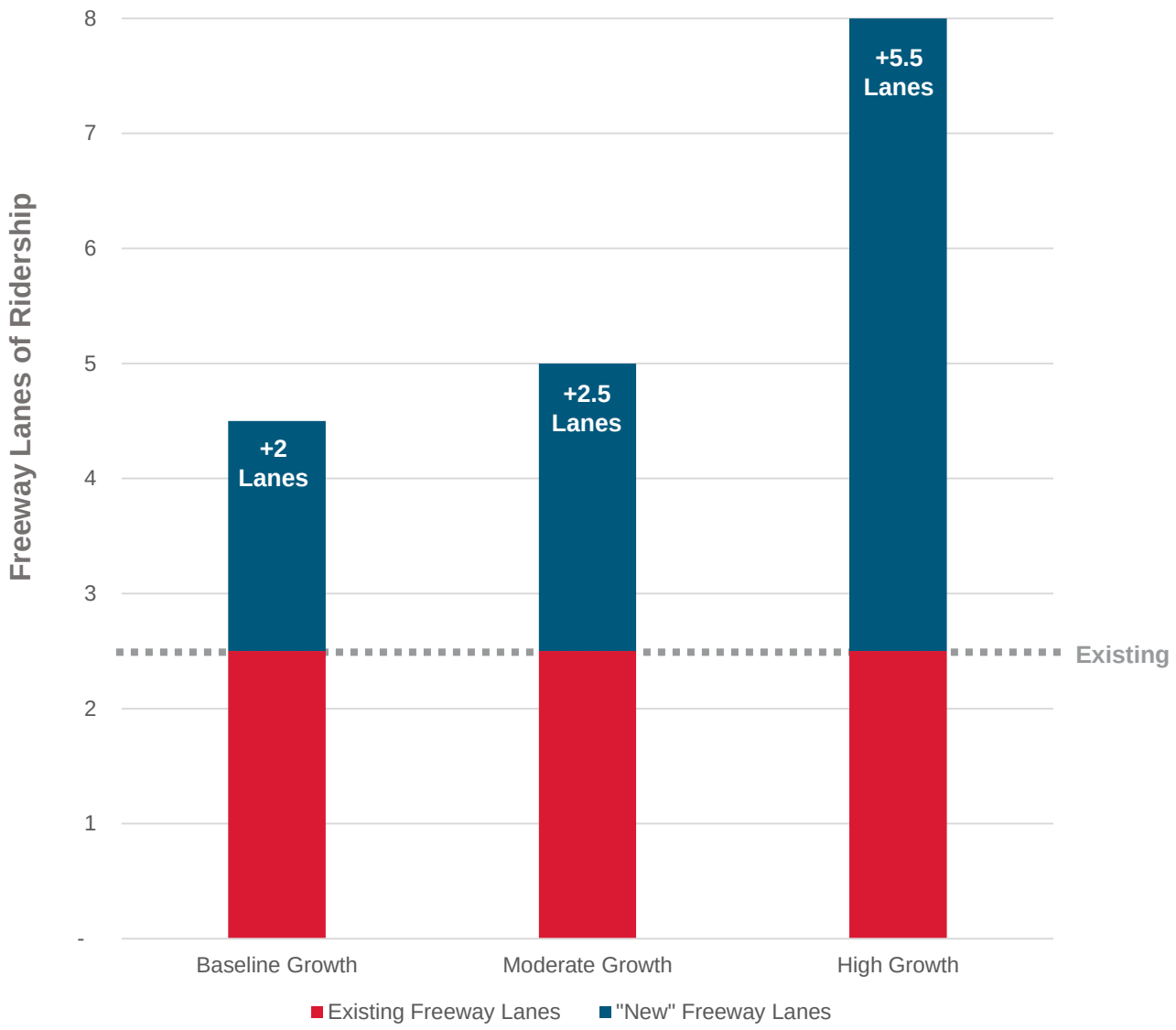
System Forecasts- Constrained for Crowding

Systemwide Boardings: Weekday Ridership				
Model Year	*Service Plan*	*Demand*	*Capacity Constrained*	*Notes*
2017	5 TPH	62,100	62,100	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.
2022	5 TPH	69,700	69,700	
	6 TPH	85,000	85,000	
2029	6 TPH	103,100	103,100	
	6 TPH (+ DTX)	130,600	124,900	
	6 TPH (+ DTX and 2 HSR)	132,900	128,900	
2033	6 TPH (+ 2 HSR)	141,700	135,700	
	6 TPH (+ 4 HSR)	143,800	137,600	
2040	Baseline 6 TPH (+ 4 HSR)	161,200	151,700	
2040	Moderate 8 TPH (+ 4 HSR)	184,800	177,200	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.
2040	High 12 TPH (+ 4 HSR)	207,300	207,300	Sufficient peak capacity and more connected local service serving off-peak and weekend demand.

2040 Peak Hour Crowding by Scenario



Rider Throughput as Freeway Lanes



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

Grade Crossings & Grade Separations

Background

Context

- 42 at-grade crossings on the corridor Caltrain owns between San Francisco and San Jose
- 28 additional at-grade crossings on the UP-owned corridor south of Tamien

At-Grade Crossing by County in Caltrain Territory

- San Francisco: 2 at-grade crossings
- San Mateo: 30 at-grade crossings
- Santa Clara: 10 at grade crossings (with 28 additional crossings on the UP-owned corridor)

Most of the data shown in this presentation pertains to the Caltrain-owned corridor north of Tamien Station

Background

History

Today, 71 of 113 crossings along the Caltrain corridor have already been separated (63%) and 12 of 30 crossings along the UP corridor have been separated (29%)

The grade separations have been constructed (and reconstructed) at various points during the corridor's 150-year history

Planning for, funding, and constructing grade separations has been a decades-long challenge for the Caltrain corridor

Bayshore Tunnels under construction, 1907

Background

History

The following grade separation projects have been completed since the JPB assumed ownership of the Caltrain Service in 1992;

- Millbrae: Millbrae Ave (1990s)
- North Fair Oaks: 5th Ave (1990s)
- Redwood City: Jefferson Ave (1990s)
- Belmont: Ralston, Harbor (1990s)
- San Carlos: Holly, Britain Howard (1990s)
- San Bruno: San Bruno, San Mateo, Angus (2014)

There is one grade separation project under construction:

- San Mateo: 25th Avenue (estimated 2021 completion)

Funding for Grade Separation provided through San Mateo County's "Measure A" sales tax (1988, 2004) has been instrumental in completing these projects, while dedicated funding has previously not been available in San Francisco or Santa Clara Counties

Background

Regulation

Caltrain understands that the requirement for grade separation set by the current regulatory framework may be out of pace with the ongoing plans and desires of many communities on the corridor

The 2040 “Vision” will consider substantially expanded investment in grade crossing improvements and separations

When is Grade Separation or Closure of a Crossing Required?

Grade crossings are regulated by the Federal Railroad Administration (FRA) and, in California, by the California Public Utilities Commission

Under current regulations, the separation or closure of an at-grade crossing is required in the following circumstances:

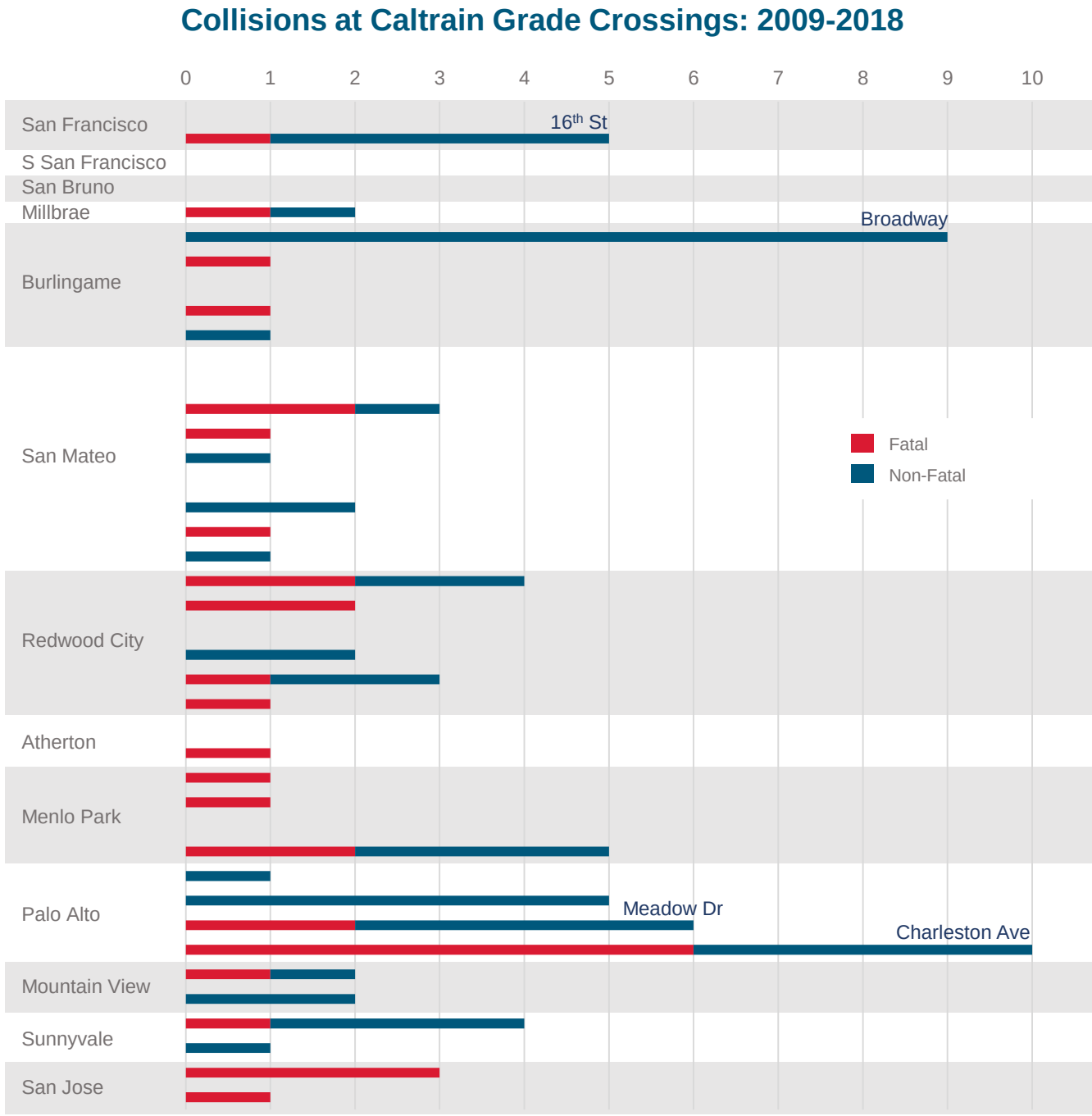
- When maximum train speeds exceed 125 mph (FRA regulation)
- When the crossing spans 4 or more tracks (CPUC guidance interpreted into Caltrain Standards)

Background

Safety

Over 80 collisions occurred at Caltrain's grade crossings in the 10 years from 2009-2018. More than 30 of these collisions involved a fatality

- 11 crossings had 0 collisions
- 8 crossings had 4 or more collisions
- 21 crossings had 1 or more fatalities



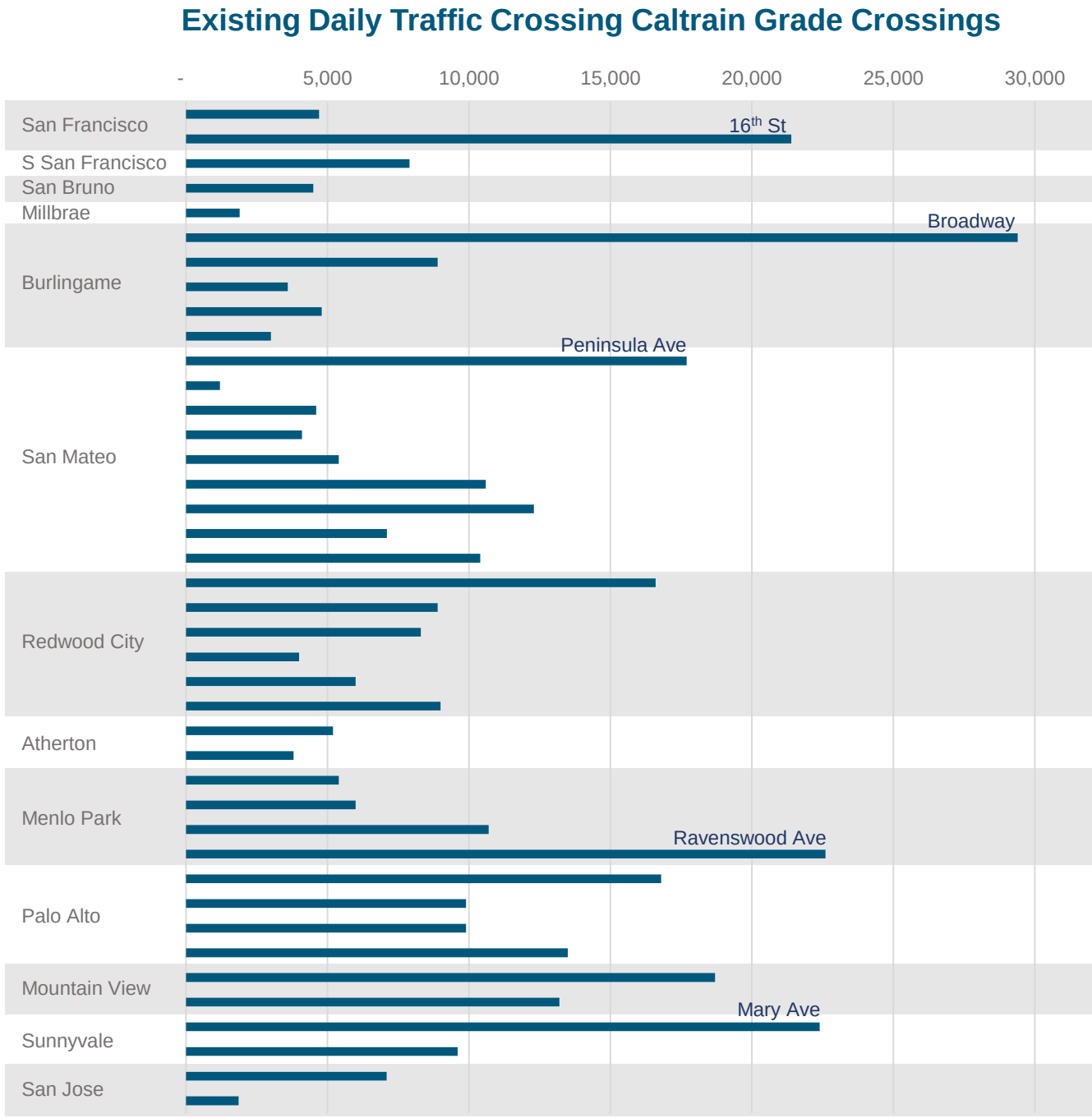
Data presented for Caltrain-owned corridor Only. Collision data from FRA reports

Background

Usage

Today, during a typical weekday, Caltrain's at-grade crossings are traversed by approximately 400,000 cars. This is equivalent to the combined traffic volumes on the Bay Bridge and San Mateo Bridge

The 10 busiest at-grade crossings account for half of all traffic volumes



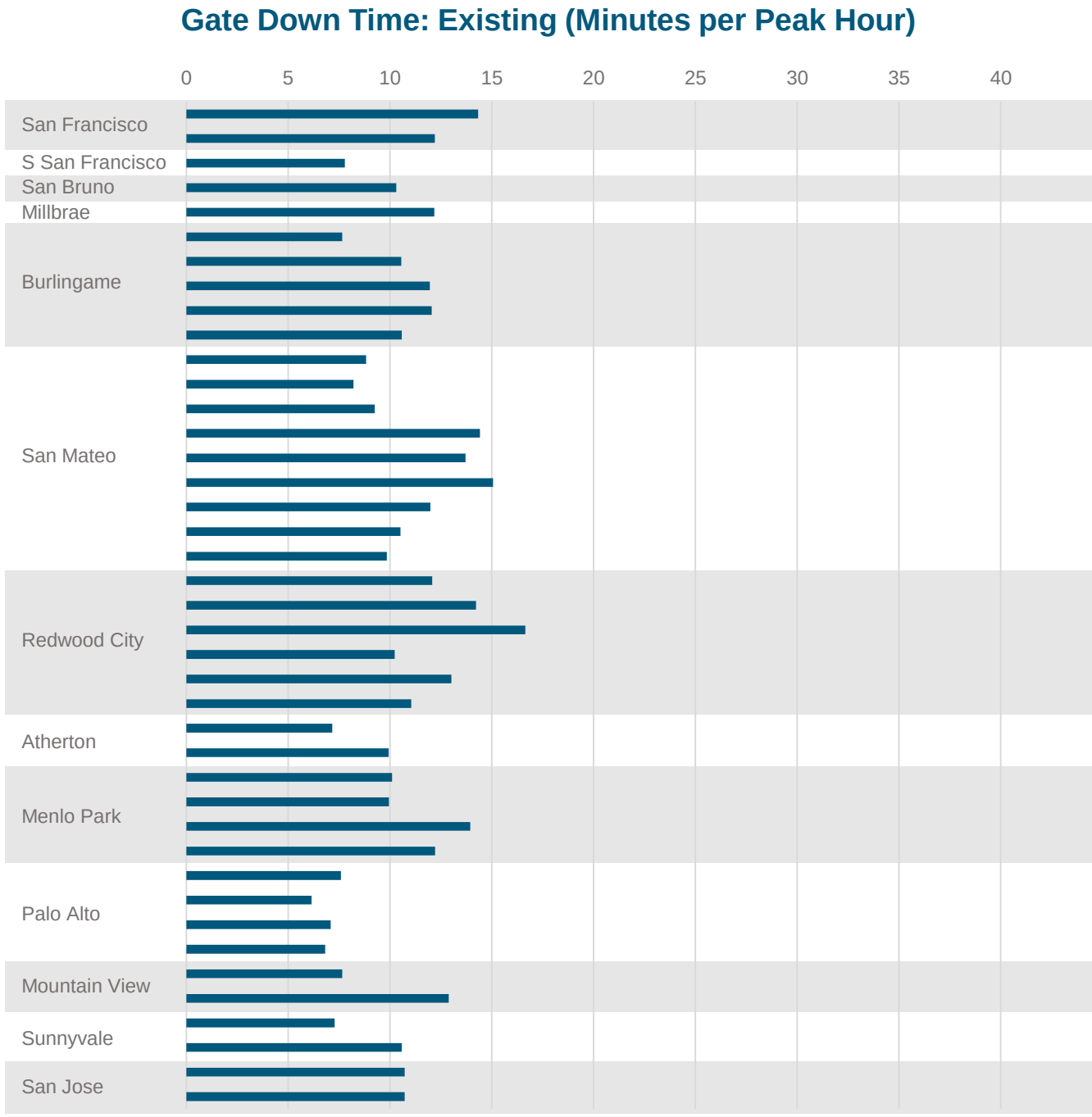
Data presented for Caltrain-owned corridor only. Data reflects 2016 ADT

Existing Gate Downtimes

Today, Caltrain's crossing gates are down for an average of about 11 minutes during the peak weekday commute hour. Gate down times range from 6 minutes up to nearly 17 minutes.

Note: Gate downtimes shown reflect the average time crossing gates are down only. Depending on individual crossing and roadway configuration traffic signals may stay red for longer and auto users may experience longer delays

Data presented for Caltrain-owned corridor only.



2040 Gate Downtimes

In 2040, projected crossing gate down times vary by scenario. This evaluation does not take into consideration planned or potential grade separations

Gate Down Time by Scenario

	Shortest	Average	Maximum
Baseline	11	17	28
Moderate	14	20	31
High	18	25	39

Minutes per Peak Hour

Note: Gate downtimes shown reflect the average time crossing gates are down only. Depending on individual crossing and roadway configuration traffic signals may stay red for longer and auto users may experience longer delays

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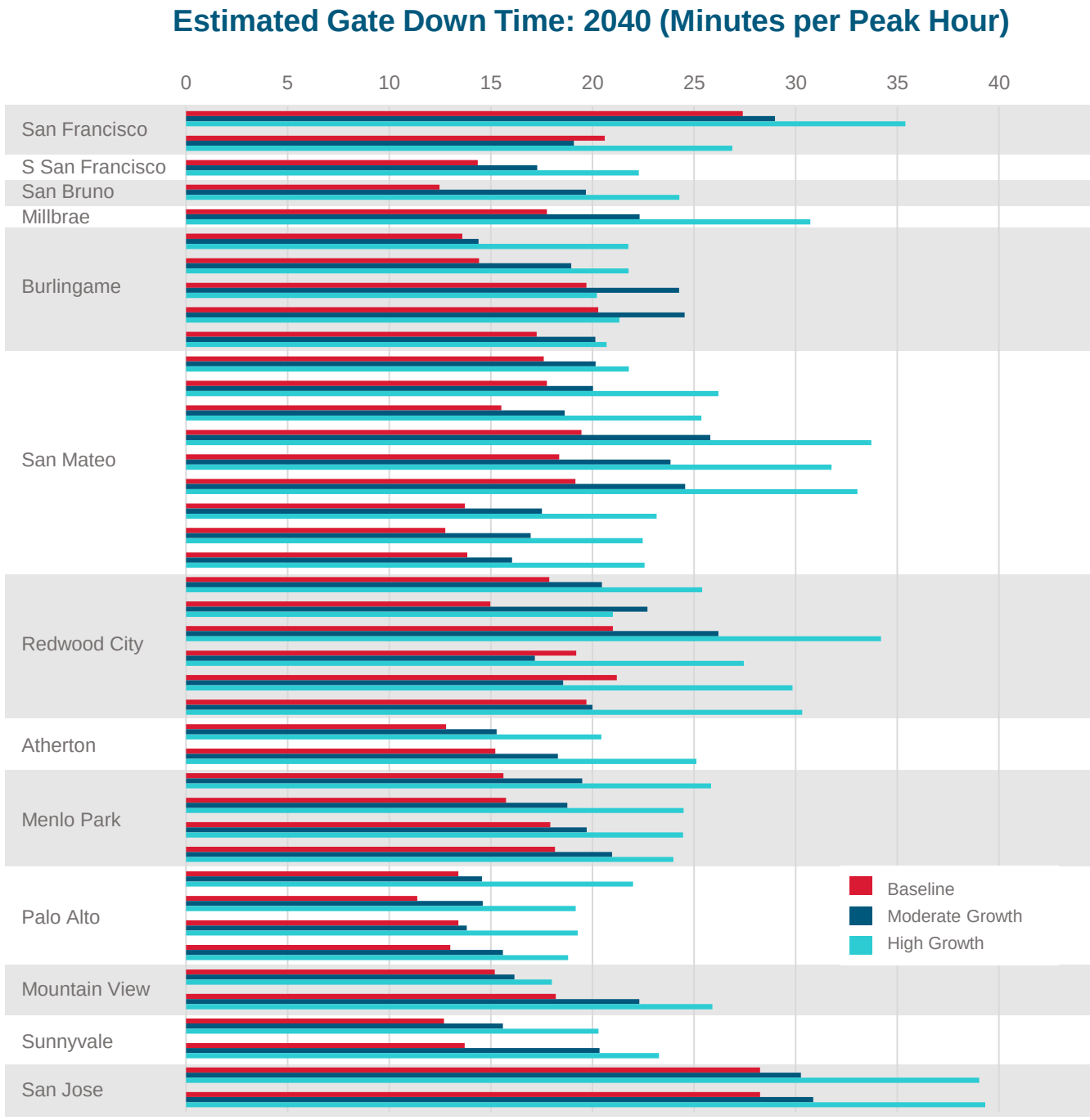


What Total Investment is Needed in Grade Separations?

The purpose of this analysis is to generate a defensible estimate of the overall financial investment in grade separations that might be needed to support different levels of future train service in the corridor

Understanding the total financial need is an essential part of developing a “business case” for increased Caltrain service – it is required to fairly represent and align the potential costs of new service with the benefits claimed

This work is not an attempt to redefine standards for grade separation nor is it intended to prescribe individual treatments or outcomes at specific crossings

Weighing the Cost of Grade Crossing Improvements

Purpose

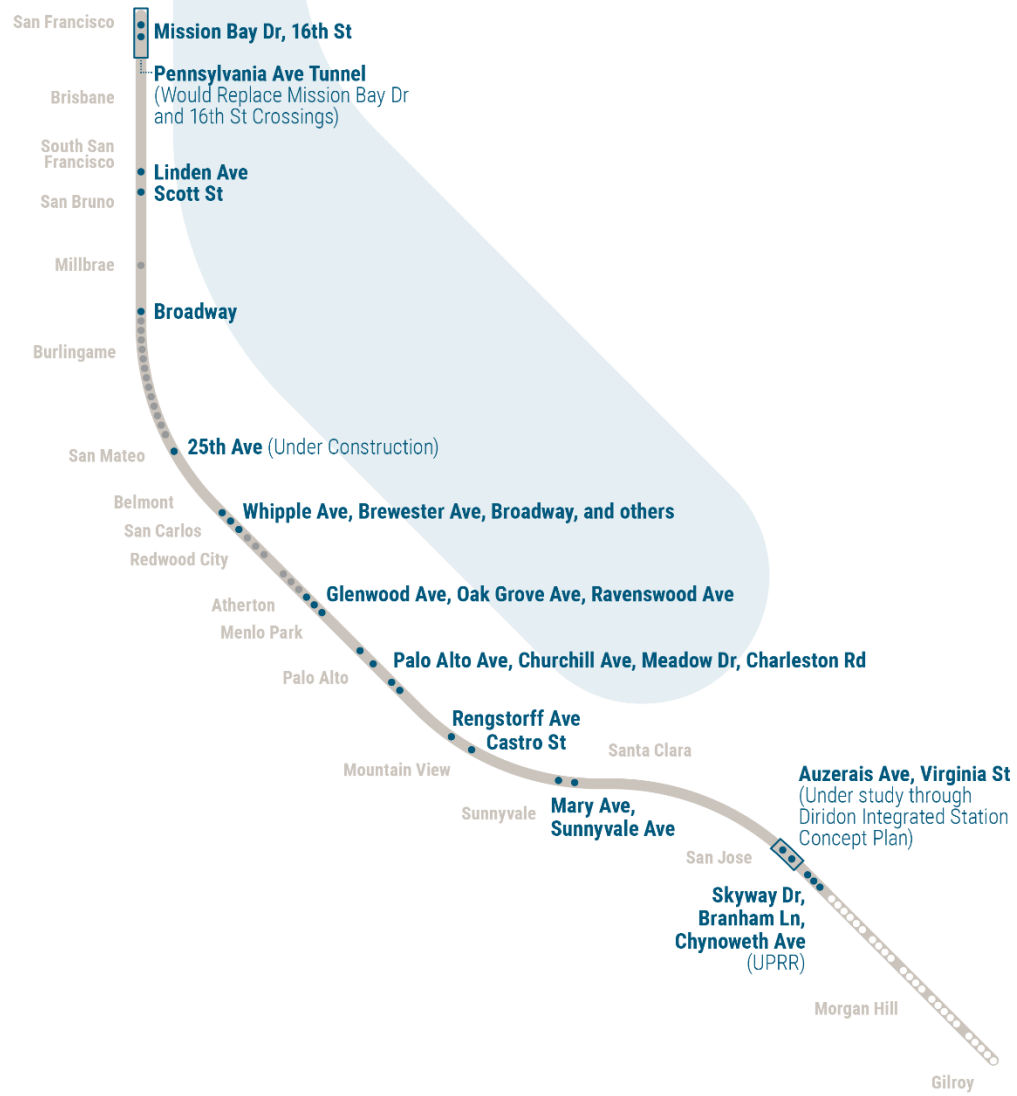
- Ensure that the overall capital costs developed for each service scenario include a reasonable level of **total, corridor wide** investment in grade separations and grade-crossing improvements

Overall Methodology

- Review and utilize and City-led plans for each grade separations or closures
- Develop generic investment types and costs for crossings where no plans are currently contemplated
- Develop ranges of potential investment costs varied by:
  - Service Scenario
  - Intensity of investment (low, medium, high)

City Studies, Plans and Projects

- Many cities along the corridor are actively planning or considering grade separations
- Each of these represents a major community effort to plan a significant and impactful project
- These projects, including their estimated and potential costs (as available), have been incorporated into the Business Plan



Building Ranges of Investment

Variation by Service Scenario

The potential need and desire for grade separations and grade crossing improvements is significant across all scenarios.

The details of potential investments will vary between scenarios based on the location and extent of 4-track segments as well as the amount of gate downtime projected

Key Variables between Scenarios

Estimated Number of Crossings in 4-Track Segments*

- Baseline : 0
- Moderate: 2
- High: 12

Estimated Gate Downtime Ranges

- Baseline: 11 – 28
- Moderate: 14 – 31
- High: 18 – 39

Minutes per Peak Hour

**A range of options are discussed for potential 4-track segments within the Moderate and High Growth service scenarios. Number of crossings impacted by 4-track segments are indicative estimates only and subject to variation based on more detailed design and feasibility studies*

Union Pacific Corridor (Tamien to Gilroy)

Caltrain does not own the Union Pacific Corridor

Plans for expanded service on this corridor are relatively new and still in flux. HSR will be the predominate user of the corridor and the details of potential future train volumes are highly dependent on HSR's future plans

For Business Planning purposes, Caltrain has proposed carrying a single general allocation cost to capture the need for grade crossing improvements on this corridor. This allocation assumes estimated costs for City-planned separations in San Jose as well as potential additional investments throughout the UP corridor

Legal Minimum

- Quad gates at all crossings
- Total costs = approx. $28M

Recommended Approach for Business Planning

- City planned separations at Skyway Dr, Branham Ln, and Chynoweth Ave
- Two additional separations
- 3 mitigated closures
- Quad gates at remaining crossings
- Total cost = approx. $1.4B

This estimate of need can be updated in conjunction with VTA and corridor cities as HSR's plans for the corridor are further solidified

Potential Planning Level Grade Crossing Cost Estimates: Low

	Type	Baseline Growth	Moderate Growth	High Growth
Total Corridor Wide Cost Estimate for Crossings	Auto	$8.4B	$8.6B	$9.6B
	Bike / Ped	$140M	$140M	$140M
	Total	**$8.5B**	**$8.7B**	**$9.7B**
Investments on JPB-owned Corridor	Quad Gates & Safety Improvements	14	14	10
	Mitigated Closure	3	3	6
	Grade Separation	24	24	25
Investments on UP-owned Corridor	Quad Gates & Safety Improvements	20	20	20
	Mitigated Closure	3	3	3
	Grade Separation	5	5	5

Builds on and accounts for costs associated with all City-led separation and closure plans

Potential Planning Level Grade Crossing Cost Estimates: Medium

	Type	Baseline Growth	Moderate Growth	High Growth
Total Corridor Wide Cost Estimate for Crossings	Auto	$8.7B	$8.9B	$10.1B
	Bike / Ped	$140M	$140M	$140M
	Total	**$8.8**	**$9.0B**	**$10.2B**
Investments on JPB-owned Corridor	Quad Gates & Safety Improvements	12	11	6
	Mitigated Closure	4	5	8
	Grade Separation	25	25	27
Investments on UP-owned Corridor	Quad Gates & Safety Improvements	20	20	20
	Mitigated Closure	3	3	3
	Grade Separation	5	5	5

Builds on and accounts for costs associated with all City-led separation and closure plans

Potential Planning Level Grade Crossing Cost Estimates: High

	Type	Baseline Growth	Moderate Growth	High Growth
Total Corridor Wide Cost Estimate for Crossings	Auto	$8.9B	$9.8B	$11.0B
	Bike / Ped	$140M	$140M	$140M
	Total	**$9.0B**	**$9.9B**	**$11.1B**
Investments on JPB-owned Corridor	Quad Gates & Safety Improvements	10	5	0
	Mitigated Closure	5	8	11
	Grade Separation	26	28	30
Investments on UP-owned Corridor	Quad Gates & Safety Improvements	20	20	20
	Mitigated Closure	3	3	3
	Grade Separation	5	5	5

Builds on and accounts for costs associated with all City-led separation and closure plans

Next Steps on Grade Separations

There is a significant body of work remaining to address the issue of at grade crossings in the Caltrain corridor

Caltrain plans to continue advancing a corridor wide conversation regarding the construction, funding and design of grade separations while continuing to support the advancement of individual city-led projects

Within the Business Plan

- Incorporate grade crossing investment estimates into overall corridor costing and business case analysis
- Continue peer review of corridor wide grade separation case studies and examples

Beyond the Business Plan

- Develop corridor wide grade separation strategy, potentially addressing;
  - Risk assessment and prioritization factors
  - Construction standards and methods
  - Project coordination and sequencing
  - Community resourcing and organizing
  - Funding analysis and strategy

For individual City projects

- Continue working with cities and county partners to support advancement of individual grade separation plans and projects

Outreach Activities to Date

July 2018 – April 2019 Timeline

	2018 July	Aug	Sept	Oct	Nov	Dec	2019 Jan	Feb	Mar	Apr
Local Policy Maker Group	●	●	●		●	●		●	●	●
City/County Staff Coordinating Group	●	●	●		●	●		●	●	●
Project Partner Committee	●	●	●	●	●	●	●	●	●	●
Community Jurisdiction Meetings (One Per Jurisdiction)			●	●	●				●	●
Stakeholder Advisory Group				●			●			●
Partner General Manager				●			●			●
Website & Survey Launch					●					
Community Meetings (SPUR SJ & SF, Friends of Caltrain, Reddit TownHall)					●		●	●	●	
Sister Agency Presentations (SFCTA, SF Capital Planning, TJPA, SamTrans, SMCTA, CCAG, VTA, MTC)					●	●	●	●	●	●

Outreach Activities to Date

July 2018 – April 2019 by the Numbers

Stakeholders Engaged

21
Jurisdictions

26
Public Agencies

113
Stakeholder Meetings

93
Organizations in Stakeholder Advisory Group

Public Outreach

30
Public Meetings and Presentations

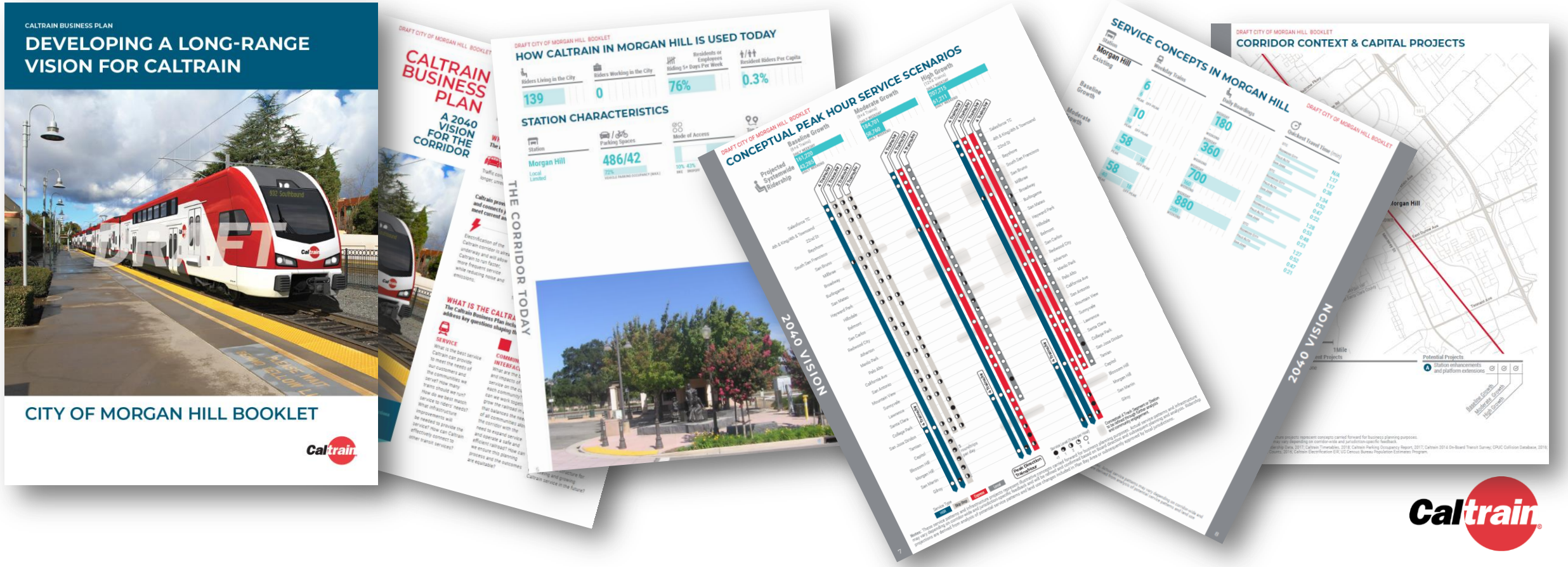
1,000+
Survey Responses

8,500+
Website Hits

27,000
Social Media Engagements

Engagement with Local Jurisdictions

Individual Meetings and Individualized Materials for 21 Local Jurisdictions



Next Steps

Next Steps

Over the next two months the Business Plan team is working to complete a full set of draft materials to support Board consideration and adoption of a 2040 Service Vision

Following Board designation of a long range “Service Vision” staff will work to complete a full Business Plan document by the end of 2019

Ongoing Analysis

- Capital costing and Operations and Maintenance Analysis
- Economic analysis and benefits calculations
- Organizational assessment
- Community Interface documentation and peer case studies

Upcoming Milestones

- Major Board Workshop in July to review expanded set of materials and discuss recommended “Service Vision”
- Subsequent adoption of Service Vision in August timeframe pending Board discussion and stakeholder feedback

FOR MORE INFORMATION

WWW.CALTRAIN.COM