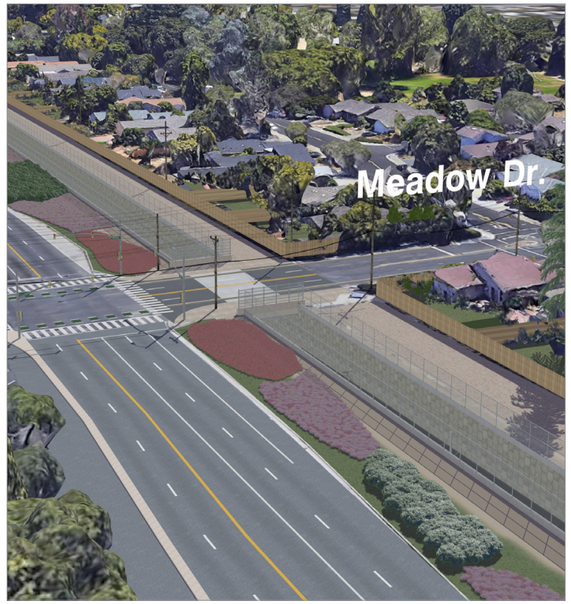
Proposed Ground Level View - Looking South
Charleston Road Intersection



Proposed Trench Aerial View - Looking South
Meadow Drive Intersection

Proposed Backyard View - Looking East
Typical Property West of Tracks

CITY OF PALO ALTO

Meadow-Charleston Trench

About the Trench

For the trench alternative, the railroad tracks will be lowered in an U-shaped box below Meadow Drive and Charleston Road. The new electrified railroad tracks will be built at the same location as the existing railroad tracks and will begin lowering south of Loma Verde Avenue, remain lowered under Meadow Drive and Charleston Road, and return to the existing elevation north of the San Antonio Station.

The roadways at Meadow Drive and Charleston Road will remain at their existing grade on a bridge over the railroad tracks. The roadway will have a similar configuration to what exists today with the addition of Class II buffered bike lanes on Charleston Road. This will require expanding the width of the road to maintain bike lanes through the overpass of the railroad.

By the numbers

- Railroad track is designed for 110 mph.
- Meadow Drive and Charleston Road are designed for 25 mph.
- Maximum grade on railroad is 2%.
- Travel lane widths are 10-12 feet.
- Bike lane widths are 5-6 feet.
- Construction period is approximately 6 years.

Engineering Challenges

- A non-standard grade of 2% will be required on the tracks. Caltrain's preferred maximum grade is 1%.
- Lowering of the tracks will require diversion of Adobe and Barron creeks, resulting in the need for lift station/siphons and numerous regulatory agency permits/approvals. Negotiations with the regulatory agencies will be lengthy and difficult since there are other "least impacting" alternatives that could be considered.
- Pump stations will also be needed for dewatering because the trench will be below the ground water level.
- Increased long-term maintenance costs and risk of flooding due to pump stations.
- Major utility relocations are required for the lowered railroad.

Cost Breakdown

Roadway & Railroad Items	$885M to $1,120M
Structure Items	$15M to $20M
Right-of-way & Utilities	$50M to $60M
Support Costs	$275M to $400M
Escalation to 2031 dollars	$275M to $400M
TOTAL PROJECT COSTS	**$1,500M to $2,000M**

Preliminary and subject to change. Maintenance costs and relocation of fiber optic lines not included.

Neighborhood Considerations

- During construction, Meadow Drive will be closed while the Charleston Road bridge is constructed and vice versa; right turn lanes on Alma Street at Meadow Drive and Charleston Road will be removed.
- Vertical clearance of Meadow Drive and Charleston Road over the railroad will be 24.5 feet.
- Subsurface acquisitions will be required for ground anchors for the trench retaining walls and only vegetation with shallow root vegetation will be allowed.
- The railroad tracks will be approximately 30 feet below the existing street between Meadow Drive and Charleston Road. A high fence will be required along trench walls.
- With grade separations at Meadow Drive and Charleston Road the traffic at nearby intersections is expected to improve.

Trench in Reno, Nevada

For more Rail Fact Sheets visit: https://connectingpaloalto.com/fact sheets/

Evaluation with City Council-Adopted Criteria

Facilitate movement across the corridor for all modes of transportation
Meadow Drive and Charleston Road will be grade separated from the railroad for all modes and will remain open.

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.

Provide clear, safe routes for pedestrians and cyclists crossing the rail corridor, separate from vehicles
Pedestrians/cyclists will be separated from train traffic only. Bike lanes will be added to Meadow Drive and Charleston Road intersections. Additional pedestrian/cyclist separations routes can be explore on the next phase of design..

Support continued rail operations and Caltrain service improvements
A temporary railroad track will be required, and a crossover track located north of the San Antonio Caltrain Station will be relocated. With the pump stations, there will be potential risks to train operations from flooding.

Finance with feasible funding sources (Order of magnitude cost)
The trench will require greater levels of local funding in the form of fees, taxes or special assessments, the feasibility of which are still being studied in the context of overall citywide infrastructure funding needs.

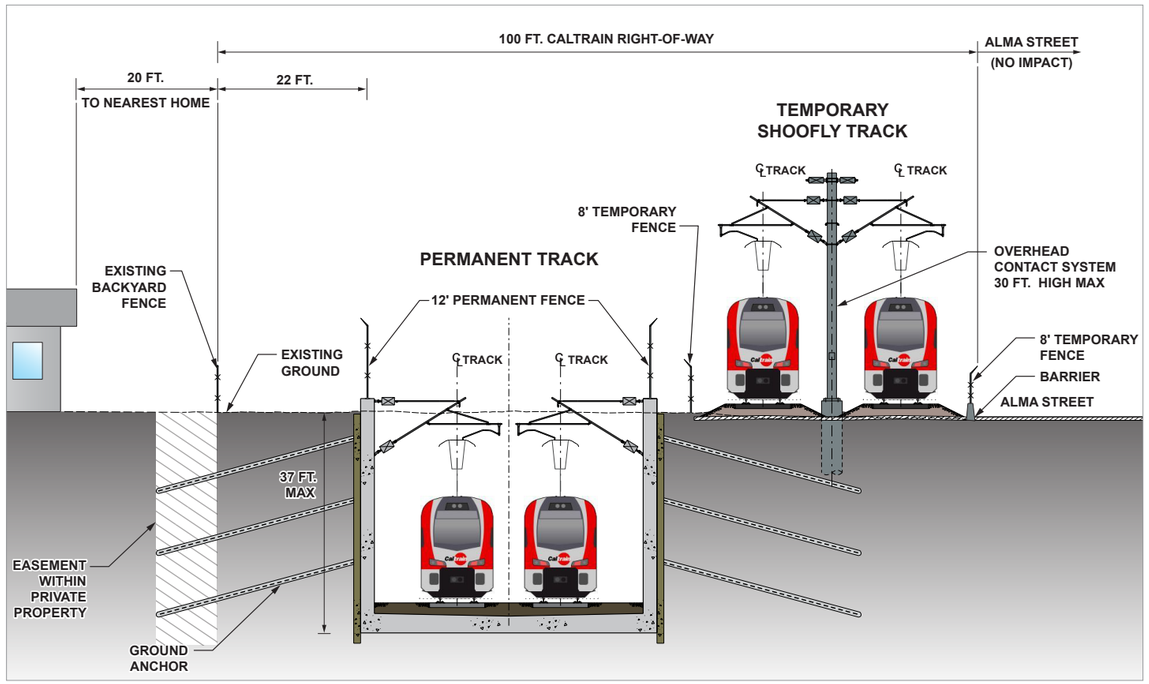
Reduce rail noise and vibration
Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations. Utilizing EMU trains instead of diesel locomotives will also reduce noise. Trains operating in trench will reduce noise in neighborhoods. Acoustically treated trench walls will eliminate acoustical reflections. There would be a slight reduction to vibration levels at nearby receptors.

Minimize visual changes along the corridor
Railroad tracks will be below grade with high fencing at grade. Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench retaining walls.

Maintain access to neighborhoods, parks, and schools along the corridor, while reducing regional traffic on neighborhood streets
No diversion of regional traffic with construction of grade separations.

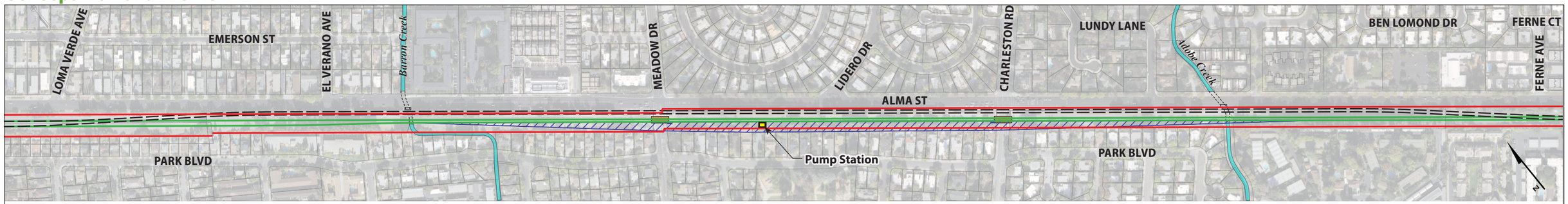
Minimize right-of-way acquisition (Private property only)
Subsurface acquisition will be required for the ground anchors for the trench retaining walls and private properties will be required for creek diversion pump station.

Minimize disruption and duration of construction
Extended road closures at Meadow Drive and Charleston Road are required. Construction would last for approximately 6 years.



Example Section - Trench - Looking North (Typical Between Meadow Drive & Charleston Road)

Concept Plan and Profile



LEGEND
- New Permanent Track
- Temporary Track (Shoofly)
- Caltrain Right-of-Way
- Existing Ground Level
- Trench Track Profile
- Creek
- Limits of Roadway Lowering
- Bridge
- Groundwater
- Ground Anchor Influence Area