Caltrain Business Plan

APRIL 2019

LPMG

April 25, 2019

Continuing 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

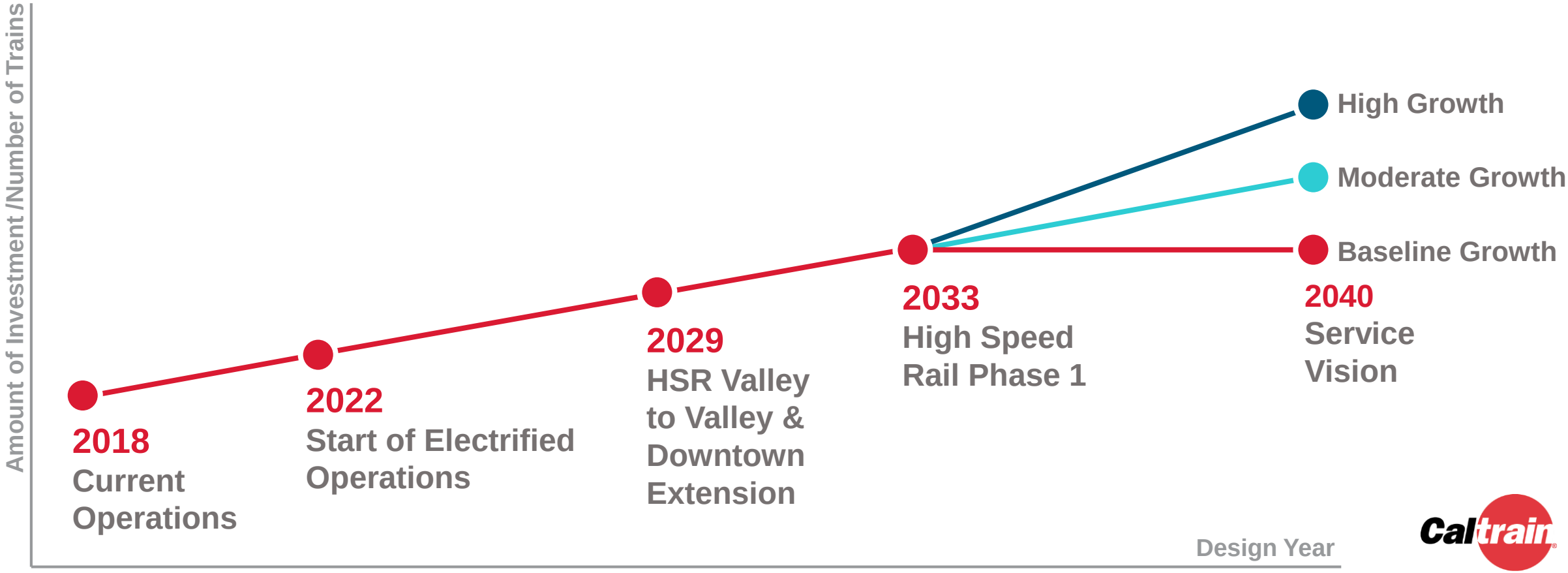
- Benefits and impacts to surrounding communities
- Corridor management strategies and consensus building
- Equity considerations

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

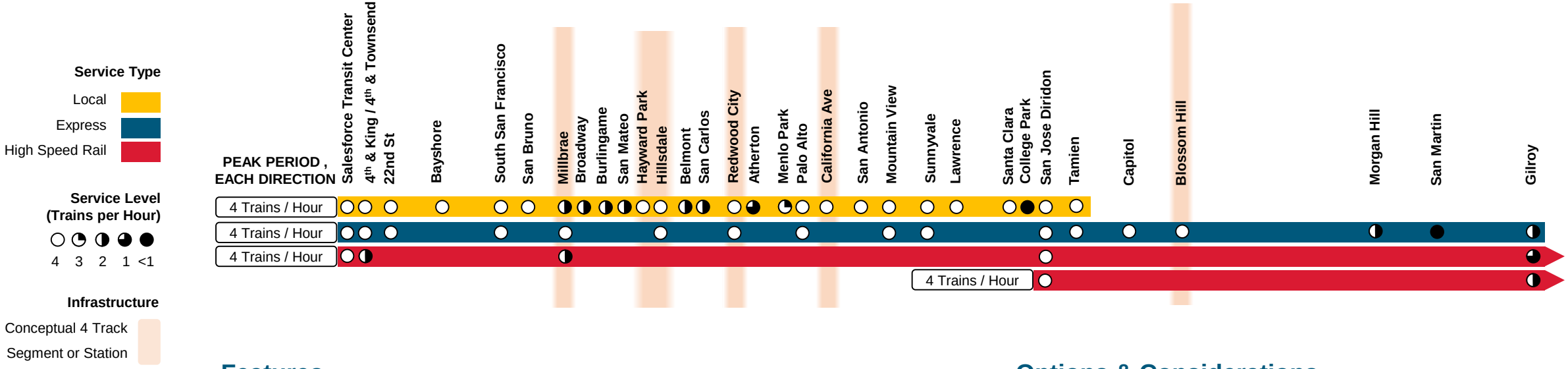
Passing Track Needs

- 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

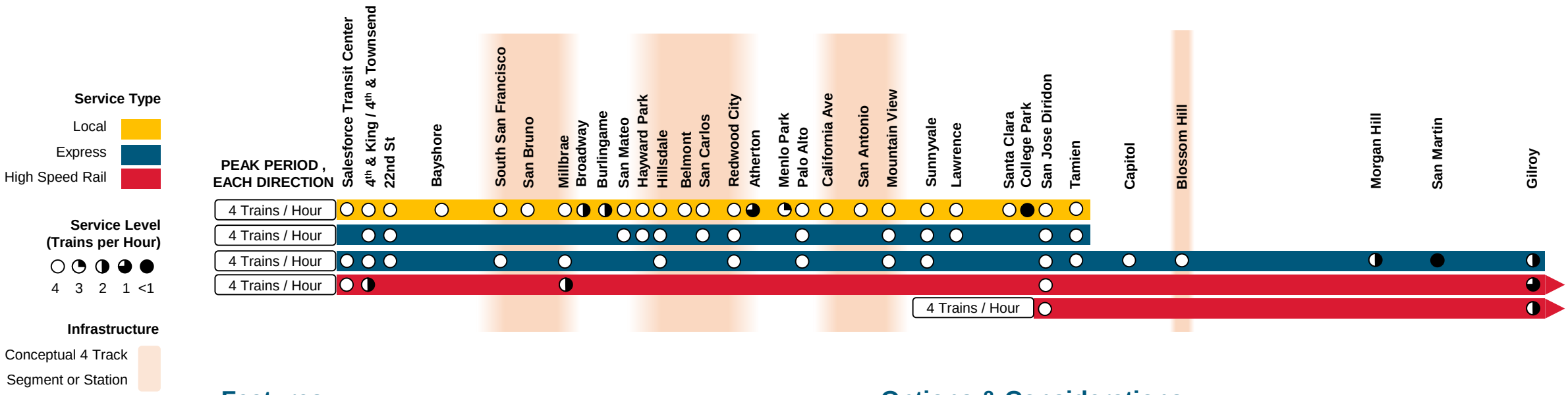
Passing Track Needs

- 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

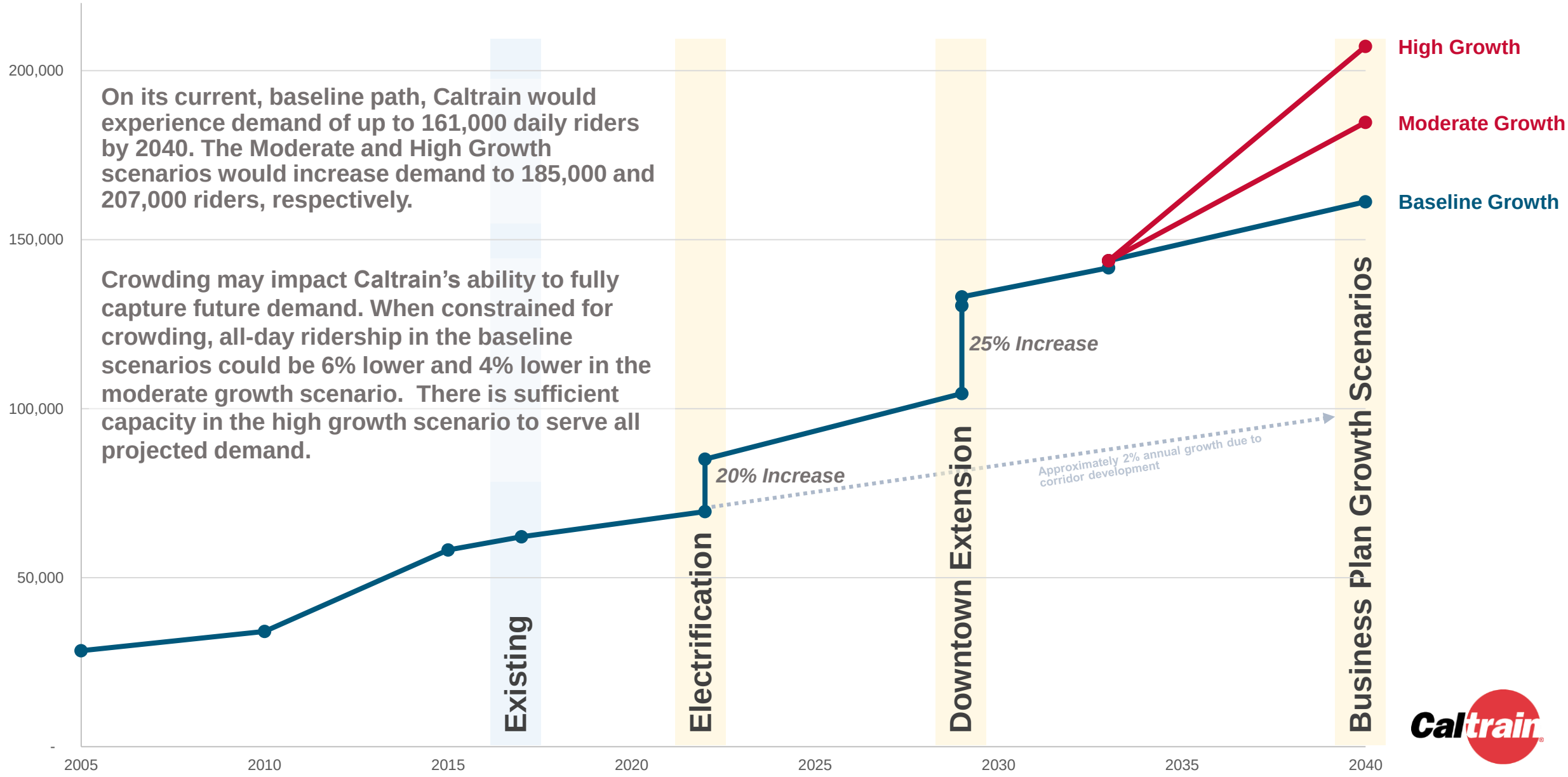
Passing Track Needs

- 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)

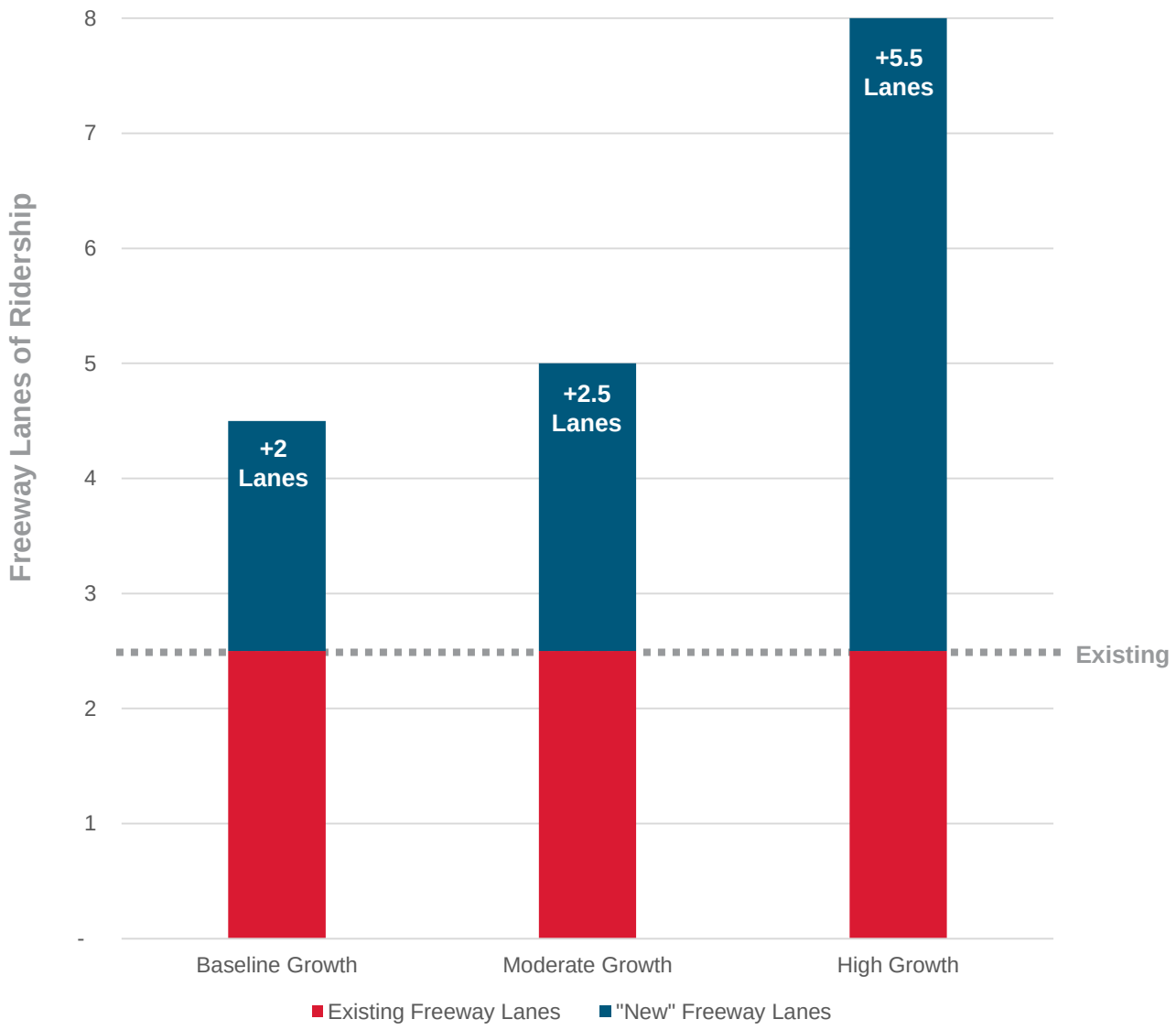
Options & Considerations

- 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

Ridership Projections



Peak Hour 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

Purpose

- Provide a corridor wide background and perspective on at-grade crossings and grade separations
- Discuss ongoing city-led grade separation plans and projects
- Quantify the range of investment in grade crossings to be incorporated into the 2040 “Service Vision”
- Discuss next steps

Background

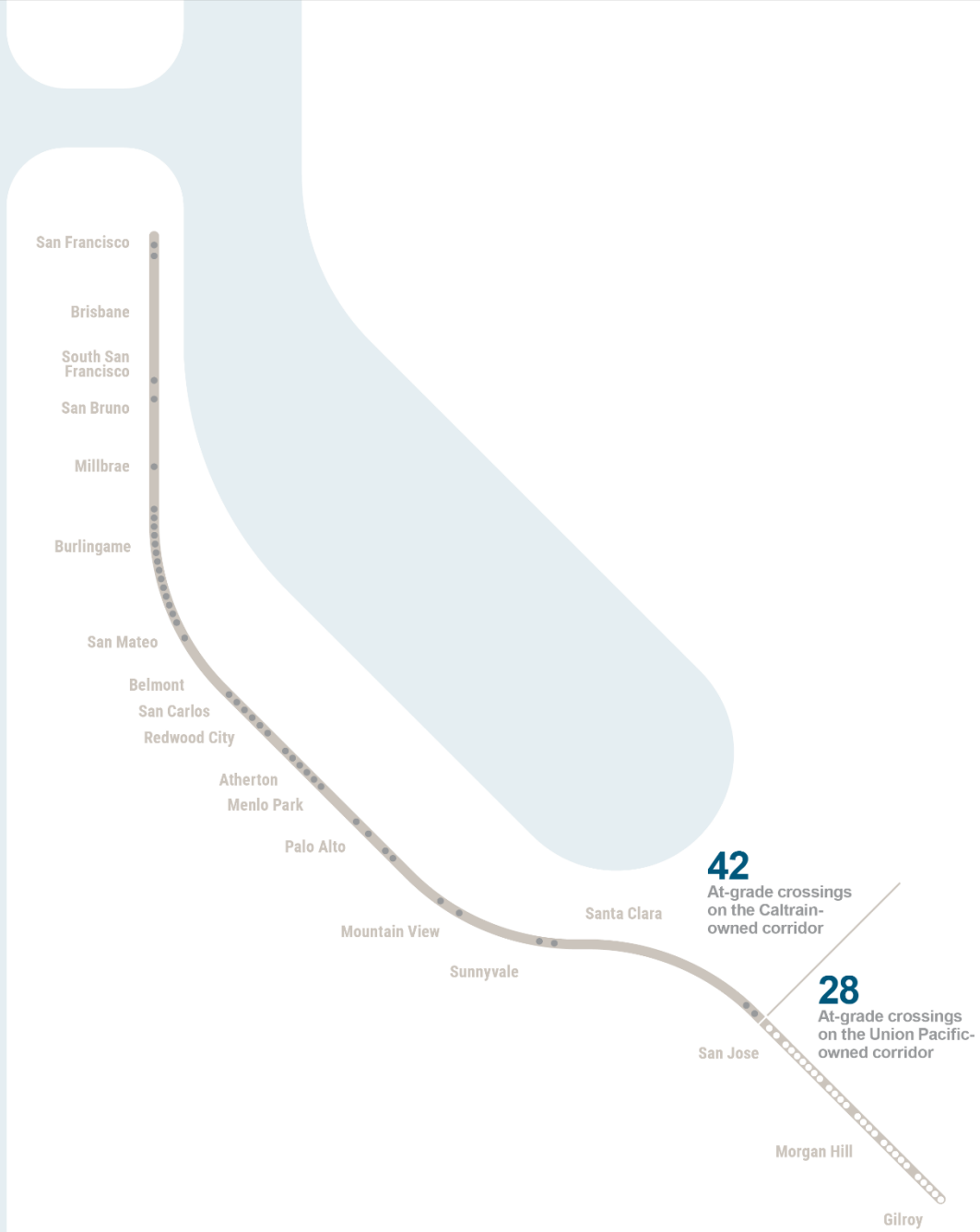
Context

- 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

Grade Separations Have Been an Enduring Challenge

"In 1929, Palo Alto City Mayor, C.H. Christen, and Stanford University Engineering Professor Emeritus, W.F. Durand, organized political leaders from San Francisco, San Mateo, and Santa Clara counties to form the Peninsula Grade Crossing Conference, also referred to as the Peninsula Grade Crossing Association. Professor Durand and the association, with help from the San Francisco City Engineer, Southern Pacific Railroad, and the California Railroad Commission, studied the grade crossing situation on the San Francisco Peninsula throughout 1930 and sought ways to eliminate grade crossings.

In 1931, the association's engineering subcommittee released a detailed, $9 million two-phase proposal to eliminate grade crossings on the peninsula. The "Primary Program" of the plan called for construction of grade separations at the 15 most traveled and hazardous grade crossings and closure of the 17 least important grade crossings. The "Secondary Program" would have completed the elimination of all major grade crossings in San Francisco, San Mateo, and Santa Clara counties. The conference's aim was to permit travelers to cross railroad tracks only via grade separations. At an average cost of $270,000 per grade separation, the Peninsula Grade Crossing Conference proposed legislation to fund these projects through a portion of the state's gasoline tax."

- *Historic Context Statement. Roadway Bridges of California 1936-1959. Published by Caltrans in 2003*

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)

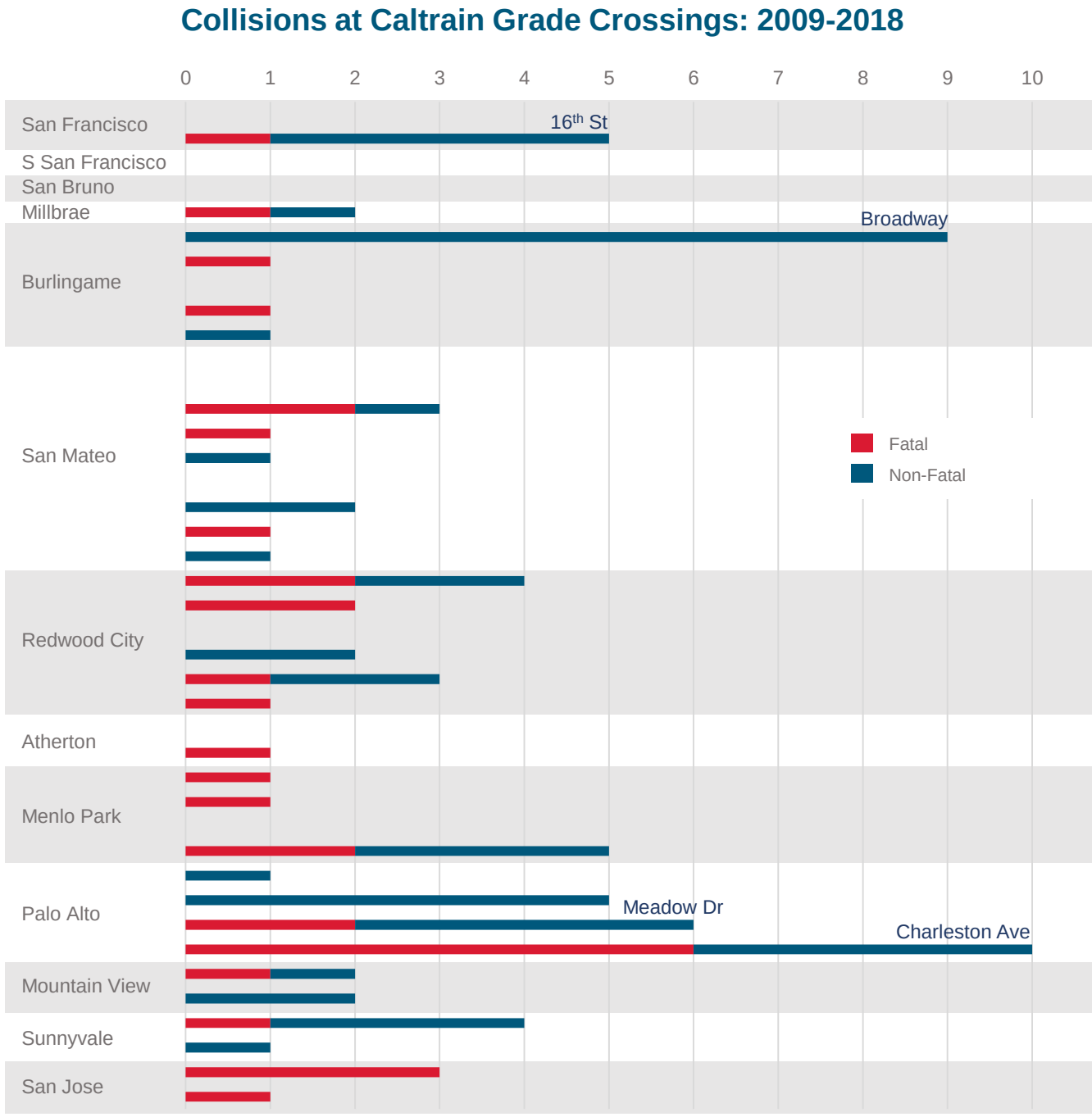
Funding for Grade Separation provided through San Mateo County's "Measure A" sales tax (1988, 2004) has been instrumental in completing these projects, while dedicated funding has previously not been available in San Francisco or Santa Clara Counties

Background

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



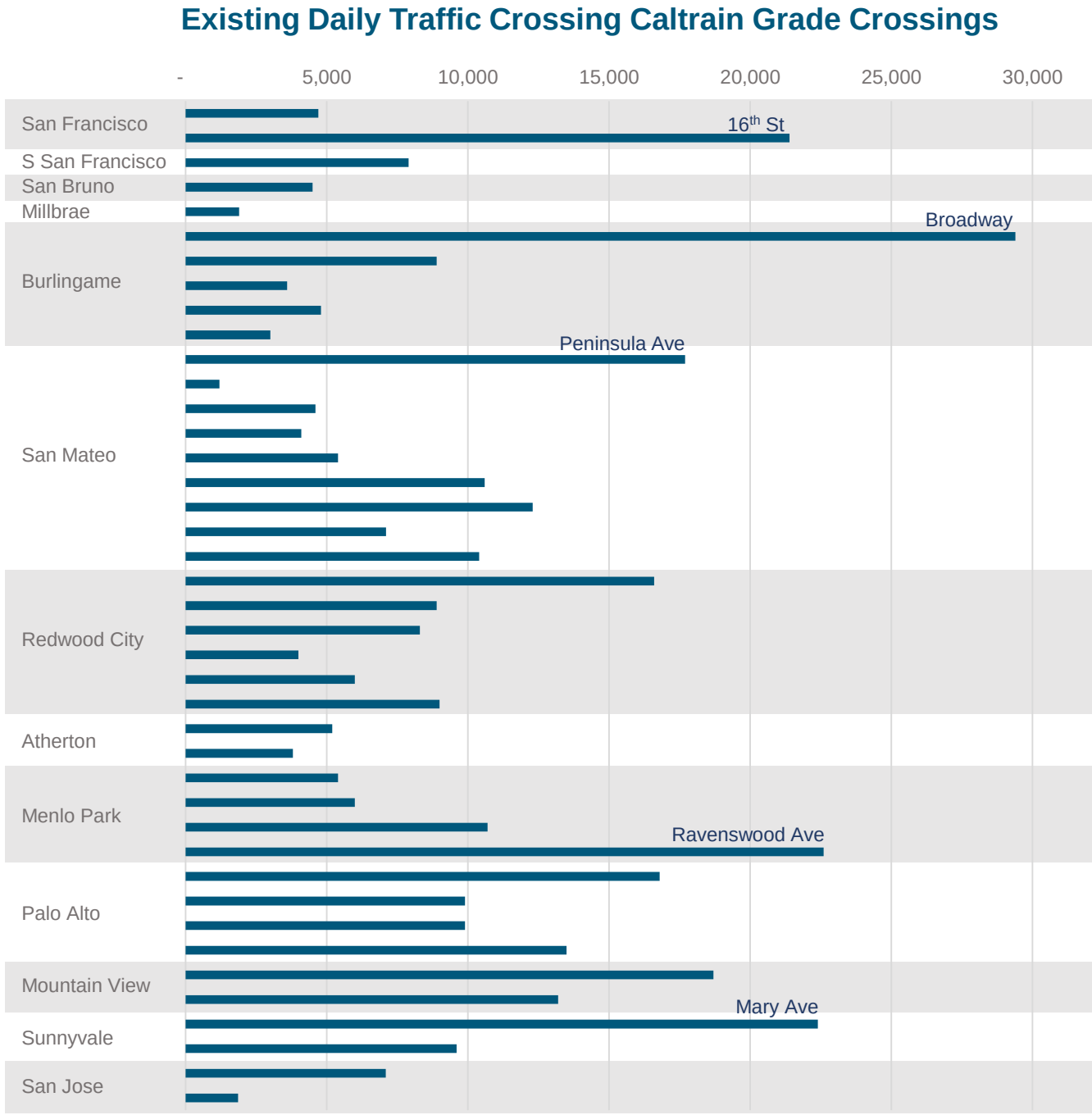
Data presented for Caltrain-owned corridor Only. Collision data from FRA reports

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

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:

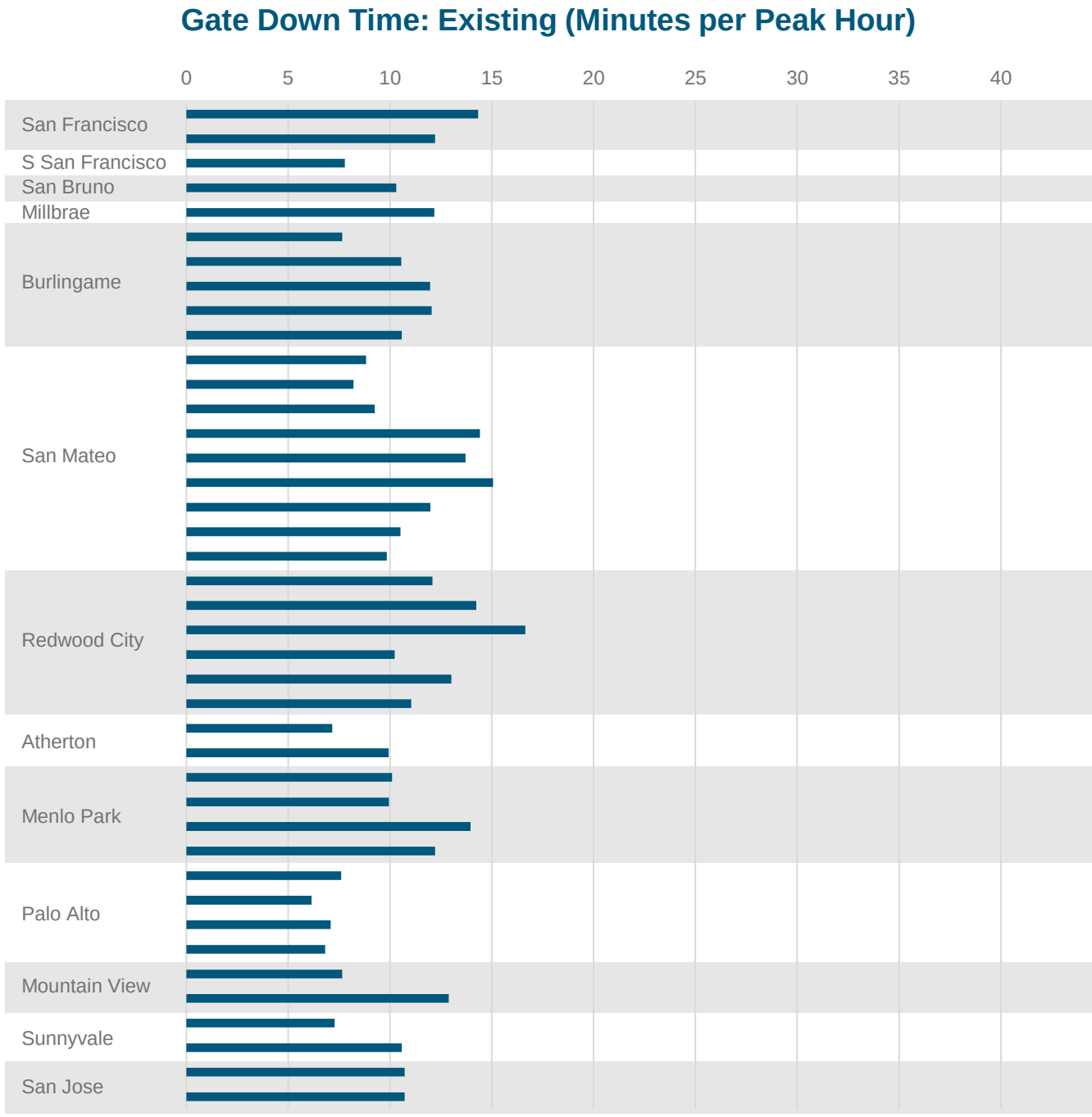
- When maximum train speeds exceed 125 mph (FRA regulation)
- When the crossing spans 4 or more tracks (CPUC guidance interpreted into Caltrain Standards)

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

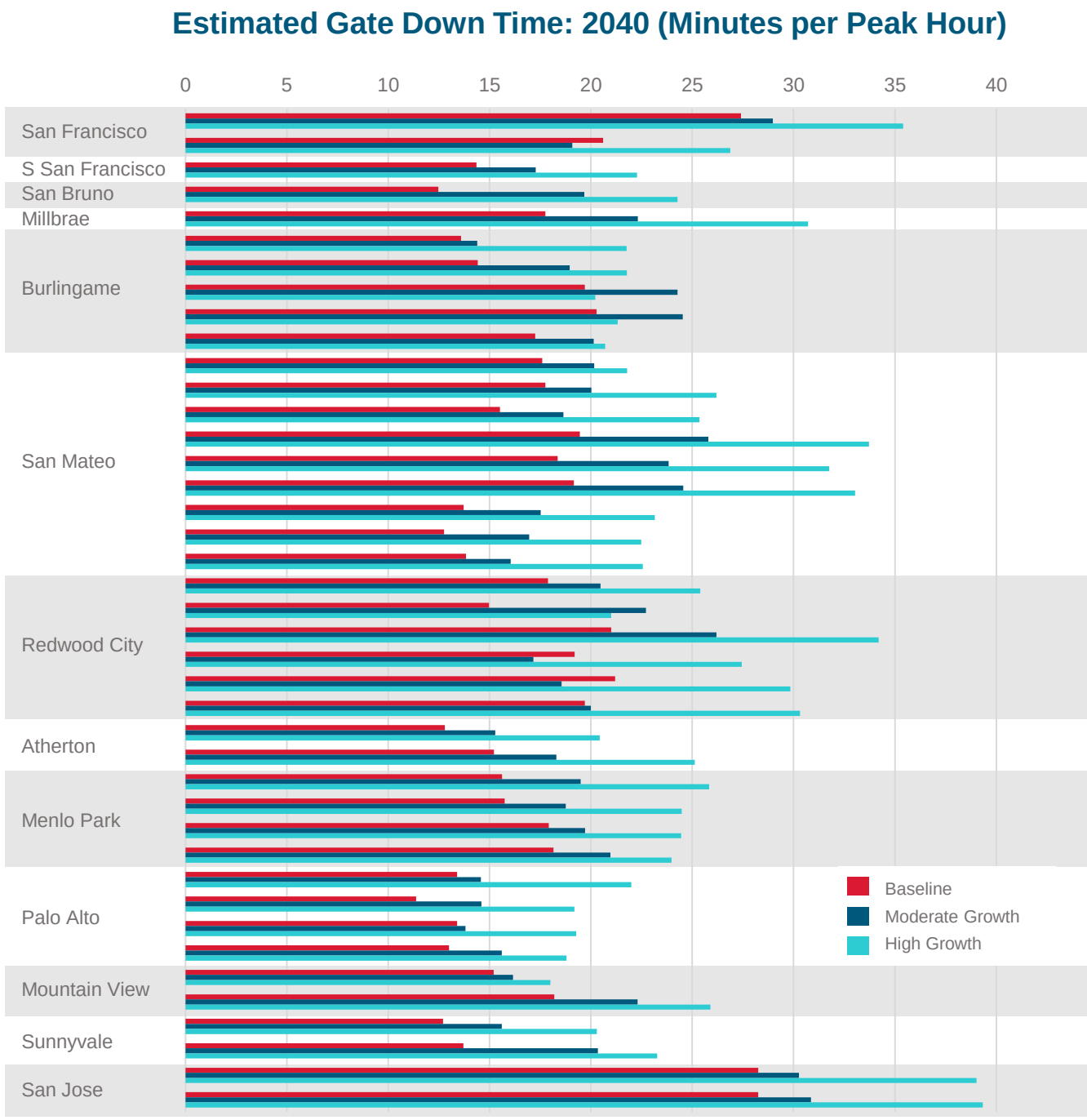
Gate Down Time by Scenario

	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

Data presented for Caltrain-owned corridor only.



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

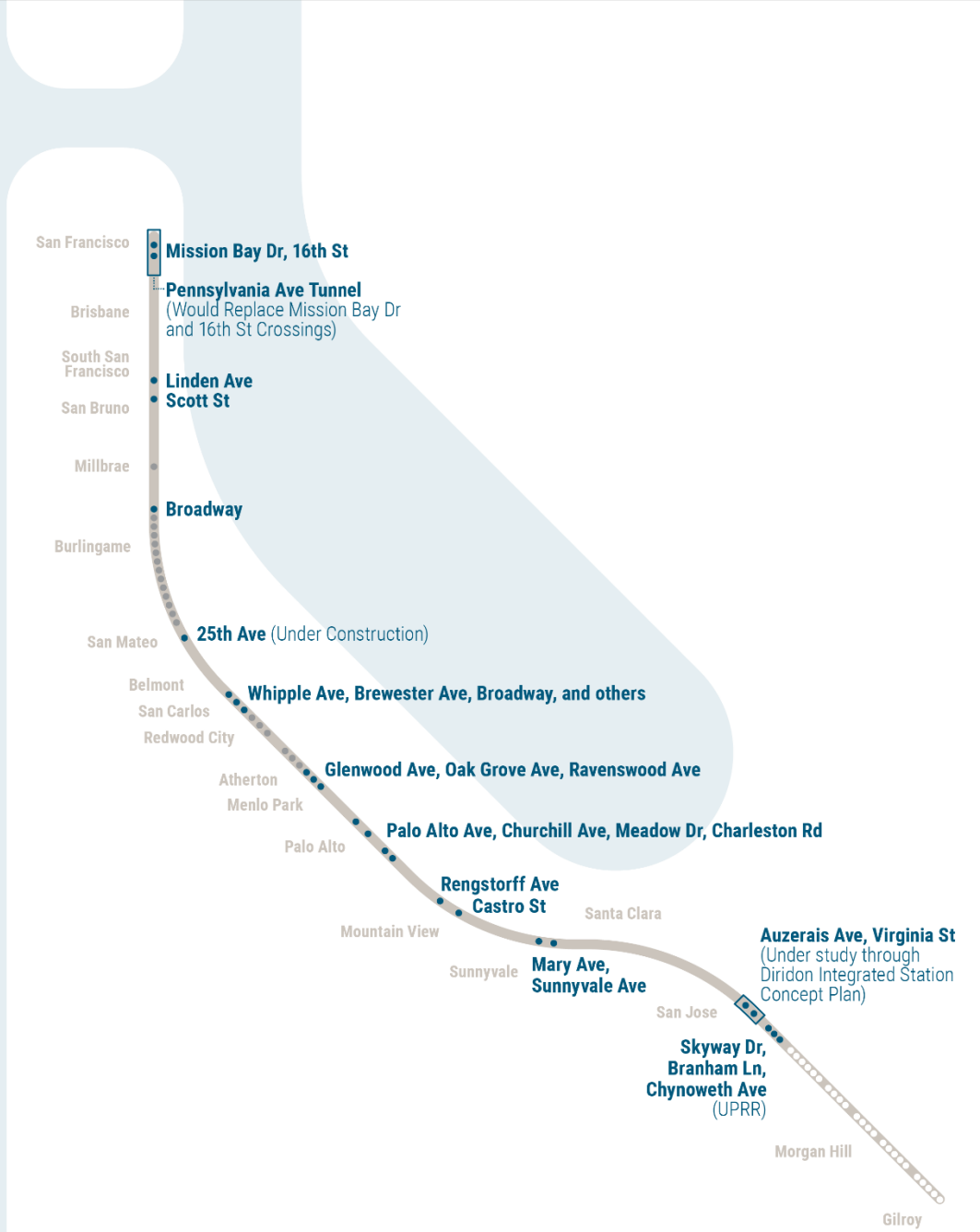
- Ensure that the overall capital costs developed for each service scenario include a reasonable level of **total, corridor wide** investment in grade separations and grade-crossing improvements

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



Types of Investments Considered

Today, many crossings on the corridor are not actively being studied for grade separation but may require investment or intervention in the future. A range of generic costs were developed to help estimate the aggregate potential costs of these investments

City-Generated Cost

Project type and cost already specified or estimated by city

Cost varies

Grade Separation

Full grade separation of an existing crossing, or a new crossing

$255 - 355 M unit cost

Mitigated Closure

Road closure with separated bike/ped access or equivalent investment

$35M unit cost

Crossing Improvement

Quad gates and/or other safety improvements and treatements

$1M unit cost

City-led Grade Separation and Closure Plans

Caltrain has incorporated or accounted for grade separation concepts, plans and cost estimates from the following city-led studies into the Business Plan

City	Crossings Under Study	Status of Plan or Study	City Generated Cost Estimate or Range	Included in Business Plan?
San Francisco	Pennsylvania Ave Tunnel (includes both Mission Bay Dr and 16th St Crossings)	Feasibility / 1% Design	$1.4B*	✔
South San Francisco	Linden Ave	PSR	TBD	✔
San Bruno	Scott St	PSR	TBD	✔
Burlingame	Broadway	EIR	$274M	✔
San Mateo	25th Ave	Construction	$180M	✔
Redwood City	Whipple Ave, Brewster Ave, Broadway (Maple, Main and Chestnut under potential consideration)	PSR	$350 - 500M (Whipple, Brewster and Broadway)	✔

In many cases cities have not yet selected a single preferred option or have not approved specific cost estimates. In these instances standardized unit costs may be used for Business Planning purposes. These can costs can be updated at a later point in the planning process based on City decisions and input

***Cost shown is highly preliminary and subject to change**

City-led Grade Separation and Closure Plans

Caltrain has incorporated or accounted for grade separation concepts, plans and cost estimates from the following city-led studies into the Business Plan

City	Crossings Under Study	Status of Plan or Study	City Generated Cost Estimate or Range	Inlcuded in Business Plan?
Menlo Park	Glenwood Ave Oak Grove Ave Ravenswood Ave	PSR	$310M – 380M	✔
Menlo Park	Middle Ave (Ped. xing only)	Feasibility	TBD	✔
Palo Alto	Palo Alto Ave	Under Study through Coordinated Area Plan	TBD	✔
Palo Alto	Churchill Ave	Alternatives Analysis	TBD	✔
Palo Alto	East Meadow Dr Charleston Rd	Alternatives Analysis	$200 - 950M	✔
Mountain View	Rengstorff Ave	PE/EIR	$150M	✔
Mountain View	Castro St	PE/EIR	$44 - 64M	✔

In many cases cities have not yet selected a single preferred option or have not approved specific cost estimates. In these instances standardized unit costs may be used for Business Planning purposes. These can costs can be updated at a later point in the planning process based on City decisions and input

City-led Grade Separation and Closure Plans

Caltrain has incorporated or accounted for grade separation concepts, plans and cost estimates from the following city-led studies into the Business Plan

City	Crossings Under Study	Status of Plan or Study	City Generated Cost Estimate or Range	Included in Business Plan?
Sunnyvale	Mary Ave	Feasibility Study with 15% Design	$100 - 200M	✔
Sunnyvale	Sunnyvale Ave	Feasibility Study with 15% Design	$40 - 250M	✔
San Jose	Azurais Ave Virginia Ave	Under study through Diridon Integrated Station Concept Plan	TBD	✔
San Jose	Skyway Dr Branham Ln Chynoweth Ave	Feasibility Study	$366M – $1,054M	✔

Crossings are part of UP-Owned Corridor

In many cases cities have not yet selected a single preferred option or have not approved specific cost estimates. In these instances standardized unit costs may be used for Business Planning purposes. These can costs can be updated at a later point in the planning process based on City decisions and input

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*

Potential Planning Level Grade Crossing Cost Estimates

Legal Minimum Investments

	Type	Baseline Growth	Moderate Growth	High Growth
Corridor Wide Cost Estimate	Auto	$221M	$926M	$4.1B
	Bike / Ped	-	-	-
	Total	**$221M**	**$926M**	**$4.1B**
Auto Crossing Treatments	Quad Gates & Safety Improvements	41	39	30
	Mitigated Closure	0	0	0
	Grade Separation	1	3	12

The legal minimum investments in grade separation and at-grade crossings would include grade separation at all crossings in 4-track segments and installation of quad gates at all remaining crossings. City-generated projects are not included in this estimate except for the 25th Avenue Grade Separation (which is already under construction)

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 the details of potential future train volumes are highly dependent on HSR's future plans and service levels

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

Building Ranges of Investment

Variation by Level of Investment

Caltrain understands that local plans and interest in grade separation go significantly beyond current regulatory requirements.

The Business Plan team has developed three different “levels” of corridor wide investments that represent different approaches to grade separation- all significantly exceeding minimum legal requirements

These ranges are simply intended to convey different approaches to investment- they do not define new standards nor do they prescribe specific plans at individual crossings

Investment Included

Lower Intensity Investment

- All city-planned projects
- Recommended UP corridor investments
- Separation and/or mitigated closure of remaining crossings with **highest** ADT and gate downtimes
- Quad gates at remaining crossings

Medium Intensity Investment

- All city-planned projects
- Recommended UP corridor investments
- Separation and/or mitigated closure of **many** remaining crossings with higher ADT and gate downtimes
- Quad gates at remaining crossings

Higher Intensity Investment

- All city-planned projects
- Recommended UP corridor investments
- Separation and/or mitigated closure of **most or all** remaining crossings
- Quad gates at remaining crossings (if any)

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

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;
  - 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

FOR MORE INFORMATION

WWW.CALTRAIN.COM