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?

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
- Board Adoption of Final Business Plan
- Part 2: Business Plan Completion
- Implementation

We Are Here
2040 Service Scenarios: Different Ways to Grow

- **2018** Current Operations
- **2022** Start of Electrified Operations
- **2029** HSR Valley to Valley & Downtown Extension
- **2033** High Speed Rail Phase 1
- **2040** Service Vision

**Design Year**

**Amount of Investment/Number of Trains**

- High Growth
- Moderate Growth
- Baseline Growth
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

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

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
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
On its current, baseline path, Caltrain would experience demand of up to 161,000 daily riders by 2040. The Moderate and High Growth scenarios would increase demand to 185,000 and 207,000 riders, respectively.

Crowding may impact Caltrain’s ability to fully capture future demand. When constrained for crowding, all-day ridership in the baseline scenarios could be 6% lower and 4% lower in the moderate growth scenario. There is sufficient capacity in the high growth scenario to serve all projected 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.
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
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

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
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.
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.”

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)

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.
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
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.
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

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Shortest</th>
<th>Average</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>11</td>
<td>17</td>
<td>28</td>
</tr>
<tr>
<td>Moderate</td>
<td>14</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>High</td>
<td>18</td>
<td>25</td>
<td>39</td>
</tr>
</tbody>
</table>

**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.
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 treatments

$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:

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

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:

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

*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:

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

*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 Minutes per Peak Hour
- Moderate: 14 – 31
- High: 18 – 39

*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

<table>
<thead>
<tr>
<th>Type</th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor Wide Cost Estimate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto</td>
<td>$221M</td>
<td>$926M</td>
<td>$4.1B</td>
</tr>
<tr>
<td>Bike / Ped</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>$221M</td>
<td>$926M</td>
<td>$4.1B</td>
</tr>
</tbody>
</table>

Auto Crossing Treatments

<table>
<thead>
<tr>
<th></th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quad Gates &amp; Safety Improvements</td>
<td>41</td>
<td>39</td>
<td>30</td>
</tr>
<tr>
<td>Mitigated Closure</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grade Separation</td>
<td>1</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

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.

**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

<table>
<thead>
<tr>
<th></th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Corridor Wide Cost Estimate for Crossings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto</td>
<td>$8.4B</td>
<td>$8.6B</td>
<td>$9.6B</td>
</tr>
<tr>
<td>Bike / Ped</td>
<td>$140M</td>
<td>$140M</td>
<td>$140M</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$8.5B</strong></td>
<td><strong>$8.7B</strong></td>
<td><strong>$9.7B</strong></td>
</tr>
<tr>
<td><strong>Investments on JPB-owned Corridor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quad Gates &amp; Safety Improvements</td>
<td>14</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Mitigated Closure</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Grade Separation</td>
<td>24</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td><strong>Investments on UP-owned Corridor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quad Gates &amp; Safety Improvements</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Mitigated Closure</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Grade Separation</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*Builds on and accounts for costs associated with all City-led separation and closure plans*
## Potential Planning Level Grade Crossing Cost Estimates: Medium

### Total Corridor Wide Cost Estimate for Crossings

<table>
<thead>
<tr>
<th>Type</th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>$8.7B</td>
<td>$8.9B</td>
<td>$10.1B</td>
</tr>
<tr>
<td>Bike / Ped</td>
<td>$140M</td>
<td>$140M</td>
<td>$140M</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$8.8</strong></td>
<td><strong>$9.0B</strong></td>
<td><strong>$10.2B</strong></td>
</tr>
</tbody>
</table>

### Investments on JPB-owned Corridor

<table>
<thead>
<tr>
<th>Investment</th>
<th>Baseline</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quad Gates &amp; Safety Improvements</td>
<td>12</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Mitigated Closure</td>
<td>4</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Grade Separation</td>
<td>25</td>
<td>25</td>
<td>27</td>
</tr>
</tbody>
</table>

### Investments on UP-owned Corridor

<table>
<thead>
<tr>
<th>Investment</th>
<th>Baseline</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quad Gates &amp; Safety Improvements</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Mitigated Closure</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Grade Separation</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*Builds on and accounts for costs associated with all City-led separation and closure plans*
# Potential Planning Level Grade Crossing Cost Estimates: High

<table>
<thead>
<tr>
<th>Type</th>
<th>Baseline Growth</th>
<th>Moderate Growth</th>
<th>High Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Corridor Wide Cost Estimate for Crossings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto</td>
<td>$8.9B</td>
<td>$9.8B</td>
<td>$11.0B</td>
</tr>
<tr>
<td>Bike / Ped</td>
<td>$140M</td>
<td>$140M</td>
<td>$140M</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$9.0B</strong></td>
<td><strong>$9.9B</strong></td>
<td><strong>$11.1B</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Investments on JPB-owned Corridor</th>
<th>Quad Gates &amp; Safety Improvements</th>
<th>Mitigated Closure</th>
<th>Grade Separation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Investments on UP-owned Corridor</th>
<th>Quad Gates &amp; Safety Improvements</th>
<th>Mitigated Closure</th>
<th>Grade Separation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*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