## Grade Separations

### What are grade separations?
Grade separations are when train tracks or the crossing street are raised or lowered so they don’t cross at the same level. These allow for car, bike, and pedestrian to cross over or under the tracks without having to wait. For example, the Jefferson Avenue underpass allows the street to pass under the railroad tracks. The Woodside Road overpass carries the street over the Caltrain tracks, removing any train related delays to people driving on Woodside. With more trains, grade separations increase safety and reduce delays for people crossing the tracks.

### How do grade separations relate to station location?
Grade separations are critical for determining the location and design of a future train station. For example, if the tracks are raised to go over Whipple, there is a limited distance for the tracks to return to grade-level at the current Redwood City Transit Center. (Trains can only go downhill or uphill gradually.) Depending on the design of grade separations, streets may need to be grade separated or closed. Depending on the number of tracks at the station, the boarding platform may need to be shifted to minimize impacts to adjacent property. Similarly, if there are four sets of tracks at the Transit Center, grade separations or street closures are mandated by the Federal Railroad Administration to meet safety regulations.

### Safety
Over 80 collisions occurred at Caltrain’s grade crossings in the 10 years from 2009-2018. 60 of the grade crossings had collisions, and more than 30 of these collisions involved a fatality.

### Peak Hour Auto Crossings

<table>
<thead>
<tr>
<th>Station</th>
<th>Collisions</th>
<th>Fatal Collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whipple</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Brewster</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Broadway</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Jefferson</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Maple</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Main</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chestnut</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hwy 84</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Crossing Gate Downtime (min/peak hr)
Gate down times shown are indicative projections extrapolated from existing crossing performance. They are examples of “worst case” gate downtimes that could occur if no grade separations or grade crossing improvements were made. The three long-range service scenarios are described in the Caltrain Service 2040 Vision.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>EXISTING</th>
<th>BASELINE GROWTH SCENARIO</th>
<th>MODERATE GROWTH SCENARIO</th>
<th>HIGH GROWTH SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0:12</td>
<td>0:14</td>
<td>0:17</td>
<td>0:10</td>
</tr>
<tr>
<td></td>
<td>+48%</td>
<td>+5%</td>
<td>+26%</td>
<td>+88%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+63%</td>
<td></td>
<td>+78%</td>
</tr>
<tr>
<td></td>
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<td>+81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N/A - Grade Separation required due to 4 track segment
Jefferson Avenue Undercrossing
Redwood City, CA

HIGHLIGHTS:
• Rail at-grade, roadway fully lowered
• Elevated sidewalks
• 2-span structure with column/bent in median of Jefferson Ave
• Total span length approximately 100 feet
• Constructed in 2000
Brittan Avenue Undercrossing
San Carlos, CA

HIGHLIGHTS:
- Hybrid design (rail partially elevated, road partially lowered)
- 2-span structure with column/bent in median of Brittan Ave
- Total span length approximately 95 feet

TRANSPORTATION IMPROVEMENTS
What does a grade separation look like?
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What does a grade separation look like?

Holly Street Undercrossing
San Carlos, CA

HIGHLIGHTS:
• Hybrid design (rail partially elevated, road partially lowered [-5 feet])
• Slightly elevated sidewalk
• 2-span structure with column/bent in median of Holly St
• Total span length approximately 120 feet
Ralston Avenue Undercrossing
Belmont, CA

HIGHLIGHTS:
• Hybrid design (rail partially elevated, road partially lowered)
• Elevated sidewalk w/ access to the Belmont Station platform
• 4-span structure with column/bent in median of Ralston Ave
• Total span length approximately 260 feet
42nd Avenue Undercrossing  
San Mateo, CA

HIGHLIGHTS:
- Hybrid design (rail partially elevated, road partially lowered)
- 2-span structure with column/bent in median of 42nd Ave
- Total span length approximately 95 feet
San Bruno Avenue Undercrossing
San Bruno, CA

HIGHLIGHTS:
• Hybrid design (rail partially elevated, road partially lowered)
• Located at the San Bruno Station
• 2-span structure with column/bent in the median of San Bruno Ave
• Total span length approximately 125 feet

TRANSPORTATION IMPROVEMENTS
What does a grade separation at stations look like?