

RAIL FACT SHEETS

Meadow-Charleston Underpass



Meadow Drive Underpass Overview - Looking Southeast



Charleston Road Underpass Overview - Looking South

About the Underpass

The underpass alternative retains the Caltrain tracks at the current grade and lowers Meadow Drive and Charleston Road under the tracks and under Alma Street for through traffic. Alma Street will retain four lanes of traffic, two northbound and two southbound, supported on a new road bridge spanning the intersecting road. Turning movements to and from Alma Street will be facilitated by ramps for key traffic flow directions and controlled by traffic signals. On the east side of Alma Street, the new road profile will begin descending just west of the Emerson Street for Meadow Drive, and just west of Wright Place on Charleston Road and will return to grade on the west side of the tracks, just west of Park Boulevard. Turning movements from various side streets will be limited.

The Caltrain tracks will be supported on a new rail bridge that spans the width of the intersecting road and the pedestrian/bike ramp while generally remaining on its current alignment. Meadow Drive will be realigned slightly to the north.

The pedestrian/bike ramp will provide a grade-separated crossing for cyclists and foot traffic of both Alma Street and the railroad. This pedestrian/bike crossing is separate and at a different grade from both the rail and the road, providing both the benefits of a safer route and less traffic interference resulting in better traffic flow.

The on-ramp and off-ramp connecting Meadow Drive to Alma Street will be limited to northbound and southbound traffic, respectively. Through traffic on Park Boulevard will no longer be possible. The connection from the south side of Park Boulevard to Meadow Drive will no longer be possible and will end in a cul-de-sac, while the north side of Park Boulevard will have driveway modifications but turning movements will be retained.

With connection ramps only to East Charleston Road, movement to and from Alma Street will be facilitated via a roundabout on East Charleston Road just west of Mumford Place. For example, traffic on northbound Alma Street destined for the west side of the tracks, would make a right turn at East Charleston Road, then proceed about 600 feet to the east (towards Mumford Place) and make a U-turn via the roundabout; then bear left and descend into the underpass below Alma Street and the railroad tracks towards Park Boulevard and El Camino Real. Right of way acquisition from private properties at both Meadow Drive and Charleston Road will be required to accommodate this alternative. As with Meadow Drive, through traffic on Park Boulevard will no longer be possible, however, a bridge will be constructed just west of the tracks to provide north/south pedestrian/bike connectivity at Park Boulevard. The Ely Place intersection with Alma Street will only facilitate an exit onto northbound Alma Street. Entrance from southbound Alma Street into Ely Place will be prohibited. Right turns from Northbound Alma Street onto Ely Place will also be prohibited.



Charleston Road Roundabout - Looking West

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

By the numbers

- Meadow Drive and Charleston Road are designed for 25 miles per hour.
- Alma Street is designed for 35 miles per hour.
- Maximum grade for Meadow Drive, Charleston Road and Park Boulevard is 12%
- Travel lanes are 10 to 12 feet wide.
- Meadow Drive pedestrian/bike path has a maximum grade of 5% for a length of approximately 310 feet west of the tracks and 190 feet east of the tracks. Path is 20 feet wide. Dimensions are subject to change in the next phase of design.
- Charleston Road pedestrian/bike paths have a width of 20 feet and a maximum grade of 5% for a length of approximately 190 feet west of tracks and 4% grade for a length of approximately 215 feet east of the tracks. The pedestrian/bike ramp at the northeast has a grade of 5% and is approximately 230 feet long. All dimensions are subject to change in the next phase of design.
- Construction period is approximately 3.5 to 4 years.

Engineering Challenges

- For access to the construction site, construction traffic will be diverted to other areas.
- Lowering of the roadways will require a pump station.
- Increased cost of long-term maintenance and risk of flooding due to pump station.
- Major utility relocations will be required for the lowered roadways.
- Dewatering of the excavation during construction will be required.

Neighborhood Considerations

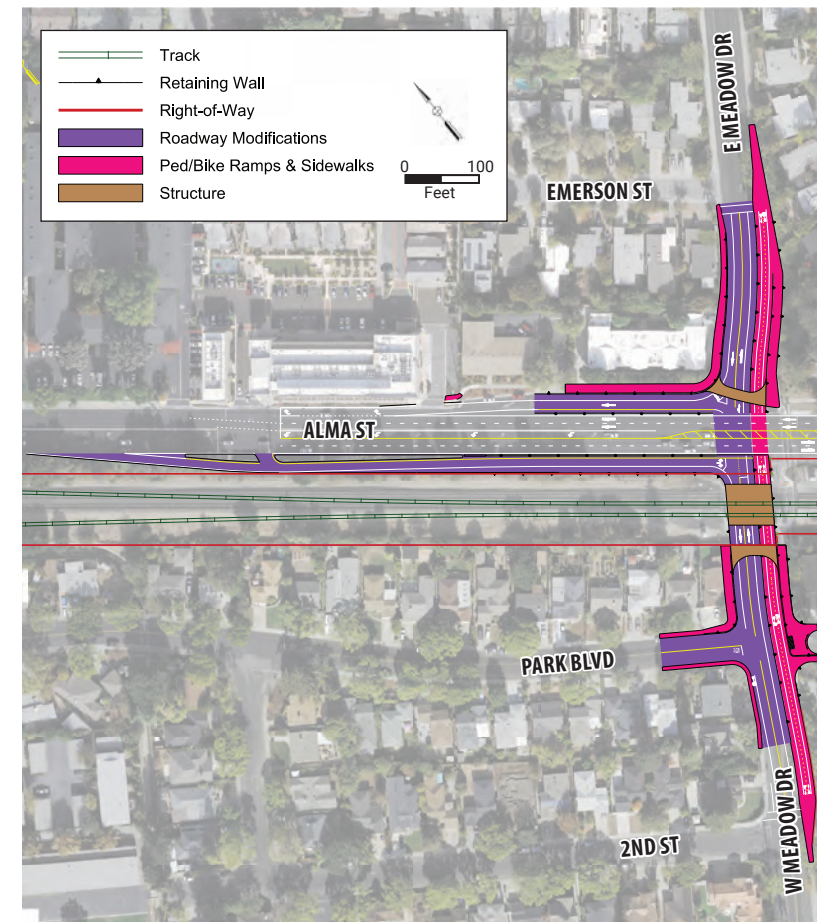
- The rail crossing at Meadow Drive and Charleston Road will need to be closed for most of the construction period.
- Excavation work and construction of the new road bridge will require or reduction of the number of lanes on Alma Street for a significant portion of the construction period.
- Vertical clearance of Meadow Drive and Charleston Road under the railroad will be 16.5 feet.
- With the grade separation at Meadow Drive and Charleston Road and restricted turning movements, traffic at nearby intersections is expected to improve.
- Significant excavation and construction work will take place adjacent to residences.
- Property acquisitions (full and partial) are required for both Meadow Drive and Charleston Road underpasses.

Cost Breakdown - Both Underpasses

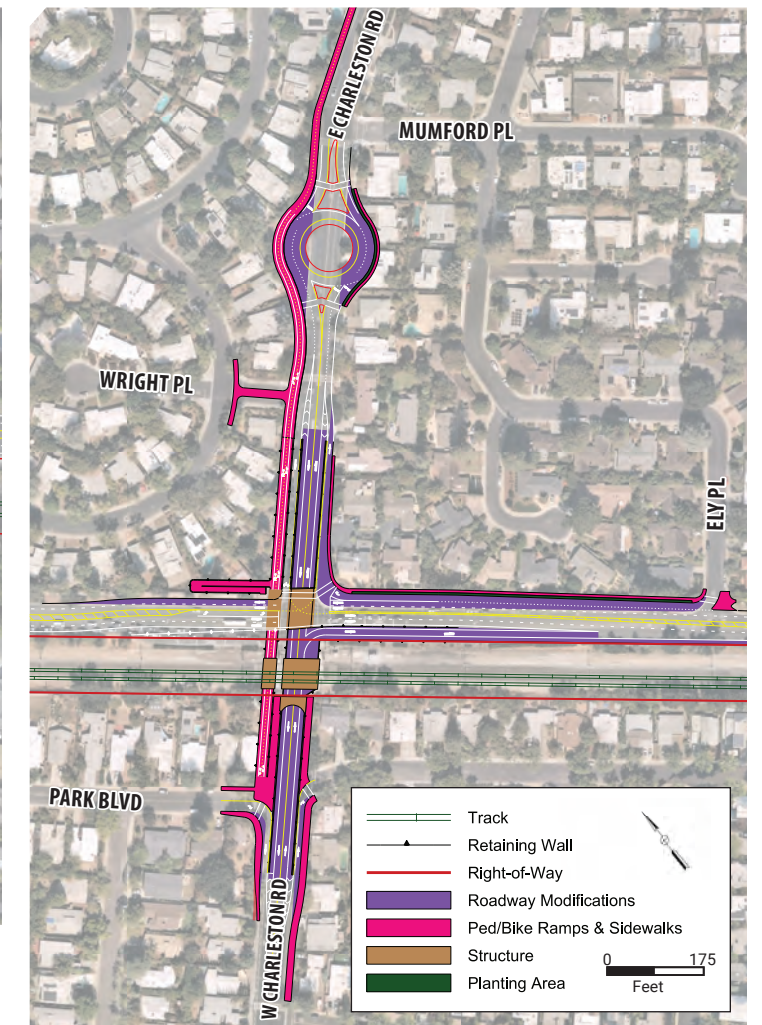
Roadway & Railroad Items	\$260M to \$320M
Structure Items	\$20M to \$25M
Right-of-Way & Utilities	\$135M to \$165M
Support Costs	\$110M to \$140M
Escalation to 2031 dollars	\$165M to \$200M
TOTAL PROJECT COSTS	\$690M to \$850M

Preliminary and subject to change. Maintenance costs and relocation of fiber optic lines not included. Both Meadow Drive and Charleston Road Intersection improvements included.

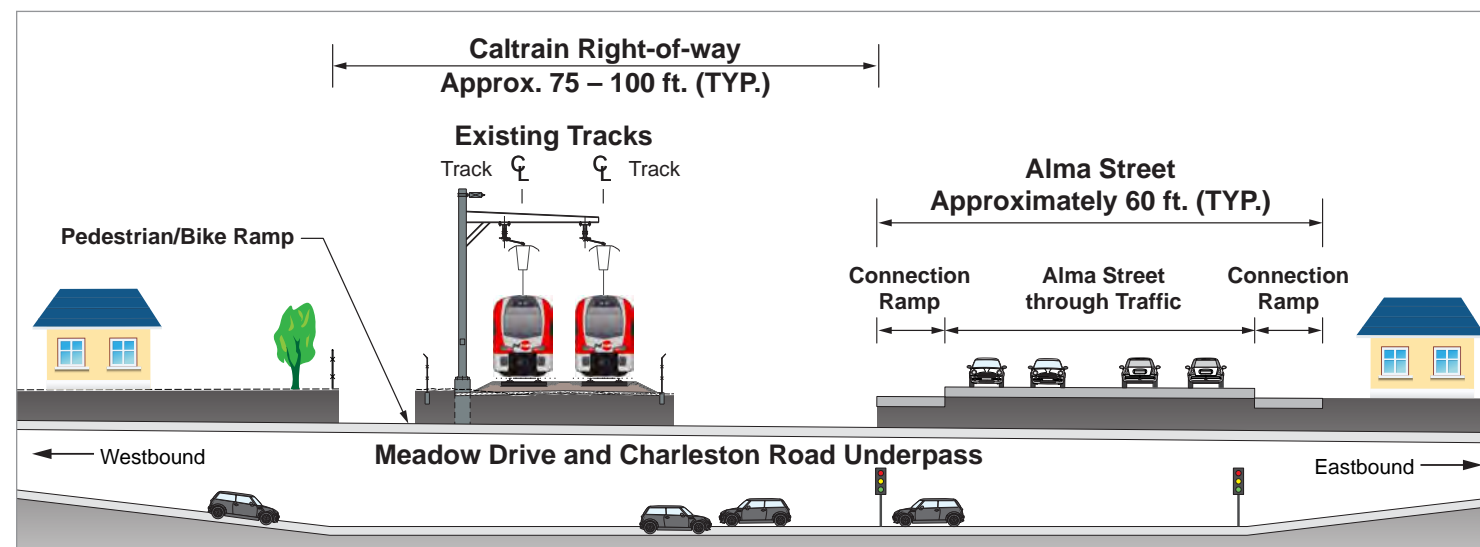
Concept Plan View



Meadow Drive Underpass Aerial (Plan)

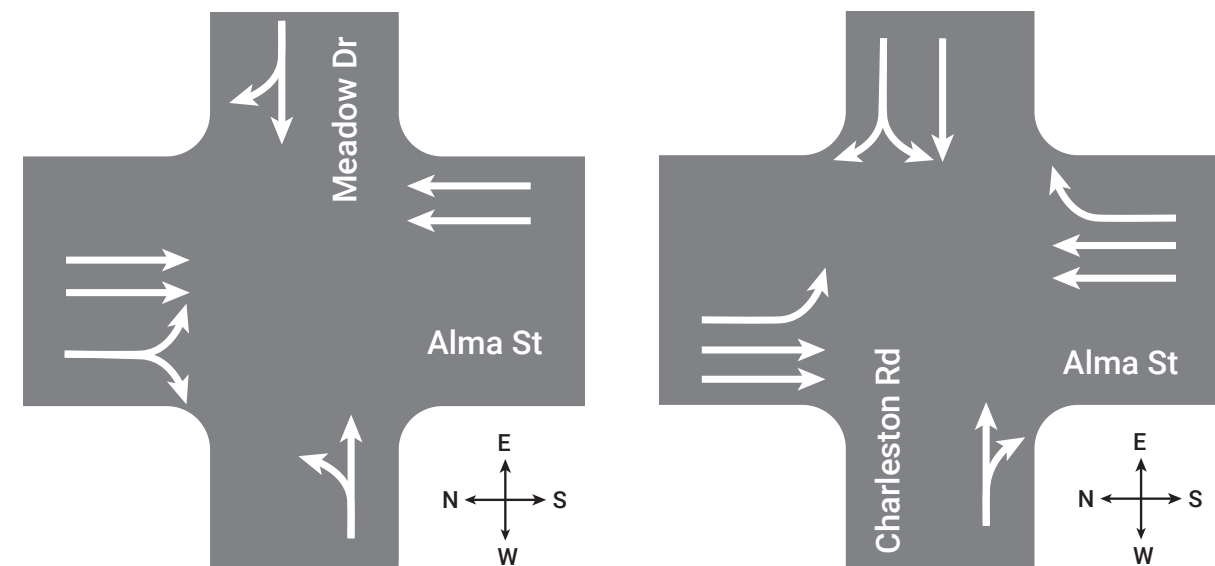


Charleston Road Underpass Aerial (Plan)



Example Section - Underpass at Meadow Drive and Charleston Road

Intersection Turning Movement Diagrams



Meadow Drive Underpass

Charleston Road Underpass

Evaluation with City Council-Adopted Criteria:

Facilitate movements across the corridor for all modes of transportation

East/West (through) traffic on Meadow Drive and Charleston Road will be grade separated from the railroad and Alma Street for all modes.

Some turning movements on Meadow Drive to/from Alma Street will be prohibited. All turning movements on Charleston Road to/from Alma Street will be permitted; however, some movements will be facilitated via a roundabout approximately 600 feet west of Alma Street, resulting in longer routes for all modes.

Reduce delay and congestion for vehicular traffic at rail crossings

With construction of the grade separation, the railroad crossing gates and warning lights at Meadow Drive and Charleston Road will be removed. Thus, the traffic will not be interrupted by the railroad crossing gates. Pedestrian and cyclist mode separation 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 traveling east/west will be completely separated from train and vehicular traffic on Alma Street. Full pedestrian and cyclist movement is maintained.

Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the pedestrian/bike path is located on one side of the street only: on the south side of Meadow Drive and on the north side of Charleston Road. For example, cyclists traveling eastbound on Charleston Road near Ruthelma Street will have to cross Charleston Road to get onto the north side of the road, then cross Charleston Road again at the roundabout near Mumford Place to get back onto the right/south side of the road.

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 underpass will require substantial local funding resources more than the hybrid alternative, but less than the trench and tunnel alternatives.

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. Modern rail bridge design will reduce excess structural noise. Sound barriers will also help to reduce propulsion and wheel/rail 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 change along the corridor

Railroad tracks will remain at-grade. On Charleston Road, removal of the planting strip on both sides of the road will be required along with the planting strip on the east side of Alma Street between Charleston Road and Ely Place.

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; however, travel in all directions will be possible, but may require a longer route and take more time. Turning movements at Ely Place will be limited to right turns onto northbound Alma Street only. Pedestrian and cyclist access will improve due to mode separation.

Minimize right-of-way acquisition (Private property)

Multiple private property acquisitions are required, and driveway modifications will be required. Some partial acquisitions of residential properties immediately adjacent to Alma Street, Meadow Drive and Charleston Road will be required.

Minimize disruption and duration of construction

Lane reductions and temporary closures (nights/weekends only) on Alma Street, a closure of Meadow Drive between Emerson Street and Park Boulevard, and a closure of Charleston Road between Alma Street and Park Boulevard will be required for the majority of construction. The total duration of construction will be approximately 3.5 to 4 years; however the durations are subject to change depending on the construction methodologies used.

Conceptual Private Property Impacts



Meadow Drive Private Property Impacts
(Subject to changes during design development)



Charleston Road Private Property Impacts
(Subject to changes during design development)



Meadow Drive Underpass - Looking West