

RAIL MEETING

1/23/24

1

Received Before Meeting



CITY OF
**PALO
ALTO**

Connecting Palo Alto Projects

Caltrain Technical Review

January 23, 2024

www.cityofpaloalto.org

Purpose

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- Rail Committee's review of comments to provide guidance to staff on specific elements.
- Direct staff to proceed coordination with Caltrain Staff or their Consultants and/or City's project consultant for material changes to alternatives

Background

Goal

- Select Preferred Alternative to Proceed with Preliminary Engineering and Environmental Phase

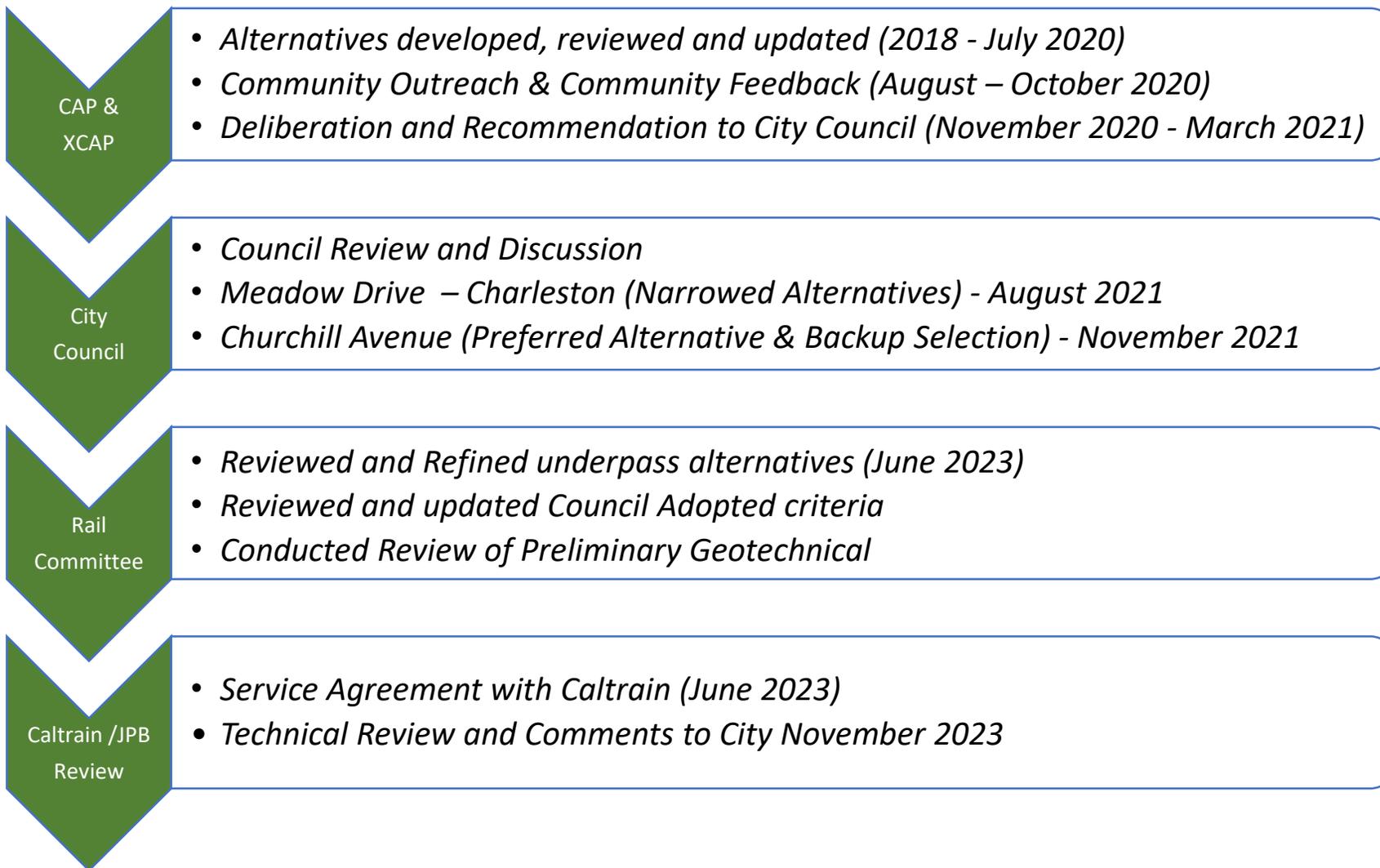
Objective

- Federal Railroad Administration (FRA) Grant Funding Agreement in place by July 1, 2024.

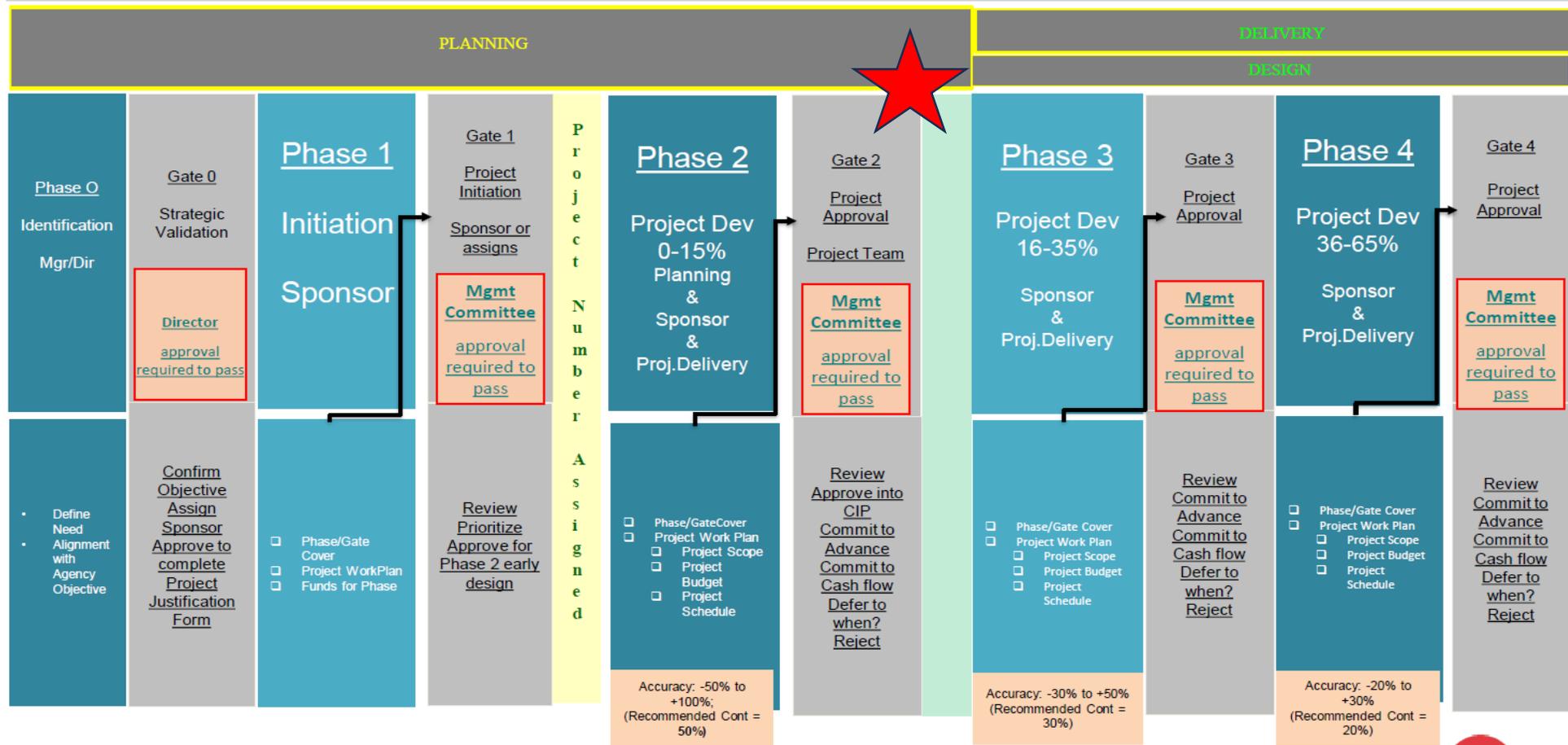
Guidance

- Rail Committee to provide guidance to on implementing design changes sufficient to support the goal.

Background



Overview of Caltrain Capital Project Management Process



Major Elements

- **Vertical Alignment**

- Vertical Clearance
- Bridge Structure Elevation (Viaduct Only)
- Railroad Grade Profile
- Pedestrian and Bicycle Path Clearance

- **Horizontal Alignment**

- Roadway Encroachment into Caltrain ROW
- Pedestrian & Bicycle Facilities Encroachment into Caltrain ROW
- Railroad Encroachment into City's ROW
- Retaining Wall offset/clearance from structures and roadways
- Maintenance Access requirement along the railroad tracks
- Clearance for MSE Wall construction during construction and maximize use of ROW

- **Four Track Segment**

- Four Track segments and Roadway encroachment into Caltrain ROW
- Four Tracking Alignment

- **Roadway Design**

- Road Profile, Sag Curves, Grades etc.
- Offset from Barriers
- Acceleration/Deceleration Lanes, Lane drops, weaving distance, etc.
- Roundabout Design
- Curved bridges

- **Construction Technology**

- Shoofly vs Box Jacking

- **Culverts**

- Reconstructing and extending culverts

- **Cost Estimates**

- Preliminary Cost Estimates

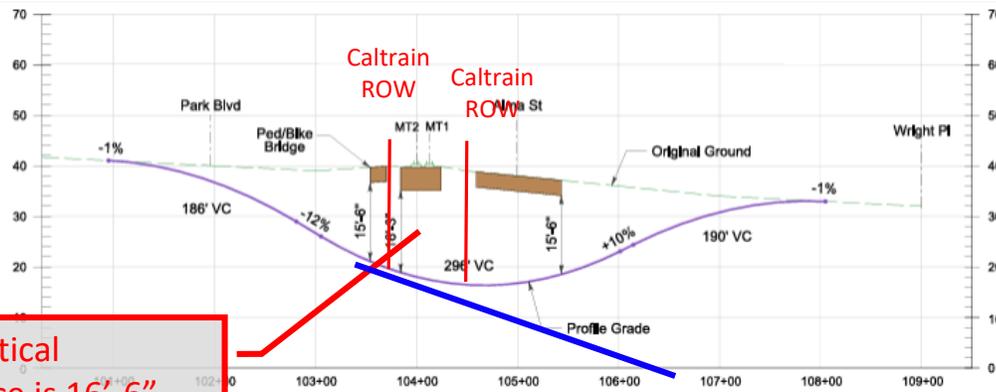
- **Cumulative Concerns**

- Compounded impacts from above comments

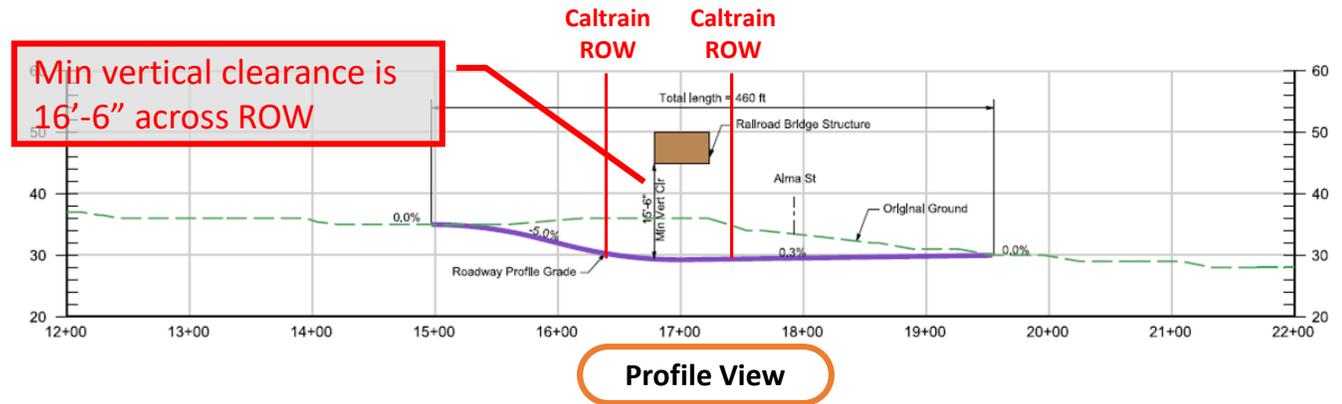
Vertical Alignment (Correction)

1. Vertical Dimensions (Roadway Vertical Clearance required across Caltrain ROW)

- Vertical Clearance for vehicular traffic under the Railroad (Increase from 15.5' to 16.5')



Charleston Rd Profile
Meadow Drive Underpass



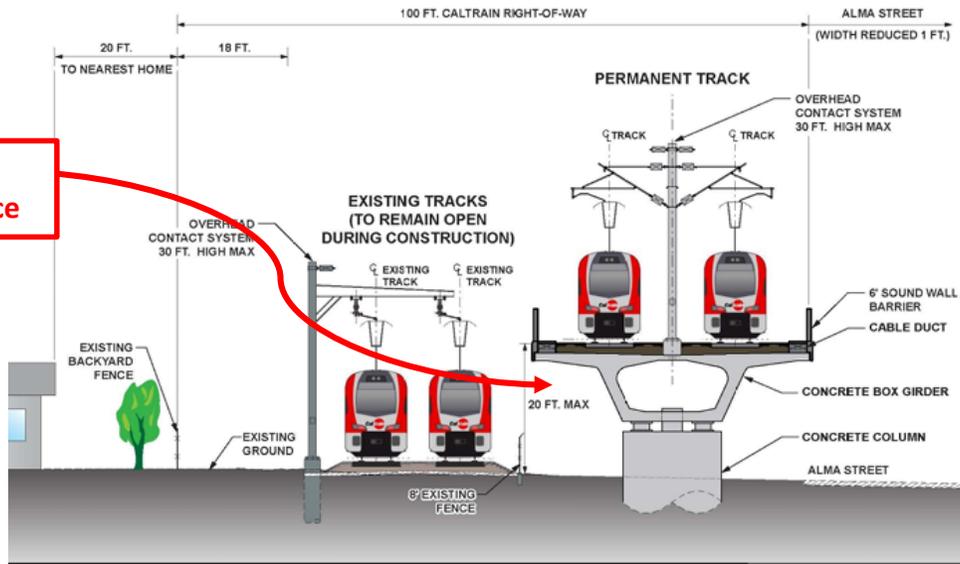
Meadow Charleston - Hybrid

Vertical Alignment (Correction)

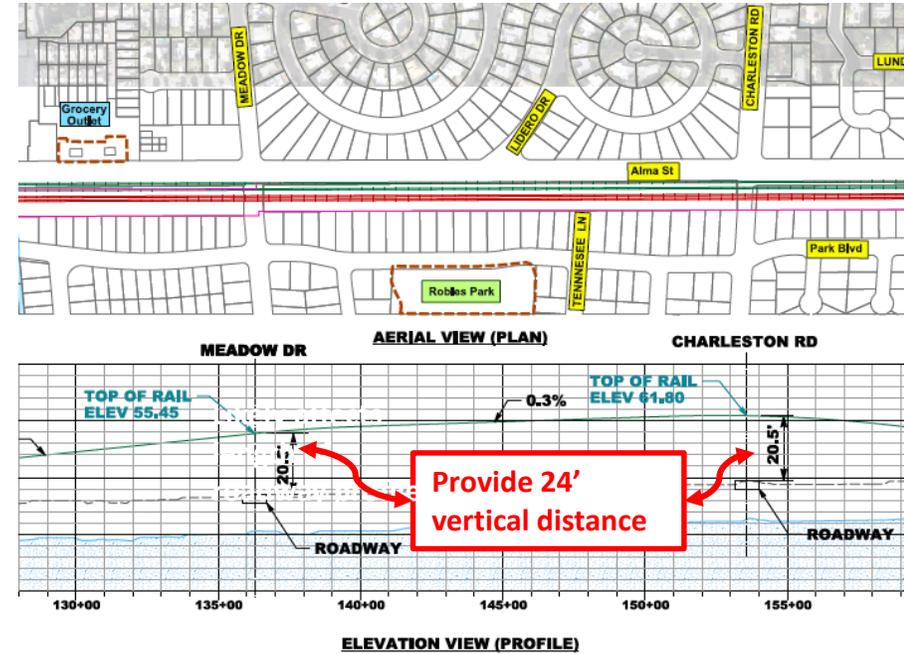
2. Vertical Dimensions (Top of Rail to Top of Roadway – Viaduct Alternative only)

- Vertical Clearance for vehicular traffic under the Railroad (Increase from 20.5' to 24.0')

Provide 24' vertical distance



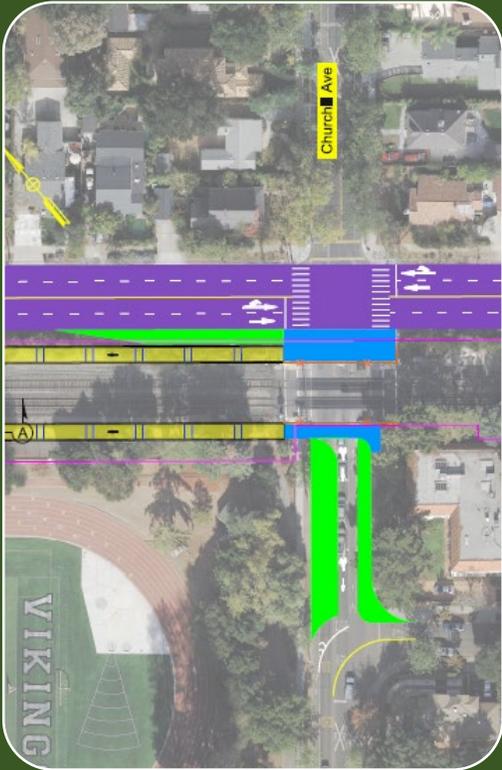
Example Section - Viaduct - Looking North
(Typical Between Meadow Dr & Charleston Rd)



Meadow Charleston - Viaduct Alternative

Summary of Comments - Churchill Avenue

Churchill Closure with Mitigations - Option 1

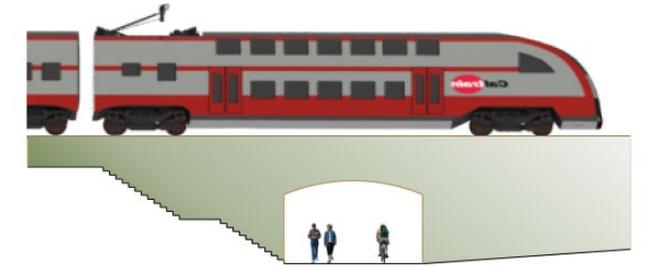
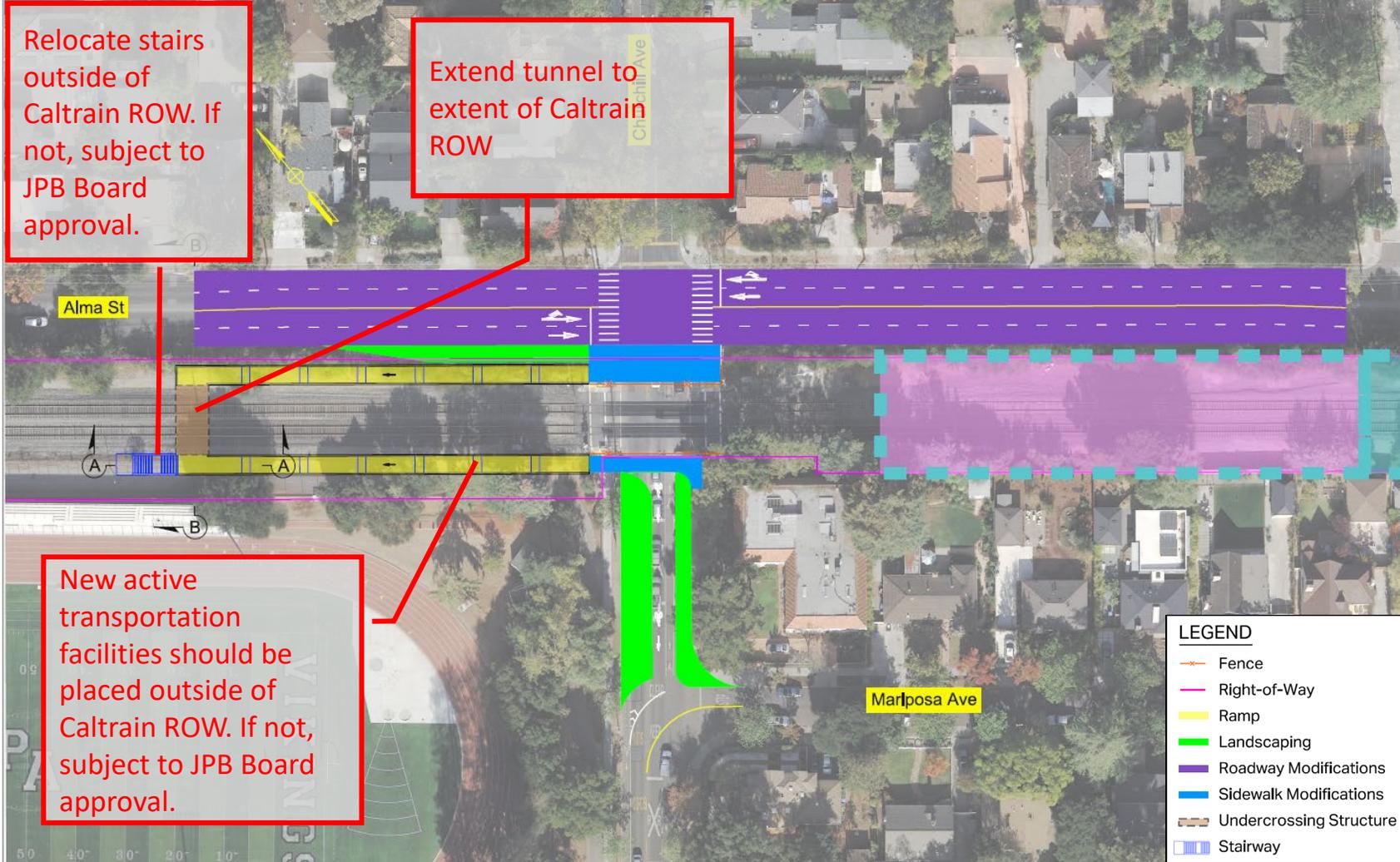


- New active transportation facilities should be placed outside of Caltrain ROW. If not, they are subject to JPB Board approval

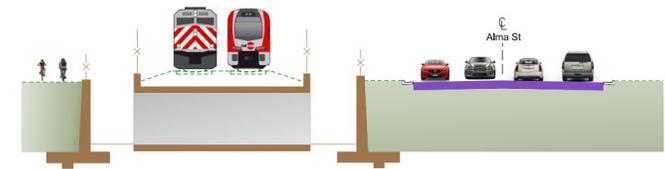
* No Changes for Churchill Avenue Closure with Mitigations Option 2

Summary of Comments - Churchill Avenue – Closure Option 1

Plan View



Section A-A

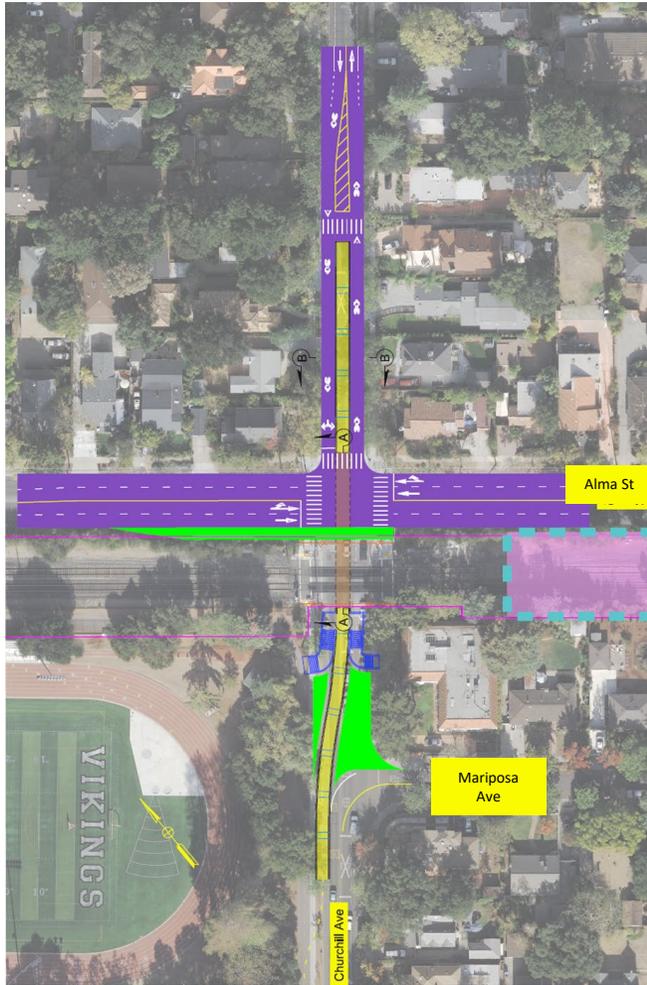


Section B-B

4-Track Influence Area

Transition between 2-Track and 4-Track

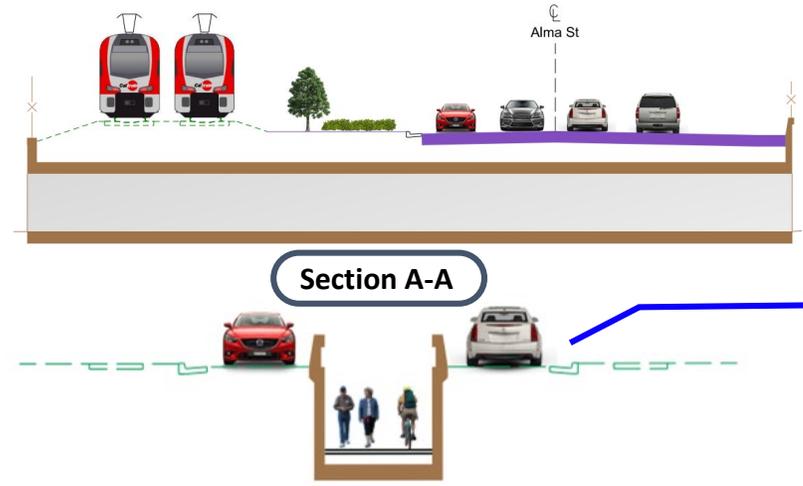
Summary of Comments - Churchill Avenue – Closure Option 2



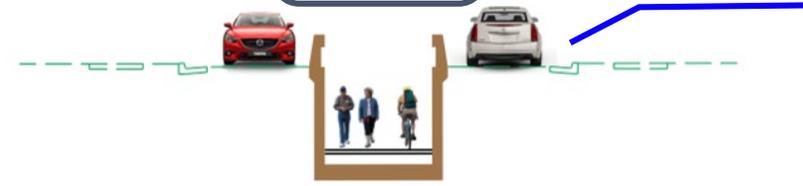
Plan View

- LEGEND**
- Fence
 - Right-of-Way
 - Ramp
 - Landscaping
 - Roadway Modifications
 - Sidewalk Modifications
 - Undercrossing Structure
 - Stairway

No Major/Significant Concerns



Section A-A



Section B-B

Show lane width and shoulder dimensions

Summary of Comments - Churchill Avenue

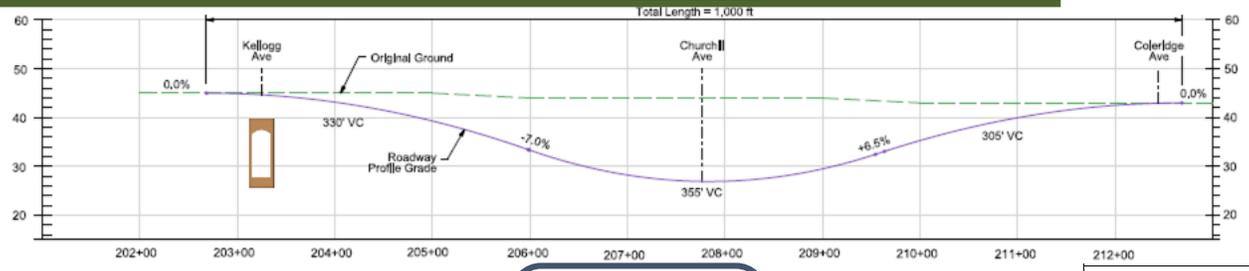
Churchill - Partial Underpass



- New active transportation facilities should be placed outside of Caltrain ROW. If not, they are subject to JPB Board approval.
- Adjust retaining walls outside of Caltrain ROW.
- Provide 16'6" vertical clearance requirement for the extent of the Caltrain ROW—will require reprofiling of roadway
- Bridge width to provide access for Caltrain maintenance and emergency vehicles.
- Roadway design to meet Caltrans HDM/AASHTO 'Greenbook' /AASHTO 'Highway Safety Manual'

Summary of Comments - Churchill Avenue – Partial Underpass

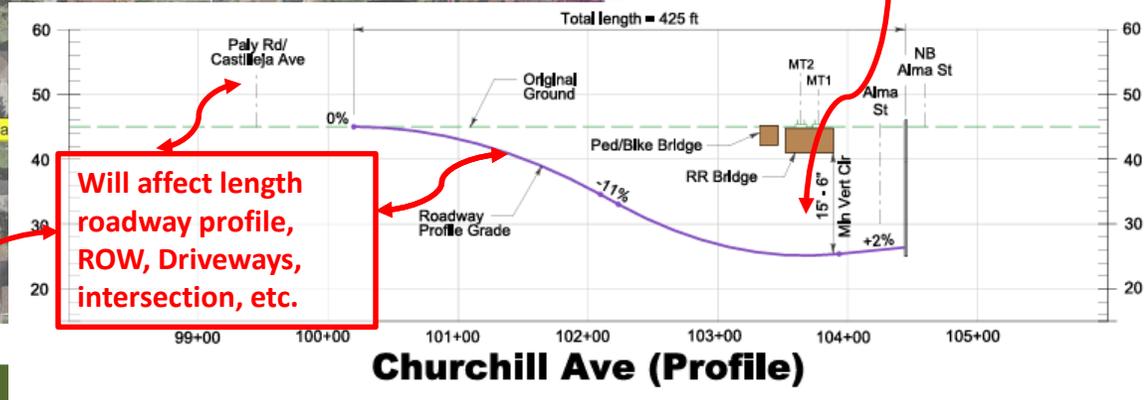
- 4-Track Influence Area
- Transition between 2-Track and 4-Track



LEGEND:

- Track
- Retaining Wall
- Right-of-Way
- Roadway Modifications
- Ped/Bike Ramps & Sidewalks
- Structure
- Direction of Traffic

- Other elements:
- Merging taper/median design
 - Offset from barriers
 - Lane width etc.
 - Curved bridges



Summary of Comments – Meadow Drive & Charleston Road

Meadow Charleston - Underpass



- Provide 16'6" vertical clearance requirement for the extent of the Caltrain ROW—will require reprofiling of roadway.
- Provide bridge width to provide access for Caltrain maintenance and emergency vehicles.
- Adjust retaining walls outside of Caltrain ROW to accommodate 4-track and 4-track transitions, provide sufficient space (10' min) for maintenance vehicle access, and maximize utility of Caltrain ROW.
- Roadway design to meet Caltrans HDM/AASHTO 'Greenbook'/AASHTO 'Highway Safety Manual'

Summary of Comments – Meadow Dr - Underpass

Plan View (Meadow Drive)

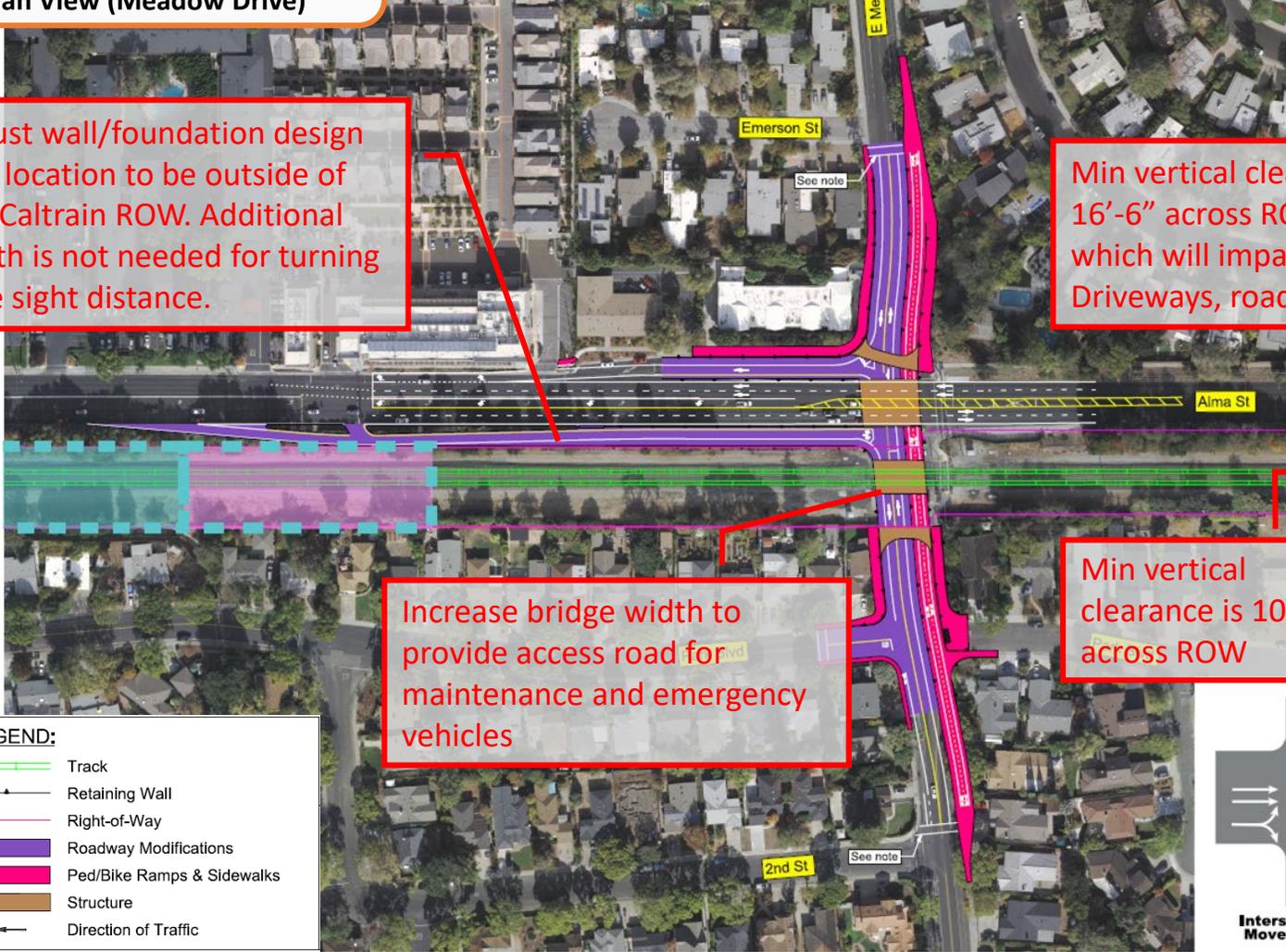
Adjust wall/foundation design and location to be outside of the Caltrain ROW. Additional width is not needed for turning lane sight distance.

Min vertical clearance is 16'-6" across ROW, which will impact ROW, Driveways, road profile.

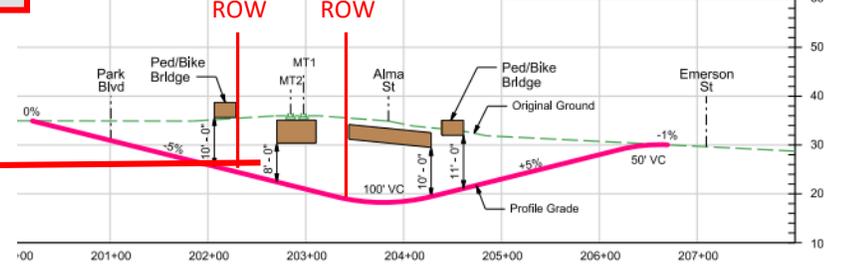
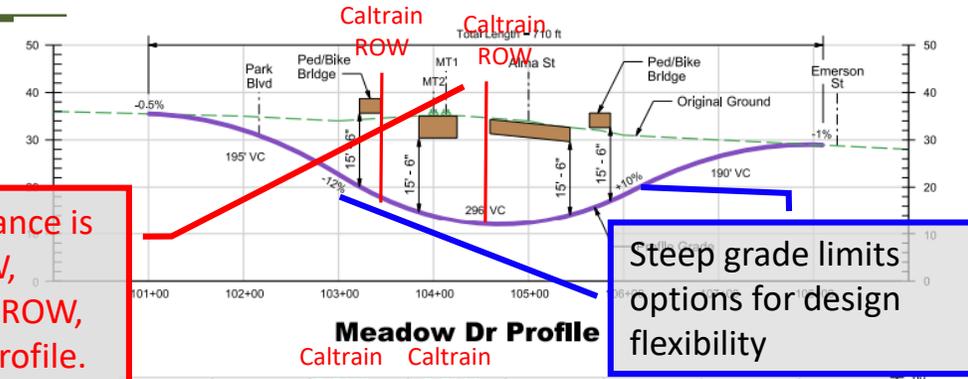
Increase bridge width to provide access road for maintenance and emergency vehicles

Min vertical clearance is 10' across ROW

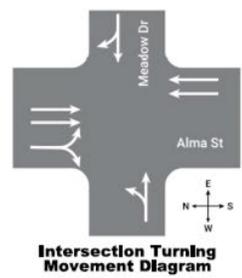
- LEGEND:**
- Track
 - Retaining Wall
 - Right-of-Way
 - Roadway Modifications
 - Ped/Bike Ramps & Sidewalks
 - Structure
 - Direction of Traffic



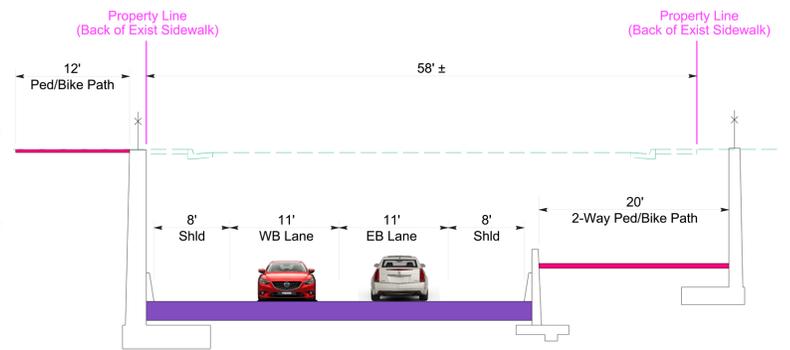
4-Track Influence Area Transition between 2-Track and 4-Track



Ped/Bike Profile from Park Blvd to Emerson St



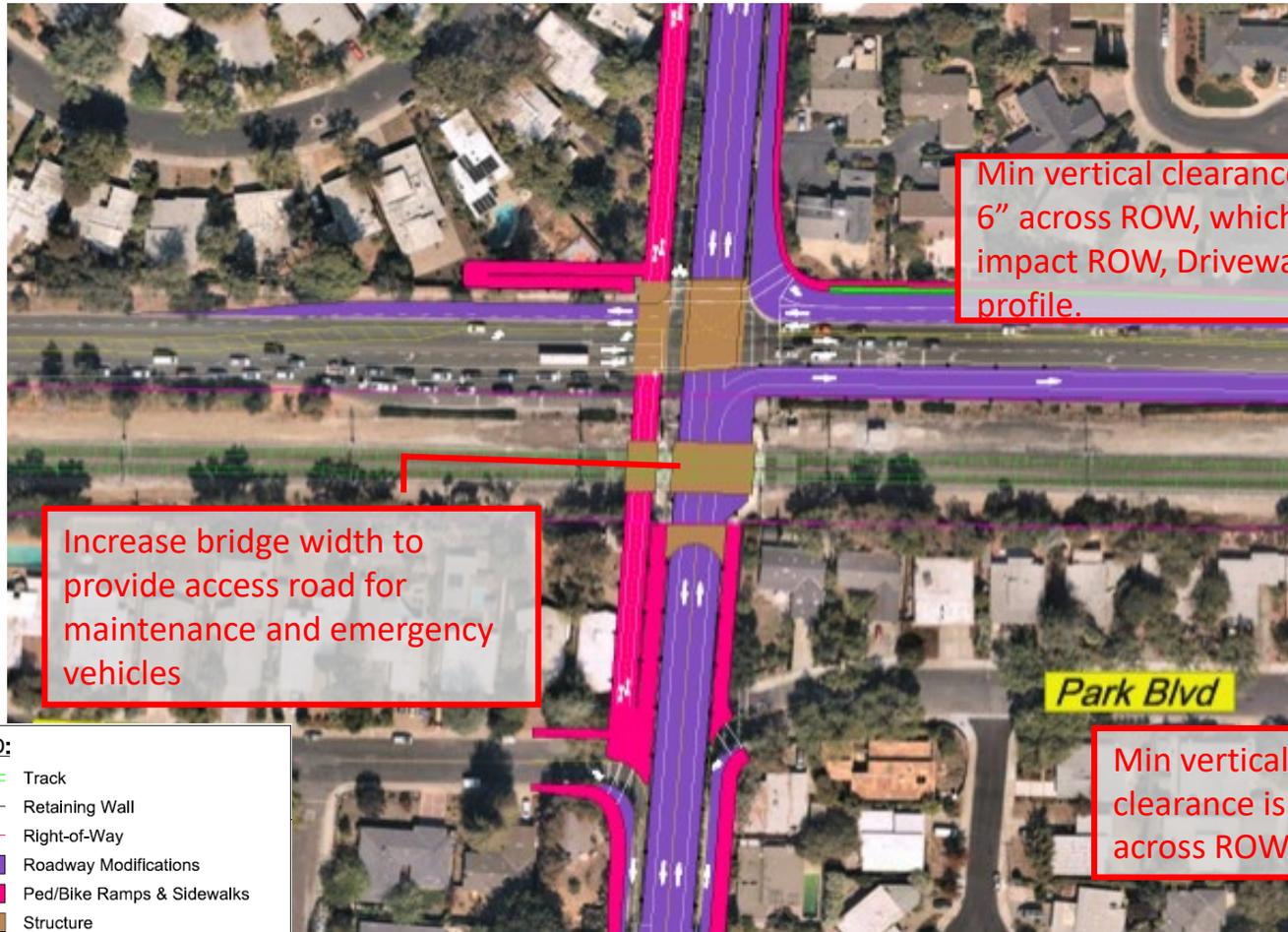
Intersection Turning Movement Diagram



Typical Section Meadow Dr Underpass

Summary of Comments –Charleston Rd - Underpass

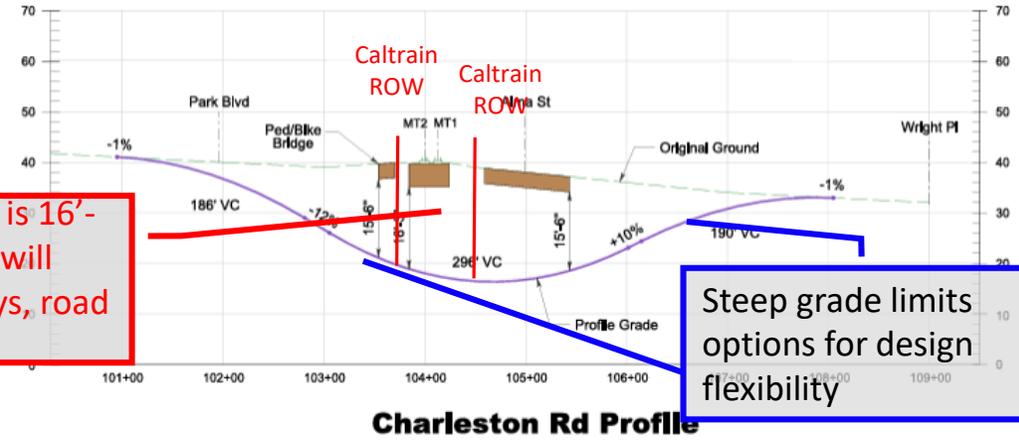
Plan View (Meadow Drive)



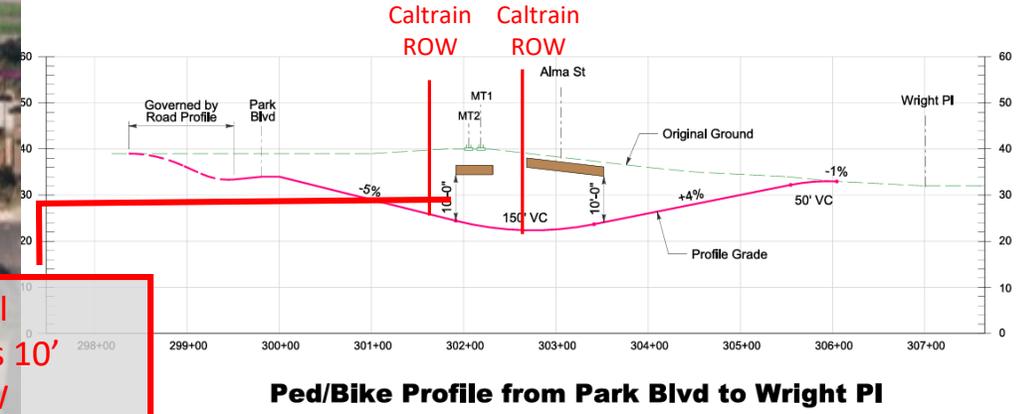
Min vertical clearance is 16'-6" across ROW, which will impact ROW, Driveways, road profile.

Increase bridge width to provide access road for maintenance and emergency vehicles

- LEGEND:**
- Track
 - Retaining Wall
 - Right-of-Way
 - Roadway Modifications
 - Ped/Bike Ramps & Sidewalks
 - Structure
 - Direction of Traffic



Steep grade limits options for design flexibility



Min vertical clearance is 10' across ROW



Summary of Comments – Meadow Drive & Charleston Road

Meadow Charleston - Hybrid



- Provide 16'6" vertical clearance requirement for the extent of the Caltrain ROW.
- Adjust retaining walls to accommodate 4-track and 4-track transitions.
- Provide sufficient space (10' min) for maintenance vehicle access and maximize utility of Caltrain ROW.
- Provide sufficient space (10' min) clearance from the walls to the roadway or structures
- Construction of permanent MSE walls to be at 20' from center of shoofly track—constructability clearance from OCS and active railroad.

Summary of Comments – Meadow Dr & Charleston Rd - Hybrid

 4-Track Influence Area
 Transition between 2-Track and 4-Track

Provide additional width on the bridge to accommodate access road for maintenance and emergency vehicles

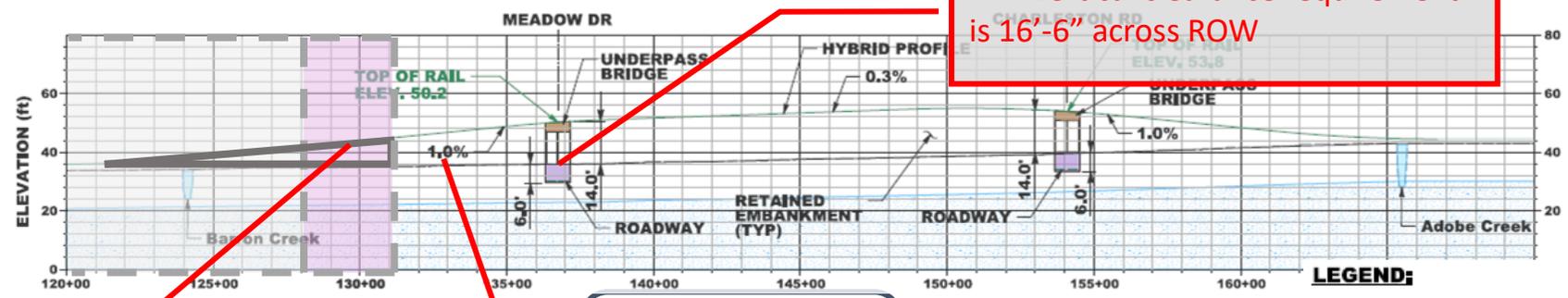
Fill retaining walls to accommodate 4-track and transition between 2-track and 4-track



Plan View

Design speed is 110 mph for passenger rail

Min vertical clearance requirement is 16'-6" across ROW



Profile

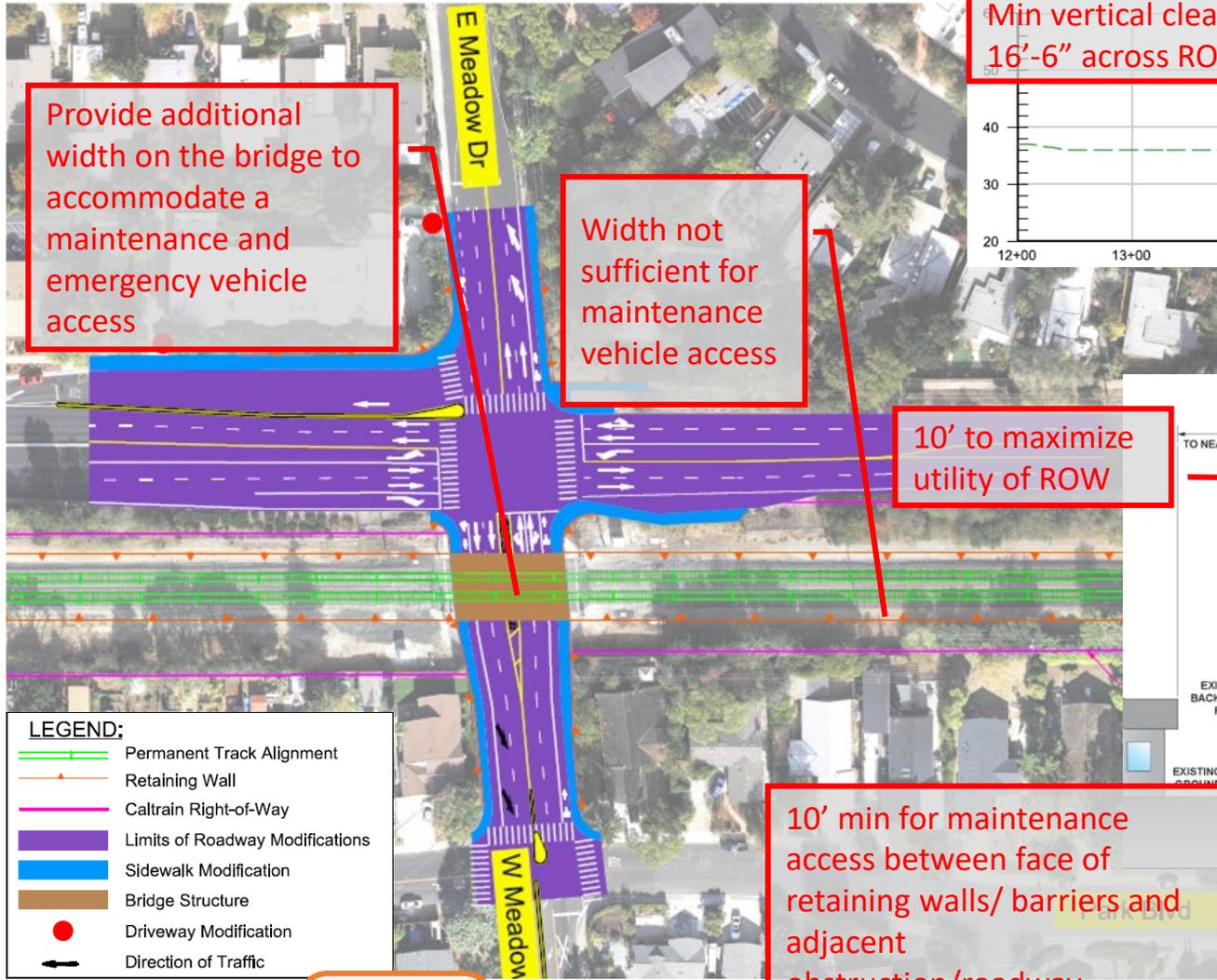
Transition segment should be tangent as special trackwork should stay outside of vertical curves

1% grade is the current maximum without variance. 1% to 2% grade requires review and approval by the Director of Engineering

LEGEND:

— New Permanent Track	 Bridge
- - - Temporary Track (Shoofly)	 Landmark
— Hybrid Track Profile	 Creek
- - - Existing Ground Level	 Groundwater
— Caltrain Right Of Way	 Limits Of Roadway Lowering

Summary of Comments – Meadow Dr - Hybrid



Provide additional width on the bridge to accommodate a maintenance and emergency vehicle access

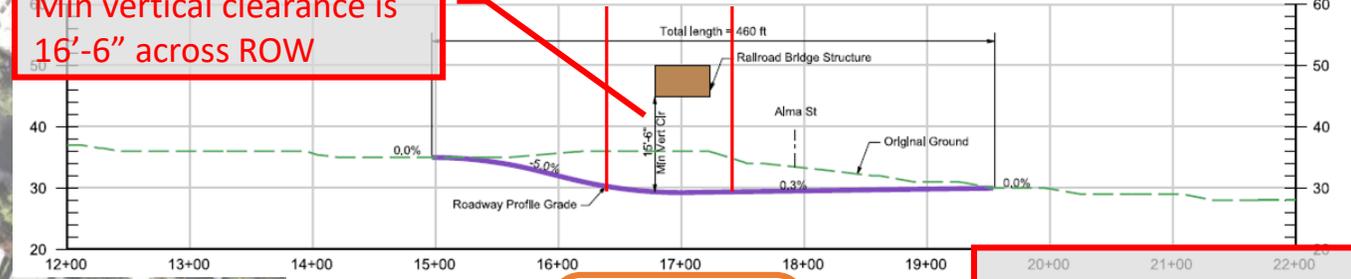
Width not sufficient for maintenance vehicle access

10' to maximize utility of ROW

10' min for maintenance access between face of retaining walls/ barriers and adjacent obstruction/roadway

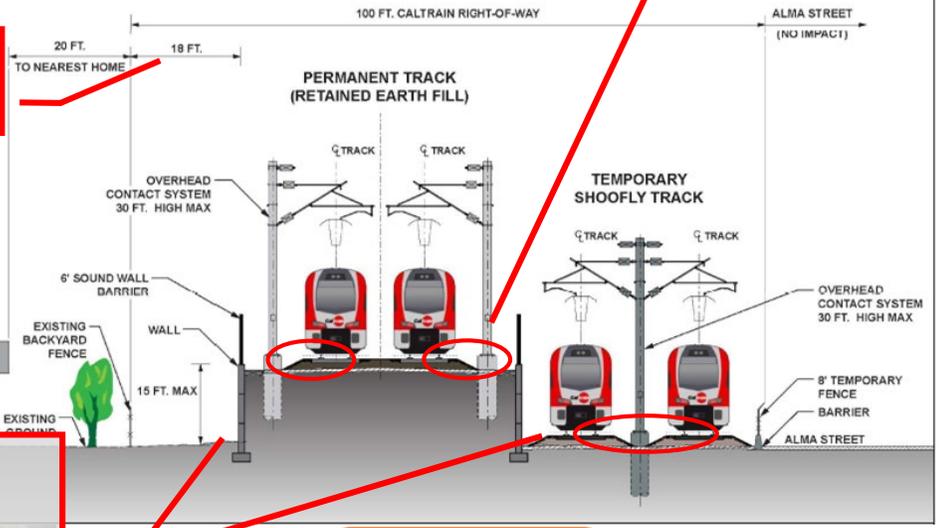
Plan View

Min vertical clearance is 16'-6" across ROW



Profile View

Confirm proximity of OCS and centerline of tracks



Typical Section

Summary of Comments – Charleston Rd - Hybrid

Provide additional width to the bridge for maintenance and emergency vehicle access

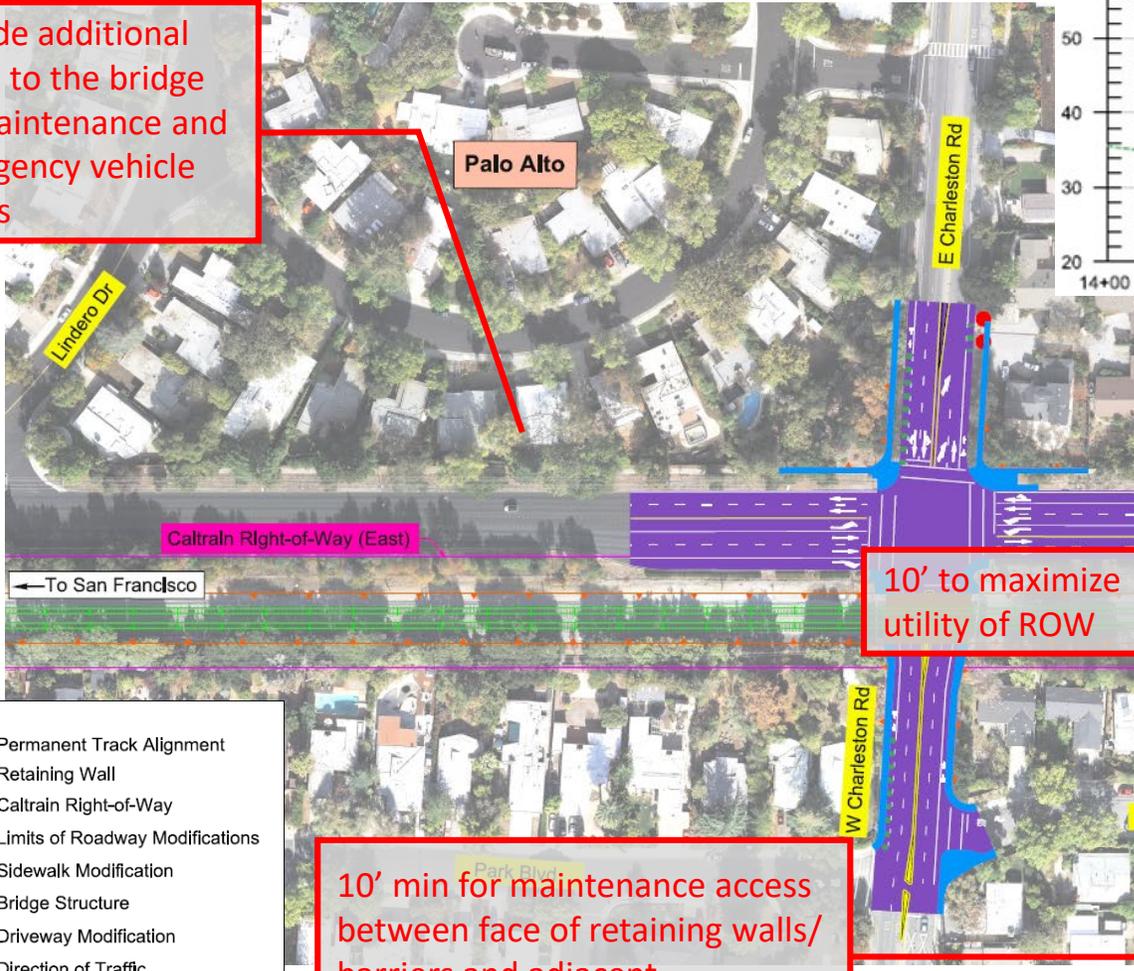
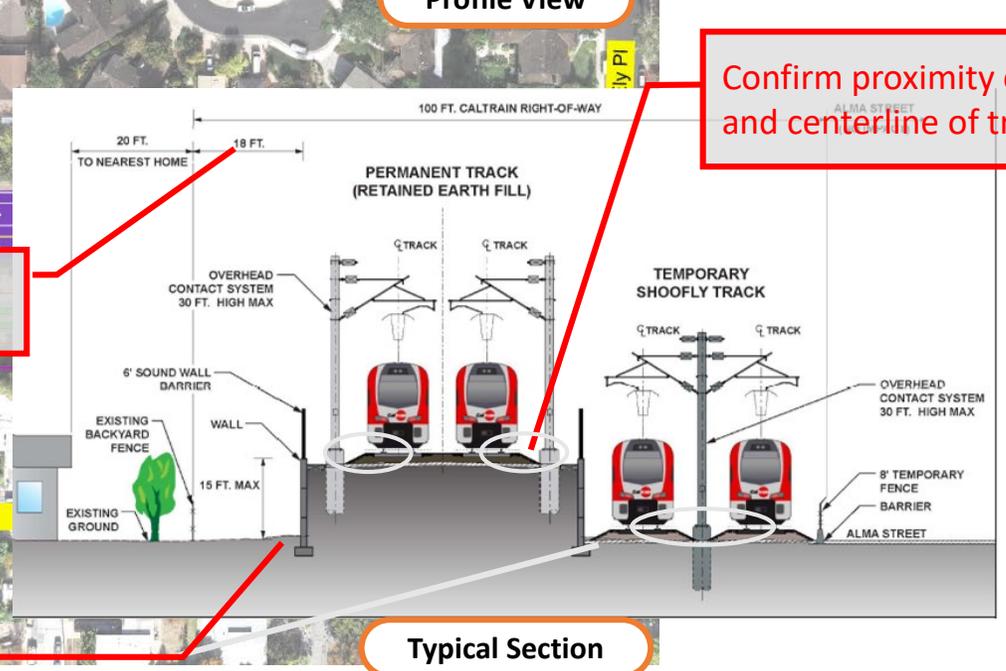
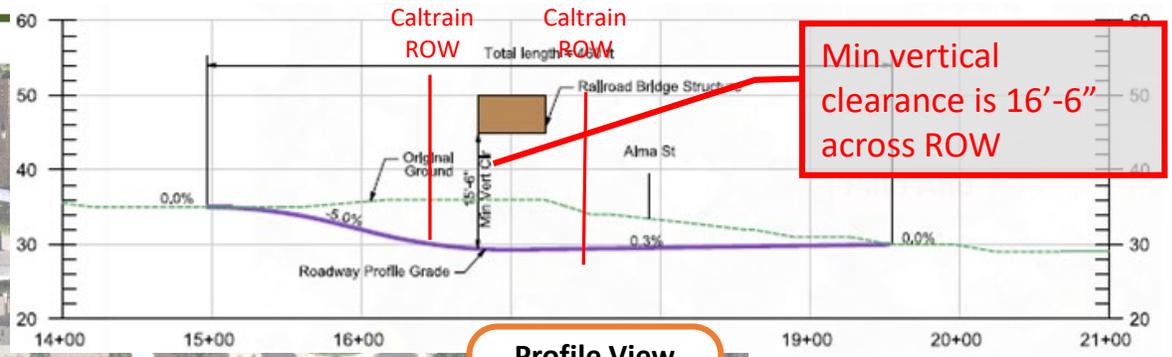
Min vertical clearance is 16'-6" across ROW

Confirm proximity of OCS and centerline of tracks

10' to maximize utility of ROW

10' min for maintenance access between face of retaining walls/barriers and adjacent obstruction/roadway

- LEGEND:**
- Permanent Track Alignment
 - Retaining Wall
 - Caltrain Right-of-Way
 - Limits of Roadway Modifications
 - Sidewalk Modification
 - Bridge Structure
 - Driveway Modification
 - Direction of Traffic



Summary of Comments – Meadow Drive & Charleston Road

Meadow Charleston - Viaduct



- Provide 16'6" vertical clearance requirement for the extent of the Caltrain ROW— will require reprofiling of roadway and/or Caltrain tracks.
- The vertical dimension from the top of the roadway to the top of the rail should be 24' instead of 20' to accommodate 5-foot bridge depth and 2'-6" Rail.
- Provide bridge width to provide access for Caltrain maintenance and emergency vehicles.
- Adjust retaining walls to accommodate 4-track and 4-track transitions.
- Provide sufficient space (10' min) for maintenance vehicle access and maximize utility of Caltrain ROW.
- Construction of permanent MSE walls to be at 20' from center of shoofly track— constructability clearance from OCS and active railroad.
- Roadway design to meet Caltrans HDM/AASHTO 'Greenbook' /AASHTO 'Highway Safety Manual'

Summary of Comments – Meadow Dr & Charleston Rd - Viaduct

 4-Track Influence Area
 Transition between 2-Track and 4-Track

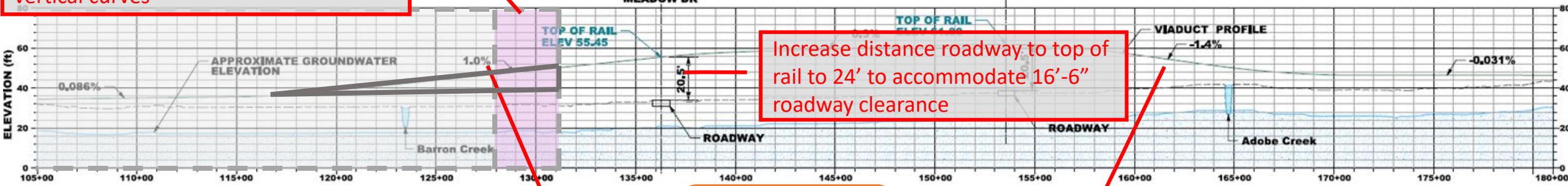
Fill retaining walls to accommodate 4-track and transition between 2-track and 4-track



Plan View

Transition segment should be tangent as special trackwork should stay outside of vertical curves

Increase distance roadway to top of rail to 24' to accommodate 16'-6" roadway clearance



Profile

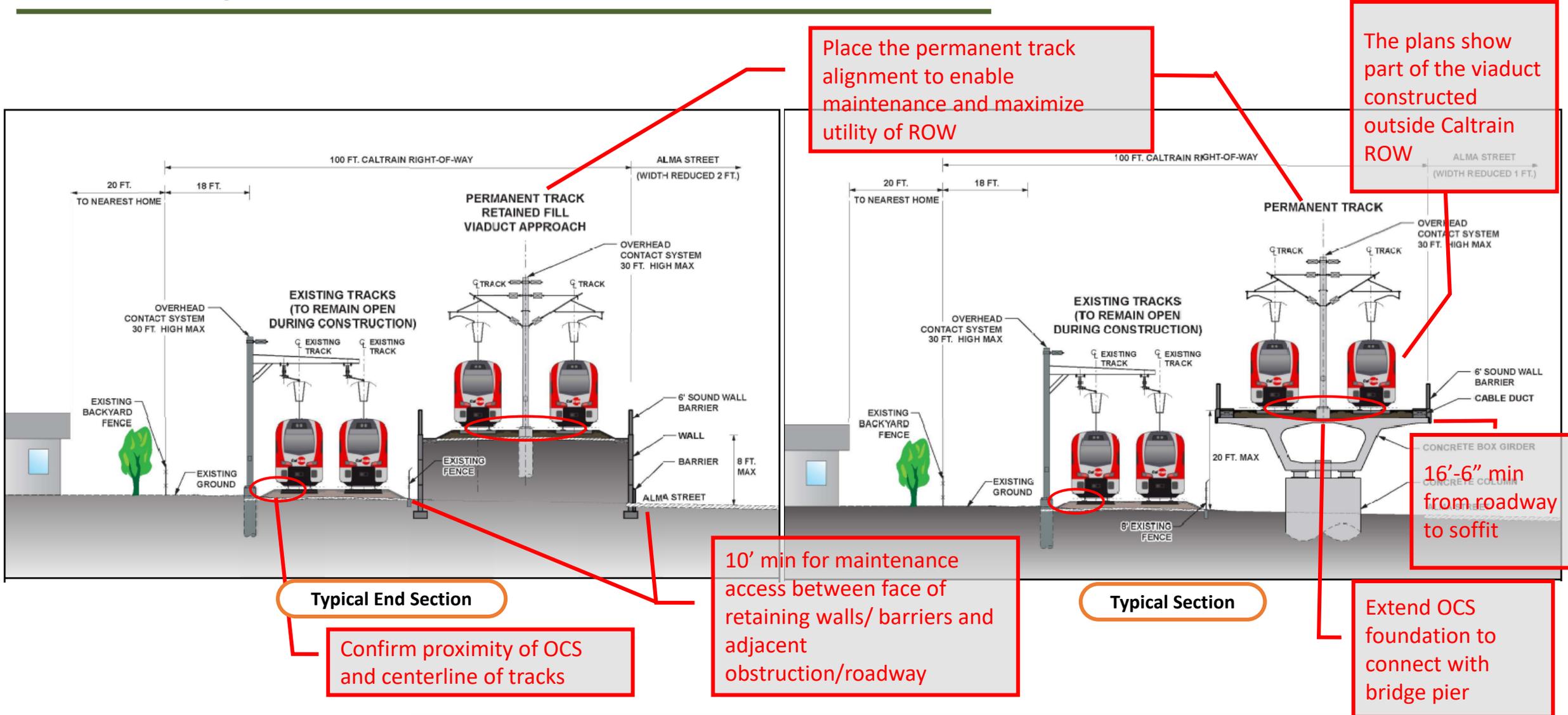
Design speed is 110 mph for passenger rail

1% grade is the current maximum without variance. 1% to 2% grade requires review and approval by the Director of Engineering

LEGEND:

— New Permanent Track	 Landmark
— Existing Tracks	 Creek
— Viaduct Track Profile	 Bridge
--- Existing Ground Level	 Groundwater
— Caltrain Right Of Way	

Summary of Comments – Meadow Dr & Charleston Rd - Viaduct



Next Steps

Next Steps



The goal is to provide sufficient information for Rail Committee to evaluate alternatives and make recommendation to the City Council. Therefore, Staff is seeking

- Rail Committee's review of comments to provide guidance to staff on specific elements.
- Direct staff to proceed coordination with Caltrain Staff or their Consultants and/or City's project consultant for material changes to alternatives



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