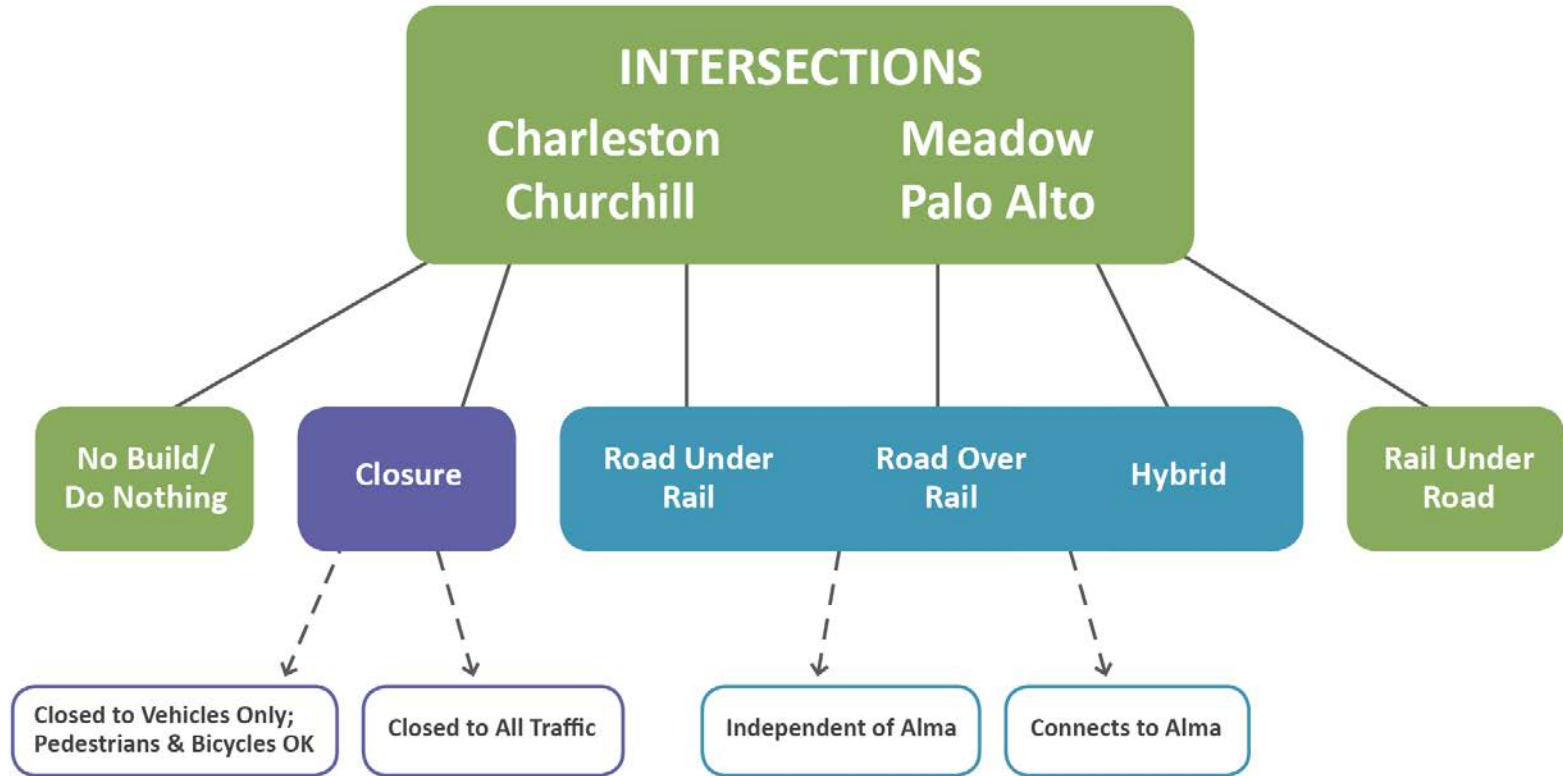




TYPES OF GRADE SEPARATIONS & CONSTRAINTS

SEPTEMBER 16, 2017

Potential Changes to Existing Crossings



Types of Crossing Modification

Road Closure at Tracks

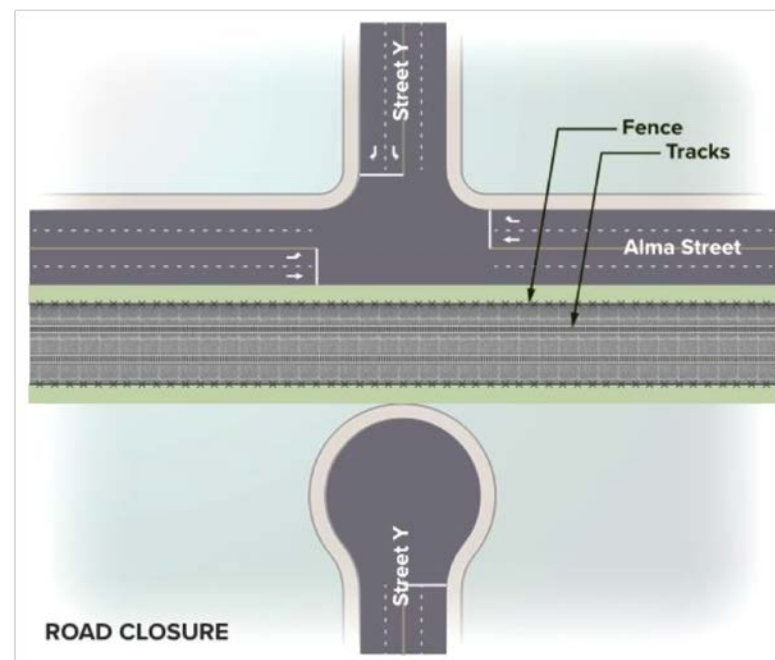
- Close City Road that crosses RR Property
- Fence RR Property
- Modify Alma intersection
- Reroute traffic to other crossings

Pros:

- Increased safety
- Eliminate train horn
- Traffic reduced on/near closed road
- Alma traffic improved
- Low cost
- Low property Impacts

Cons:

- Increased traffic on/near other crossings
- Longer routes for bikes/peds
- More vehicle trips



Types of Crossing Modification

Road Closure at Tracks

Sample location: North California Avenue, Palo Alto



Types of Crossing Modification

Lower Road/Ped/Bikes under tracks

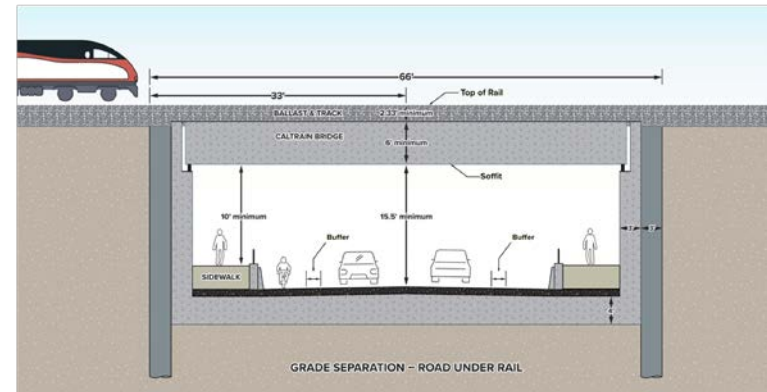
- Change local road profile to go under tracks
- Bike/Ped under RR – higher than road
- Retaining Walls parallel to road
- Train crosses over road on bridge – same elevation.
- Lower Alma to local road elevation

Pros:

- Increased safety
- Eliminate train horn
- Improved traffic flow on grade separated street

Cons:

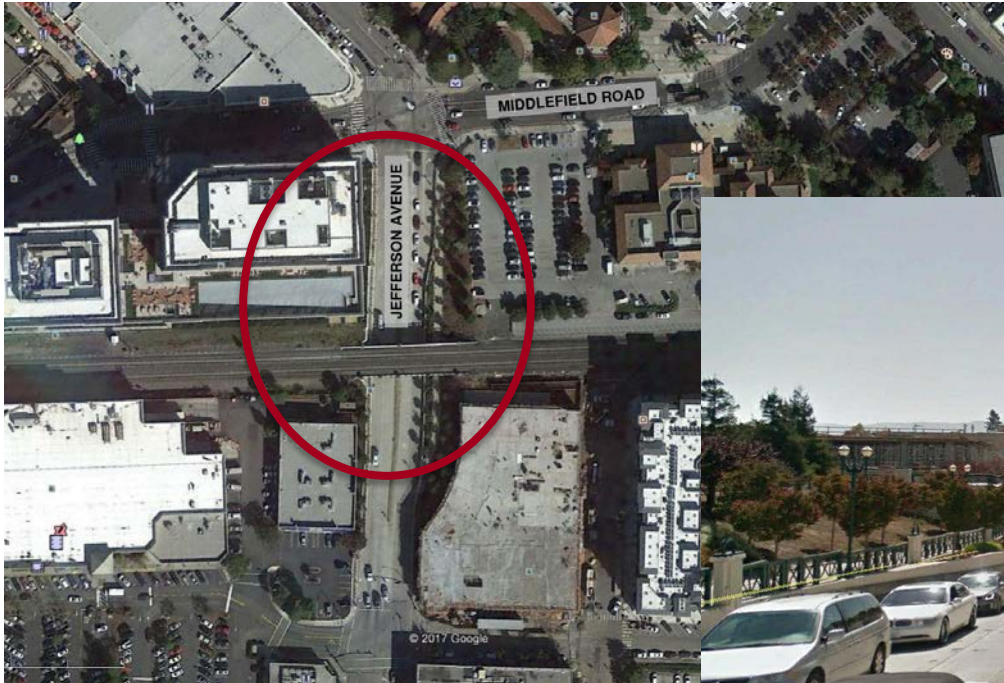
- Increased traffic on local street(s)
- Increased noise from vehicles
- Property impacts
- Potential impact to street system
- Utility impacts



Types of Crossing Modification

Lower Road/Ped/Bikes under tracks

Sample Location: Jefferson Ave, Redwood City



Types of Crossing Modification

Raise Road/Ped/Bikes over Tracks

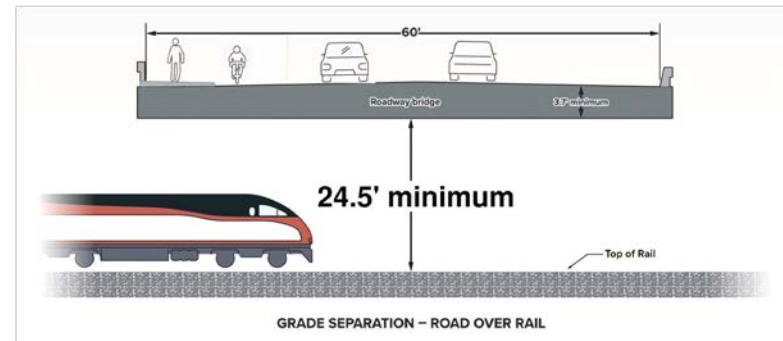
- Change local road profile to go over tracks
- Bike/Ped follow road profile
- Retaining Walls parallel to road
- Train crosses under road on existing ground
- Alma crosses under local road

Pros:

- Increased safety
- Eliminate train horn
- Improve traffic flow

Cons:

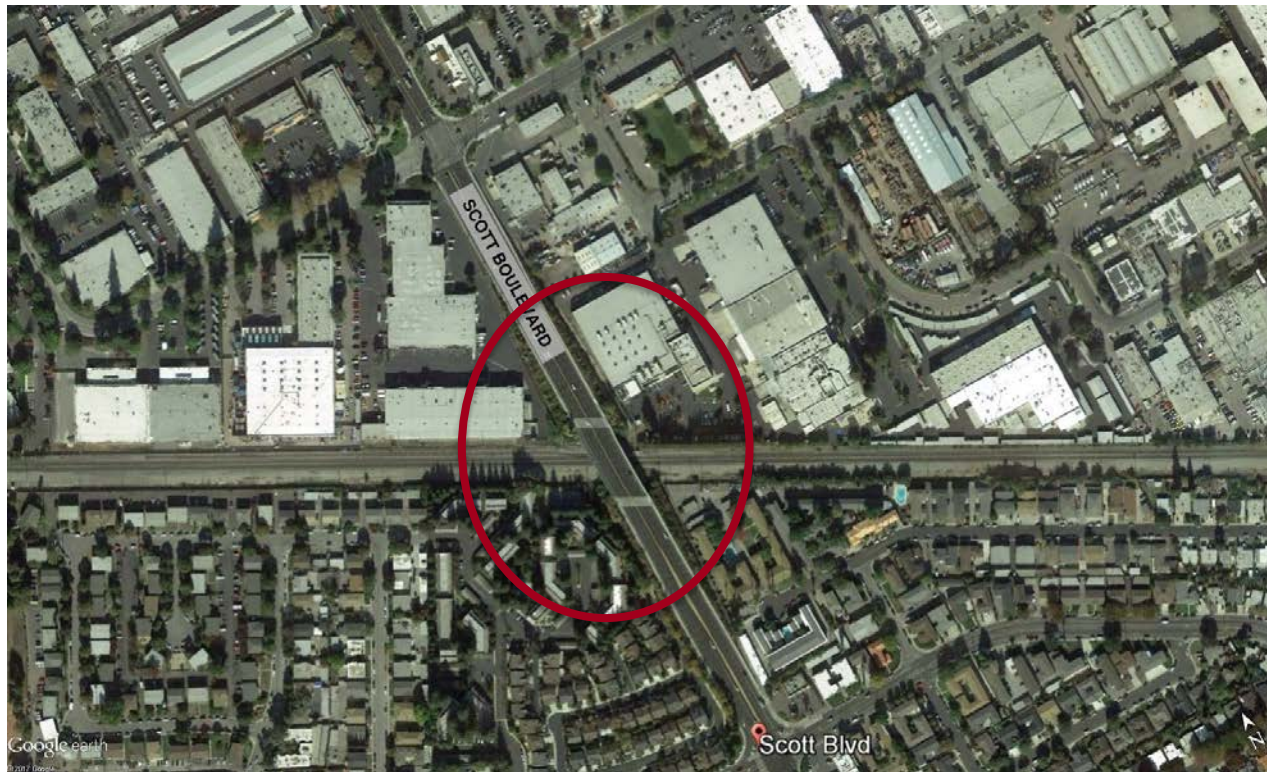
- Increased traffic on local road(s)
- Increased noise from vehicles
- Property impacts
- Local street connections lost
- Utility impacts



Types of Crossing Modification

Raise Road/Ped/Bikes over tracks

Sample location: Scott Boulevard, Santa Clara



Types of Crossing Modification

Hybrid Option 1 – Lower Road/Ped/Bikes + Raise tracks

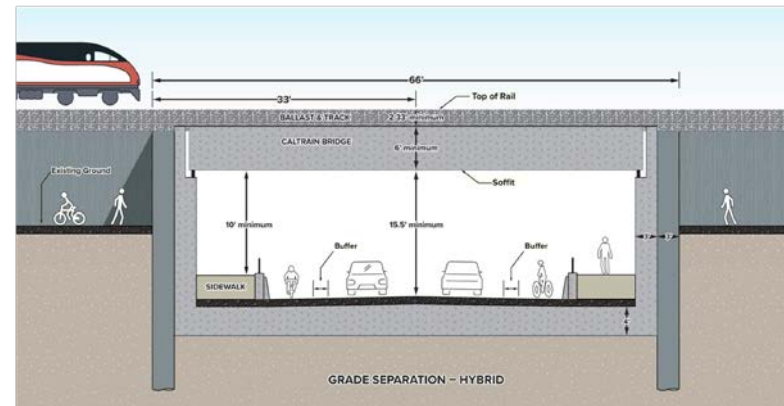
- Change local road profile to go under tracks
- Bike/Ped higher than road profile
- Retaining Walls parallel to road & parallel to tracks
- Train crosses over road at higher elevation
- Alma lowered to elevation of local road

Pros:

- Increased safety
- Eliminate train horn
- Improved traffic flow
- Reduced property impacts from other alternatives

Cons:

- Increased traffic on local road(s)
- Increased noise from vehicles and train travel
- Property impacts
- Utility impacts



Types of Crossing Modification

Hybrid Option 1 – Lower Road/Ped/Bikes and Raise tracks
Sample location: Holly Street, San Carlos



Types of Crossing Modification

Lower Railroad Tracks under Local Road

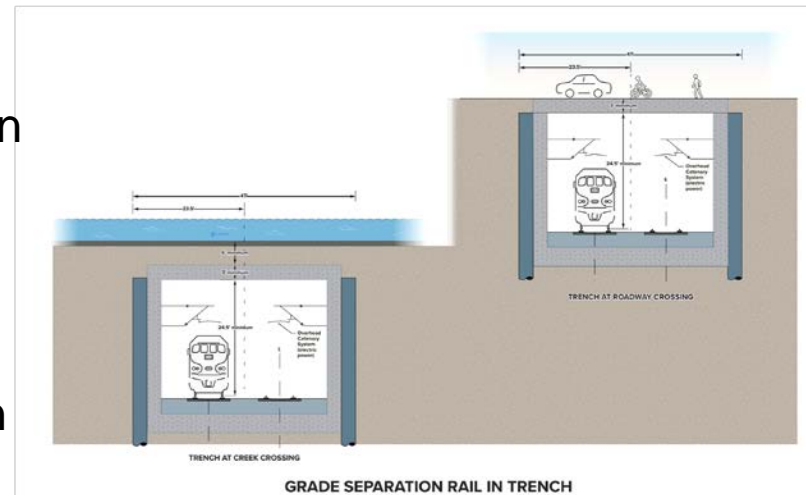
- Change RR profile to go under local road
- Bike/Ped stay at road elevation
- Retaining walls parallel to tracks
- Road crosses over RR tracks on bridge
- No impact to Alma (after construction)

Pros:

- Increased safety
- Eliminate train horn and reduce travel noise
- Improve traffic flow
- Few property impacts (after construction)

Cons:

- Increased traffic on local road(s)
- Increased noise from vehicles
- Utility impacts
- Major construction Impacts



Types of Crossing Modification

Lower RR Tracks under Local Road

Sample location: E Compton Boulevard, Compton
(Alameda Trench Corridor)



Project Constraints

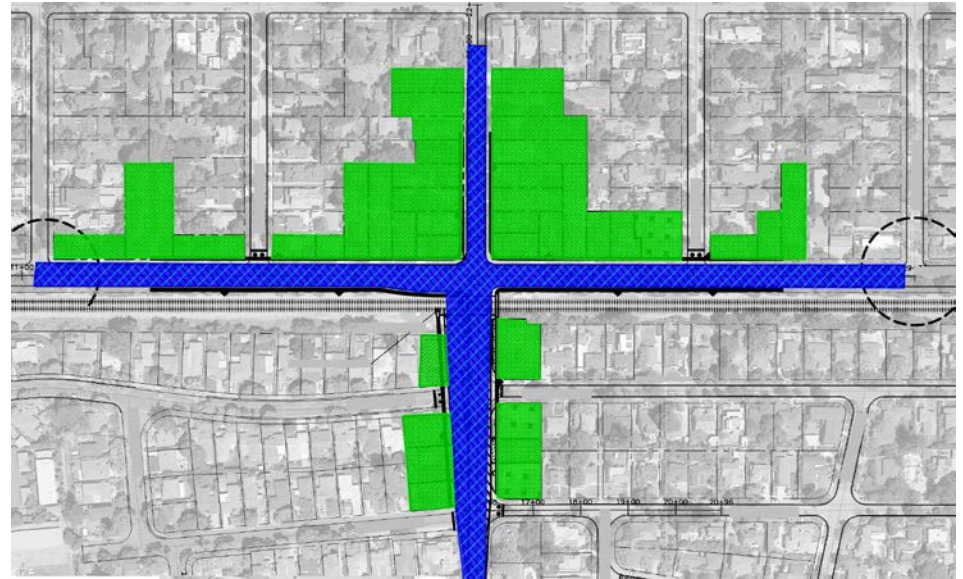
Existing Features, Conditions or Requirements that Influence Development of a Project:

- Property
- Utilities
- Creeks
- Grades (Design criteria)
- Alma Street
- Aesthetics
- Stations
- Existing undercrossings
- Caltrain modifications
- Ground water
- High-Speed Rail passing track
- Construction staging

Project Constraints

Property

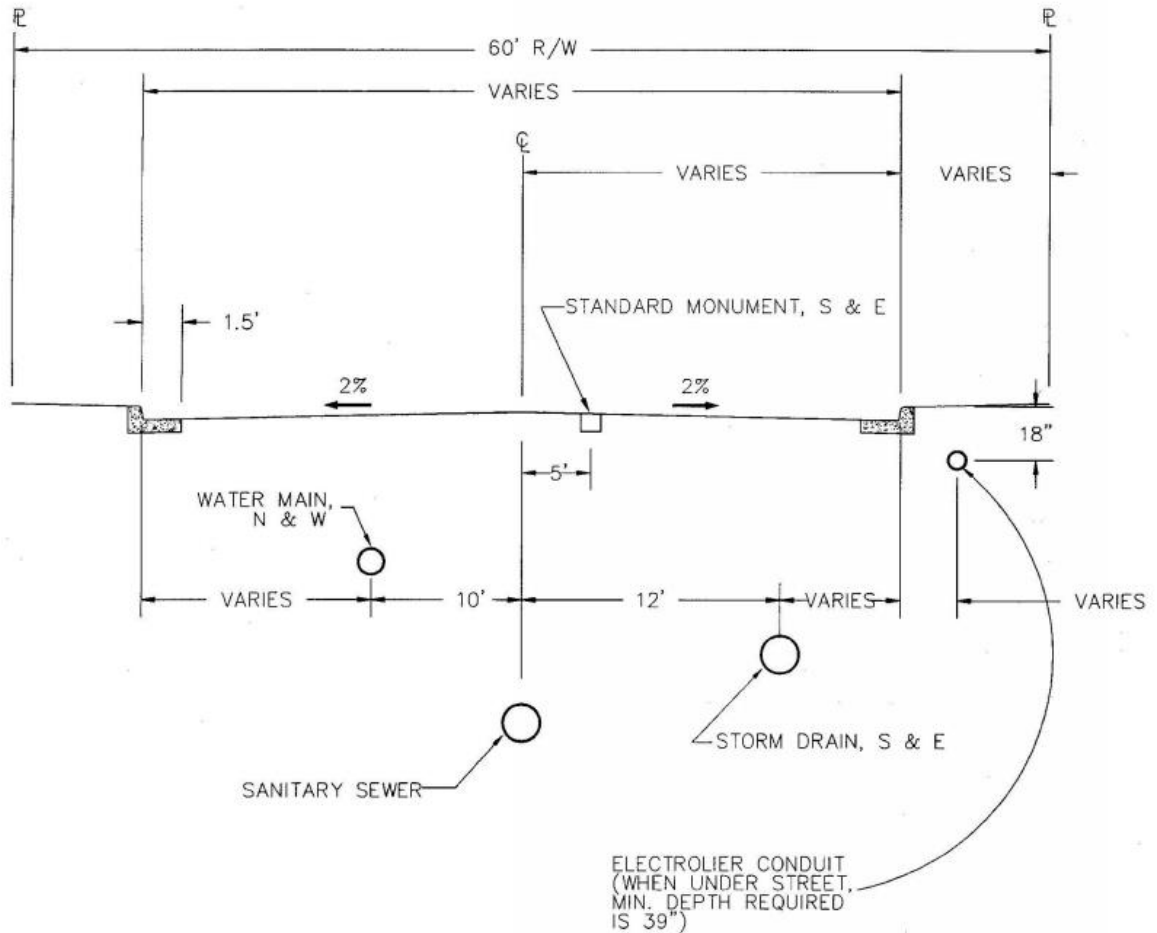
- City 'fully' developed - occupied parcels abut virtually all roads and/or Caltrain corridor
- Alternatives impact homes, schools, commercial property
- Property costs are high
- Challenge to replace lost use elsewhere



Project Constraints

Utilities

- Roadways are really utility corridors
- Aging utilities
- Gravity systems may require pumps



Project Constraints

Creeks

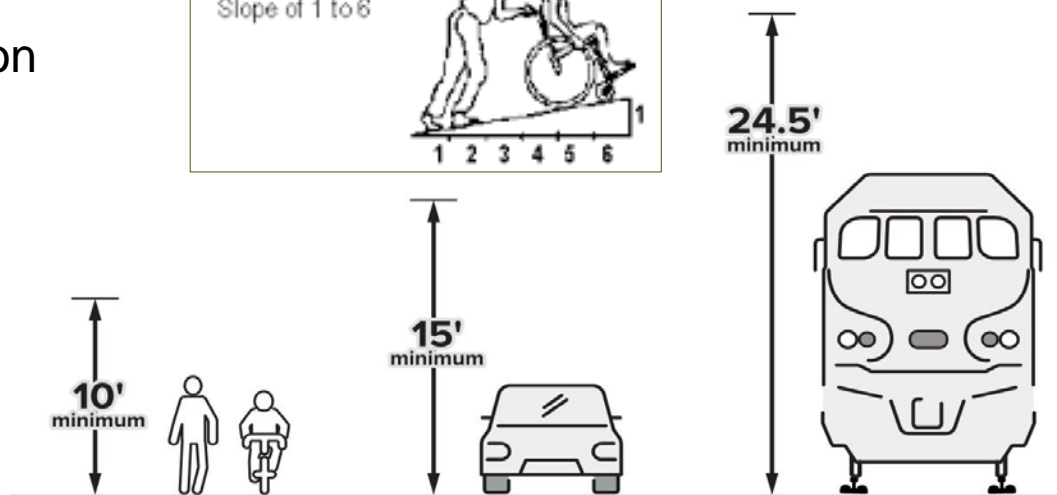
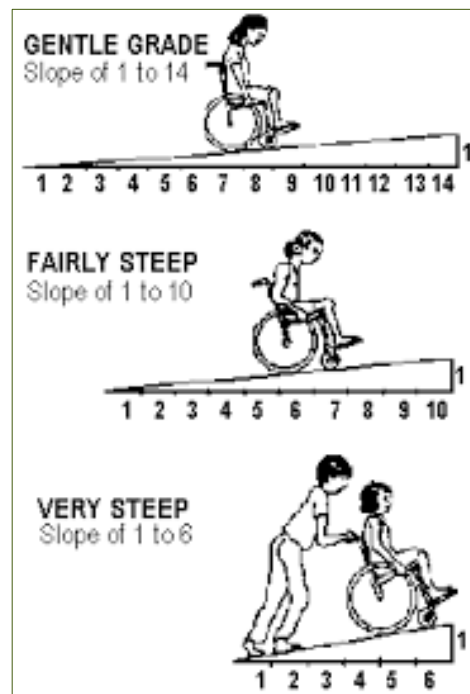
- Require 32.5' minimum clearance if RR tracks below
- Not relocatable



Project Constraints

Grades (Design Criteria)

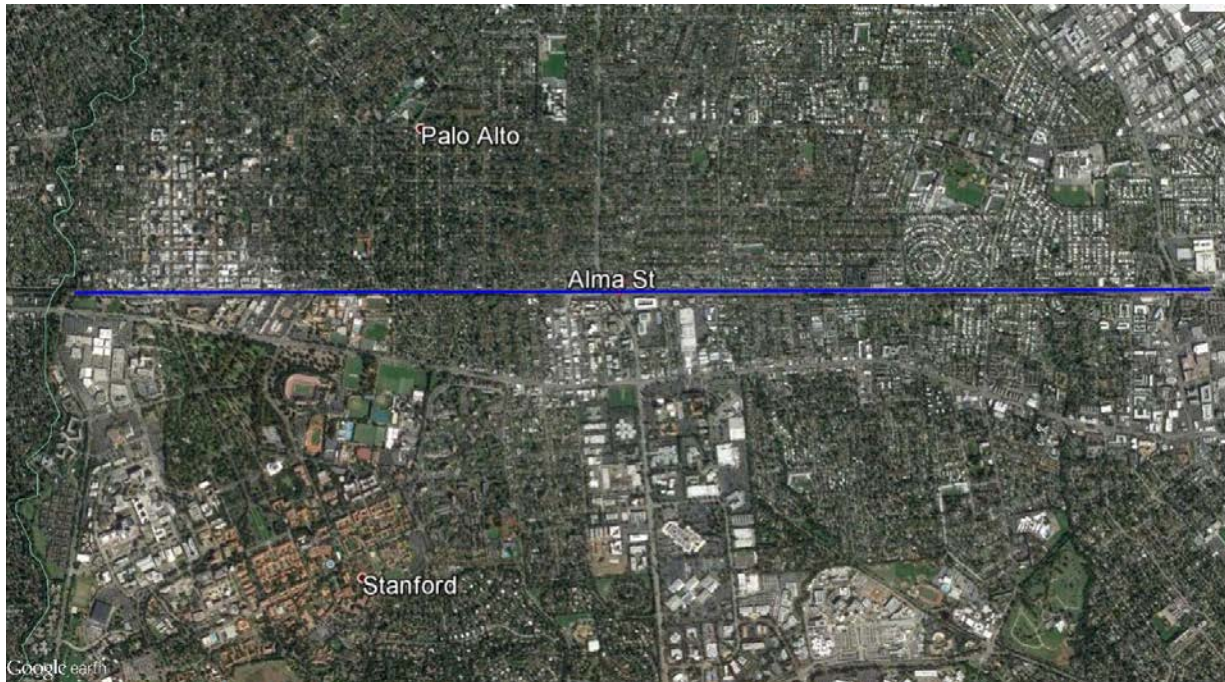
- Design speed defines profiles – safe sight distance
- Minimum vertical clearances must be achieved (see right)
- RR max standard grade = 1%
- ADA max grade = 5%
- Roadways up to 8% could discourage active transportation



Project Constraints

Alma Street

- Parallels Caltrain tracks in Palo Alto
- Major transportation corridor in the City
- Losing connections from local streets affects overall circulation in city



Project Constraints

Aesthetics

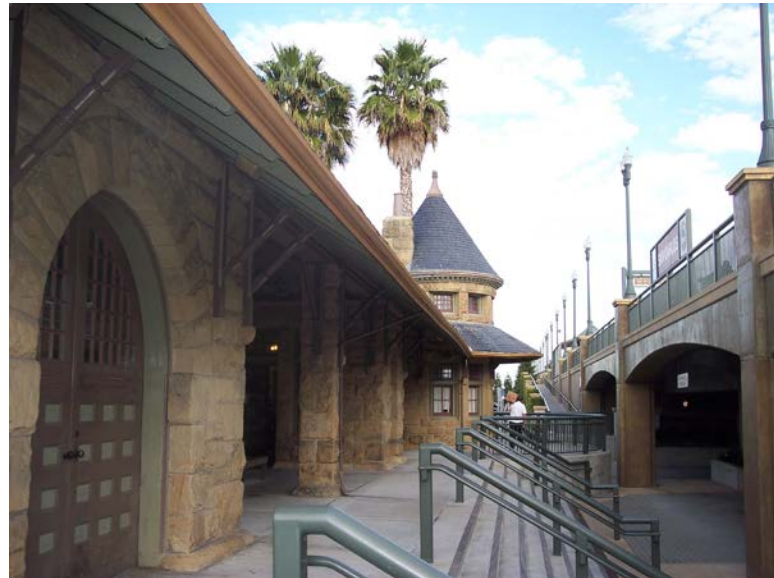
- Outside downtown, low rise development
- Elevating roadway (up to 35') or train (up to 30') would be visible change
- Grade separations will change current 'feel' of local neighborhood(s)



Project Constraints

Caltrain Stations

- Changing profile of RR tracks could impact station
- Requires level section of track up to 1000' long
- Access to stations could be changed, perhaps up or down



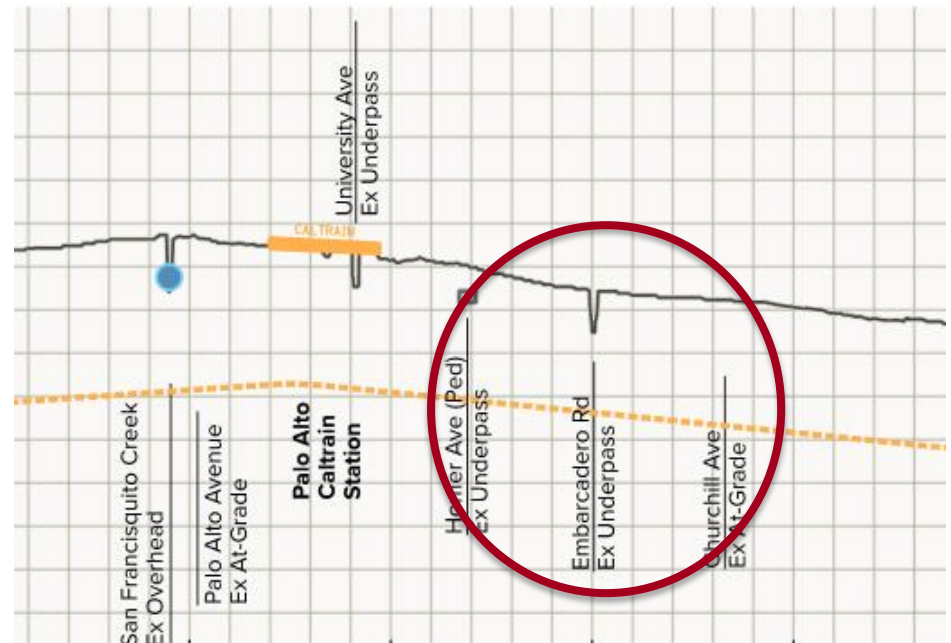
Project Constraints

Existing Undercrossing

Sample Location:

Embarcadero Road, Palo Alto

- Lowering railroad would allow and/or require rebuilding.
- If Undercrossing stays, train must be lower => longer trench



Project Constraints

Caltrain Modifications

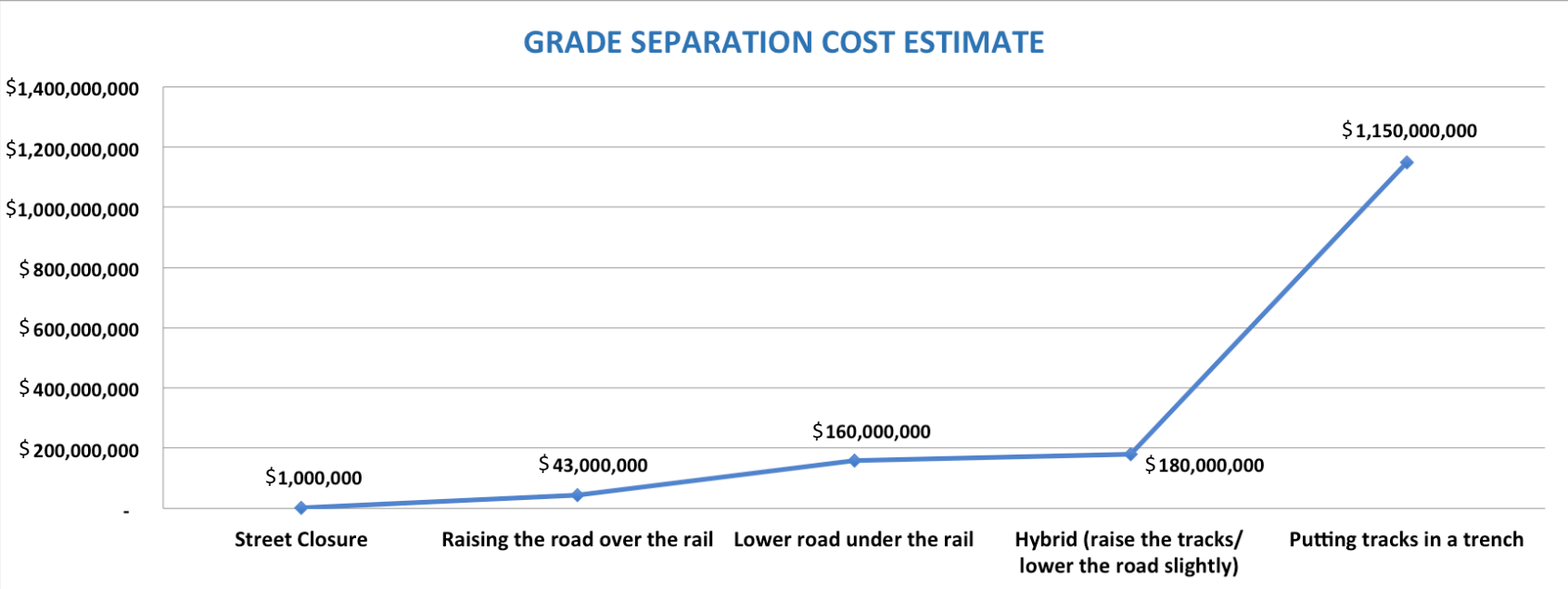
- Electrification increases cost of any changes to Caltrain facility
- Construction staging more complicated in order to keep OCS operational
- OCS adds visual element to RR corridor when at or above existing grade



Project Constraints

Cost

- Project Costs range from \$1,000,000-\$1,150,000,000



Additional Project Constraints

Ground Water

- Ranges 10-30'+ below grade
- Underground water flows in 'rivers to the bay'

High-Speed Rail Passing Track

- Makes all grade separations bridges longer/wider
- Impacts more property, utilities, etc.
- Complicates construction
- Increases project costs

Construction Staging

- Temporary impacts to traffic, property, utilities



RAIL CORRIDOR PRESENTATION #2

SEPTEMBER 16, 2017

Project Constraints

Groundwater

- Groundwater ranges from as little as 10 feet up to 30 feet or more below existing ground
- Impacts structures
- Underwater 'rivers' potentially impacted as water flows to bay

