

## RAIL FACT SHEETS

# Churchill Partial Underpass



Churchill Avenue Partial Underpass Overview - Looking Northwest



Kellogg Avenue Pedestrian/Bike Underpass - Looking Southeast

### About the Partial Underpass

The partial underpass alternative will grade separate Churchill Avenue from the current Caltrain tracks via an underpass; however, there will no longer be through traffic on Churchill Avenue at the intersection with Alma Street.

Traffic on eastbound Churchill Avenue from the Paly Road/Castilleja Avenue intersection will descend and pass under the railroad and terminate at a lowered, signal-controlled, T-intersection at Alma Street where vehicles can make a left turn onto northbound Alma Street or a right turn onto southbound Alma Street; then ascend and return to grade along Alma Street.

Traffic on westbound Churchill Avenue from Emerson Street will terminate at Alma Street. Right turns only (onto northbound Alma Street) will be permitted. Similarly, westbound traffic on Kellogg Avenue and Coleridge Avenue approaching Alma Street will be permitted to make right turns only onto northbound Alma Street.

Traffic on northbound Alma Street will be split near Coleridge Avenue:

- Vehicles bearing right will remain at grade and continue on northbound Alma Street. This traffic will be permitted to make right turns onto all connecting streets (Coleridge Avenue, Churchill Avenue, Kellogg Avenue, etc.) approaching Emerson Street.
- Vehicles bearing left will descend to the T-intersection with Churchill Avenue and be permitted to make left turns (under the railroad) onto westbound Churchill Avenue approaching Paly Road/Castilleja Avenue and El Camino Real.

Traffic on southbound Alma Street will operate as it does today except left turns onto Kellogg Avenue, Churchill Avenue and Coleridge Avenue will not be permitted.

The Caltrain tracks will be supported on a new rail bridge spanning across a lowered Churchill Avenue at approximately its current location.

A separate pedestrian/bicycle crossing will be provided at Kellogg Avenue (or Seale Avenue). From westbound Kellogg Avenue, a 12-foot wide path will descend at the center of the road, at which point widens to 20 feet and crosses under both Alma Street and the Caltrain tracks and conforms at the Embarcadero Bike Path adjacent to Palo Alto High School. To accommodate the 12-foot path, the planting strips will be removed to widen the pavement on both sides of the street (at Kellogg or Seale Avenue). A 16-foot wide, one-way road on each side of the street (at Kellogg or Seale Avenue) will be provided at the location of the pedestrian/bicycle ramp (for a length of approximately 250-300 feet from Alma Street). Street parking will not be allowed along this section of Kellogg (or Seale Avenue).



Lowered Intersection of Alma Street and Churchill Avenue - Looking Northwest

For Rail Fact Sheets for each alternative visit:  
<https://connectingpaloalto.com/fact-sheets/>



## By the numbers

- Churchill Avenue is designed for 25 mph and Alma Street is designed for 35 mph.
- Maximum grade on the roadway is 12% for Churchill Avenue, and 8% for Alma Street.
- Travel lanes are 10 to 11 feet wide.
- Each pedestrian/bike ramp is approximately 220 to 250 feet long with width ranging from 12 to 20 feet, and a maximum grade of 5%. All dimensions are subject to change in the next phase of design.
- Construction period is approximately 2.5 to 3 years.

## Engineering Challenges

- For access to the construction site, construction traffic will be diverted to other areas.
- Lowering of the roadway will require a pump station.
- Increased cost of long-term maintenance and risk of flooding due to pump stations.
- Major utility relocations will be required for the lowered roadways.
- The southbound lane/shoulder on Alma Street and the pedestrian/bike ramps on the west side of the tracks for the underpass at Kellogg Avenue will require encroachment inside Caltrain's right-of-way.

## Neighborhood Considerations

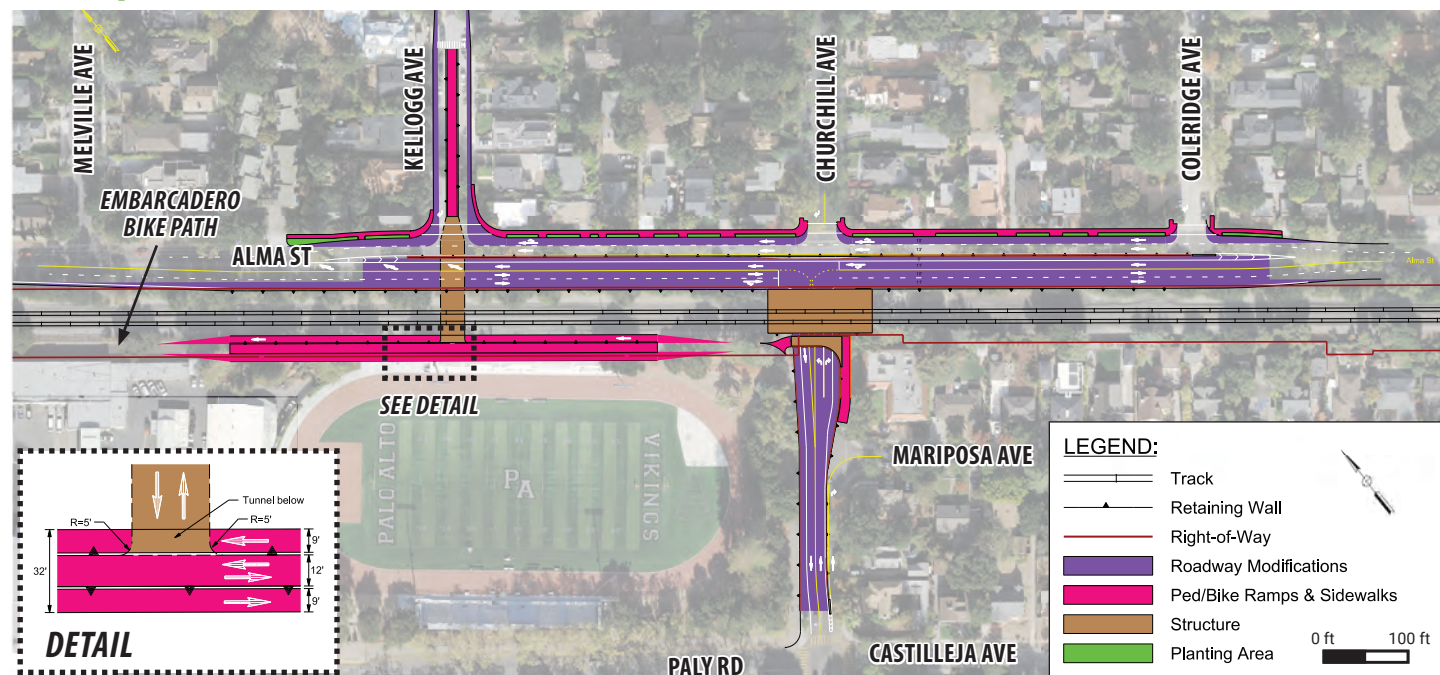
- Churchill Avenue between Alma Street and Mariposa Avenue will likely be closed for a majority of the construction period. In addition, Alma Street will be one-way northbound for approximately 6+ months. Local traffic will be diverted to other neighborhood roads during construction.
- Vertical clearance of Churchill Avenue under the railroad will be 16.5 feet.
- With the grade separation at Churchill Avenue and the restricted turning movements, traffic at nearby intersections is expected to improve.
- Significant excavation and construction work will take place adjacent to residences.
- Access to the Churchill Avenue crossing and the Embarcadero bike path will be limited during construction, which will impact pedestrian and bicycle routes heading to Palo Alto High School.
- Kellogg Avenue (or Seale Avenue, depending on the location of the pedestrian/bicycle undercrossing) between Alma Street and Emerson Street will lose street parking.
- Some partial property acquisitions are required.

## Cost Breakdown

Roadway & Railroad Items	\$110M to \$135M
Structure Items	\$10M to \$15M
Right-of-Way & Utilities	\$35M to \$45M
Support Costs	\$40M to \$50M
Escalation to 2031 dollars	\$65M to \$75M
<b>Total Project Cost</b>	<b>\$260M to \$320M</b>

Preliminary and subject to change. Maintenance costs and relocation of fiber optic lines not included. Both Churchill and Kellogg Avenue improvements included.

## Concept Plan View

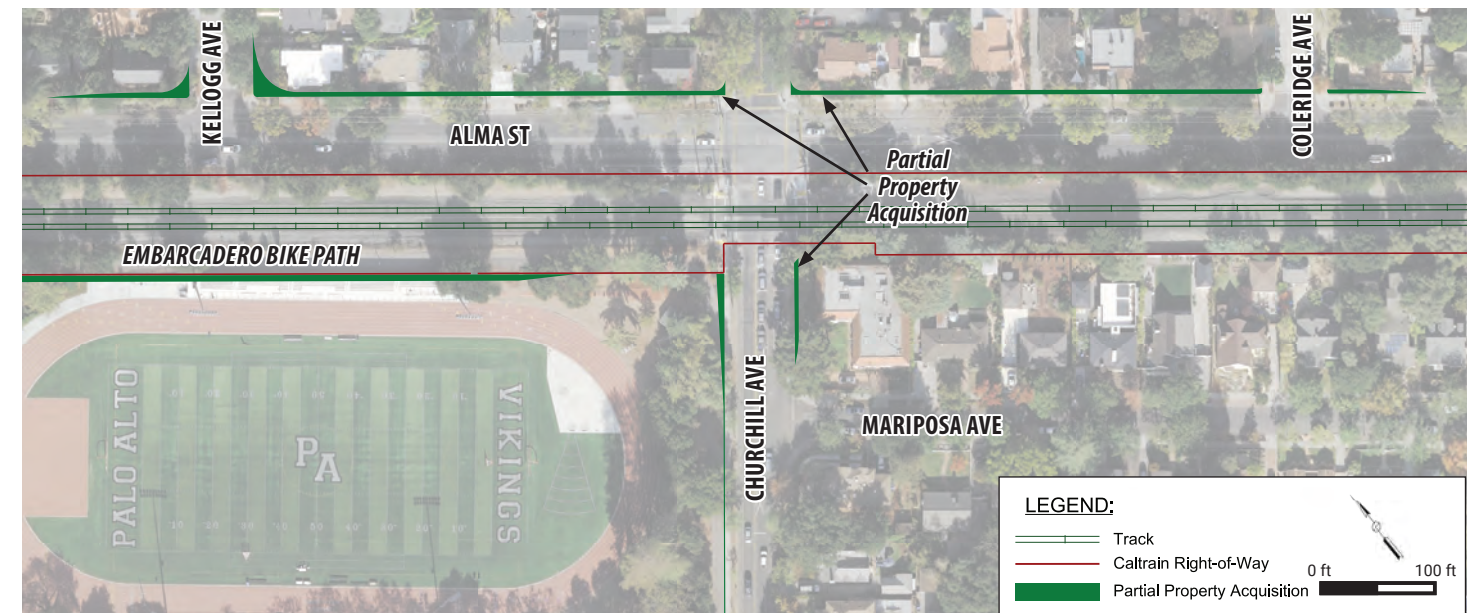


Churchill Avenue Partial Underpass Aerial (Plan)



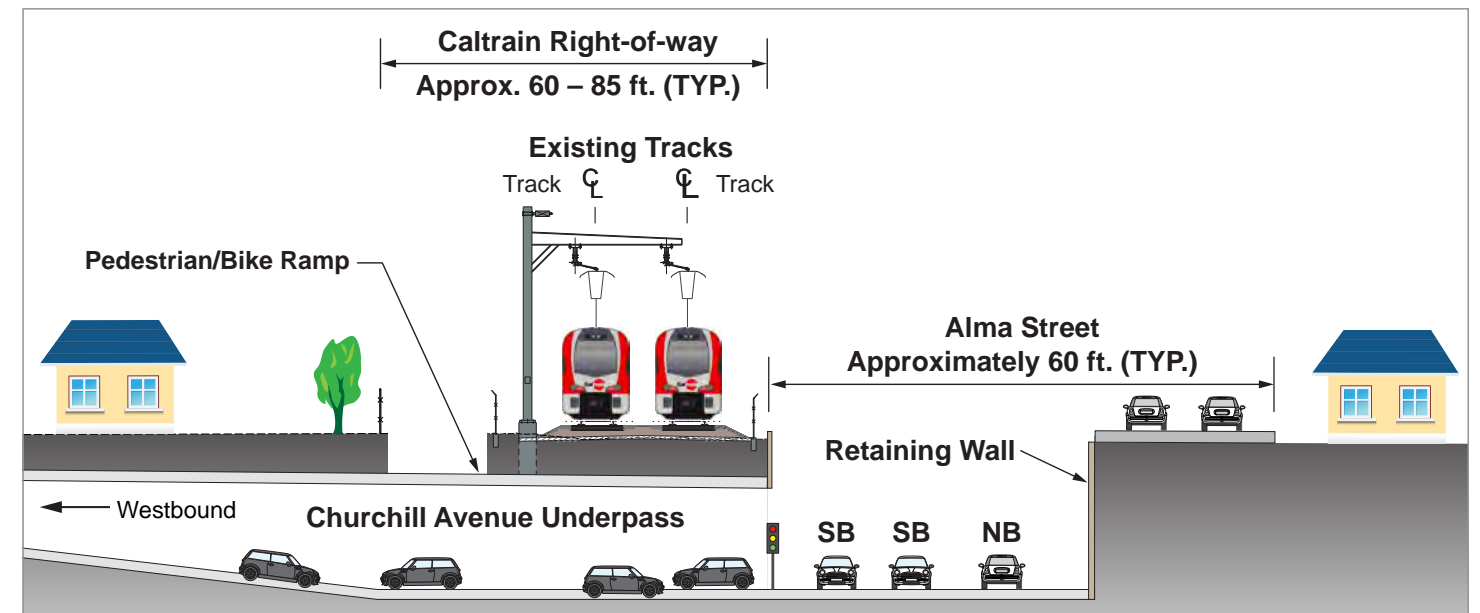
Lowered portion of Alma Street - Looking South Towards Churchill Avenue

## Conceptual Private Property Impacts



Churchill Avenue Private Property Impacts (Subject to changes during design development)

Note: See Engineering Challenges for impacts to Caltrain right-of-way.



Example Section - Underpass at Churchill Avenue



**Evaluation with City Council-Adopted Criteria:**

**Facilitate movements across the corridor for all modes of transportation**

Churchill Avenue will be grade separated from the railroad for all modes and will remain open. Through traffic on Churchill Avenue is no longer possible, and some traffic will have to take alternate routes. Pedestrian/bike (only) traffic will be grade separated from the railroad and vehicle traffic on Alma Street via an undercrossing at Kellogg Avenue (or Seale Avenue).

**Reduce delay and congestion for vehicular traffic at rail crossings**

With construction of the grade separation, the railroad crossing gates and warning lights at Churchill Avenue will be removed. Thus, the traffic will not be interrupted by the railroad crossing gates. Pedestrian undercrossing at Kellogg Avenue (or Seale Avenue) will also help reduce intersection congestion.

**Provide clear, safe routes that are separated from vehicles for pedestrians and cyclists crossing the rail corridor**

Pedestrians and cyclists will be completely separated from train and vehicular traffic. Full pedestrian and cyclist movement is maintained with a new undercrossing at Kellogg Avenue (or Seale Avenue).

**Support continued rail operation and Caltrain service improvements**

A temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.

**Finance with feasible funding sources (Order of magnitude cost)**

The underpasses would require lower levels of local funding, with a substantial portion of capital costs covered by Regional, State, and Federal sources.

**Reduce rail noise and vibration**

Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations. Utilizing EMU trains rather than diesel engines will also reduce noise and some road noise would be reduced. Modern rail bridge design will reduce excess structural noise. There would be little to no change to vibration levels at nearby receptors. An optional 6-foot high noise barrier near the tracks and on the overpass structure could significantly reduce wheel/rail and propulsion noise.

**Minimize visual changes along the corridor**

The railroad tracks and the northbound lanes of Alma Street will remain at-grade, and the east side of Churchill Avenue will remain unchanged. Mature trees and overhead power poles within the Alma Street planting strip, from just north of Kellogg Avenue to just south of Coleridge Avenue, will be removed. Landscaping restoration is limited due to space constraints. Some landscaping restoration will be possible within the new 4-foot planting strip along Alma Street.

**Maintain access to neighborhoods, parks, and schools along the corridor while reducing regional traffic on neighborhood streets**

Regional traffic will be diverted due to the restricted turning movements. Pedestrian and cyclist access will improve due to mode separation.

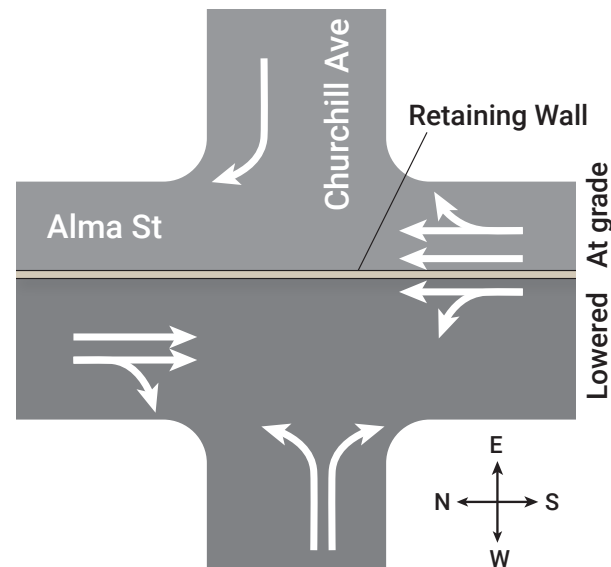
**Minimize right-of-way acquisition (Private property)**

Partial acquisitions and driveway modifications are required due to some road widening along Alma Street. Partial acquisition of the high school and/or residential property fronting Churchill Avenue on the west side of the tracks will be required. Street parking on both sides of Kellogg Avenue (or Seale Avenue) will be eliminated along the pedestrian/bike ramp (for approximately 250-300 feet from Alma Street).

**Minimize disruption and duration of construction**

Closure of Churchill Avenue between Alma Street and Mariposa Avenue will be required for the majority of construction. Alma Street will be one-way northbound for approximately 6+ months. Total duration of construction will be approximately 2.5 to 3 years; however the durations are subject to change depending on the construction methodologies used.

**Intersection Turning Movement Diagram**



Churchill Avenue Partial Underpass



Kellogg Avenue and Alma Street intersection - Looking North



Churchill Avenue and lowered Alma Street Intersection with rail bridge and pedestrian/bike crossing - Looking East