



Connecting Palo Alto Projects

Caltrain Technical Review Results

City and Caltrain Staff

City Staff



- Philip Kamhi, Chief Transportation Official
- Ripon Bhatia, Senior Engineer

Caltrain Staff



- Robert Barnard, Chief, Rail Design and Construction
- Mike Rabinowitz, Principal Planner
- Navi Dhaliwal, Government & Community Affairs Officer
- Edgar Torres, Consultant, Kimley Horn and Associates

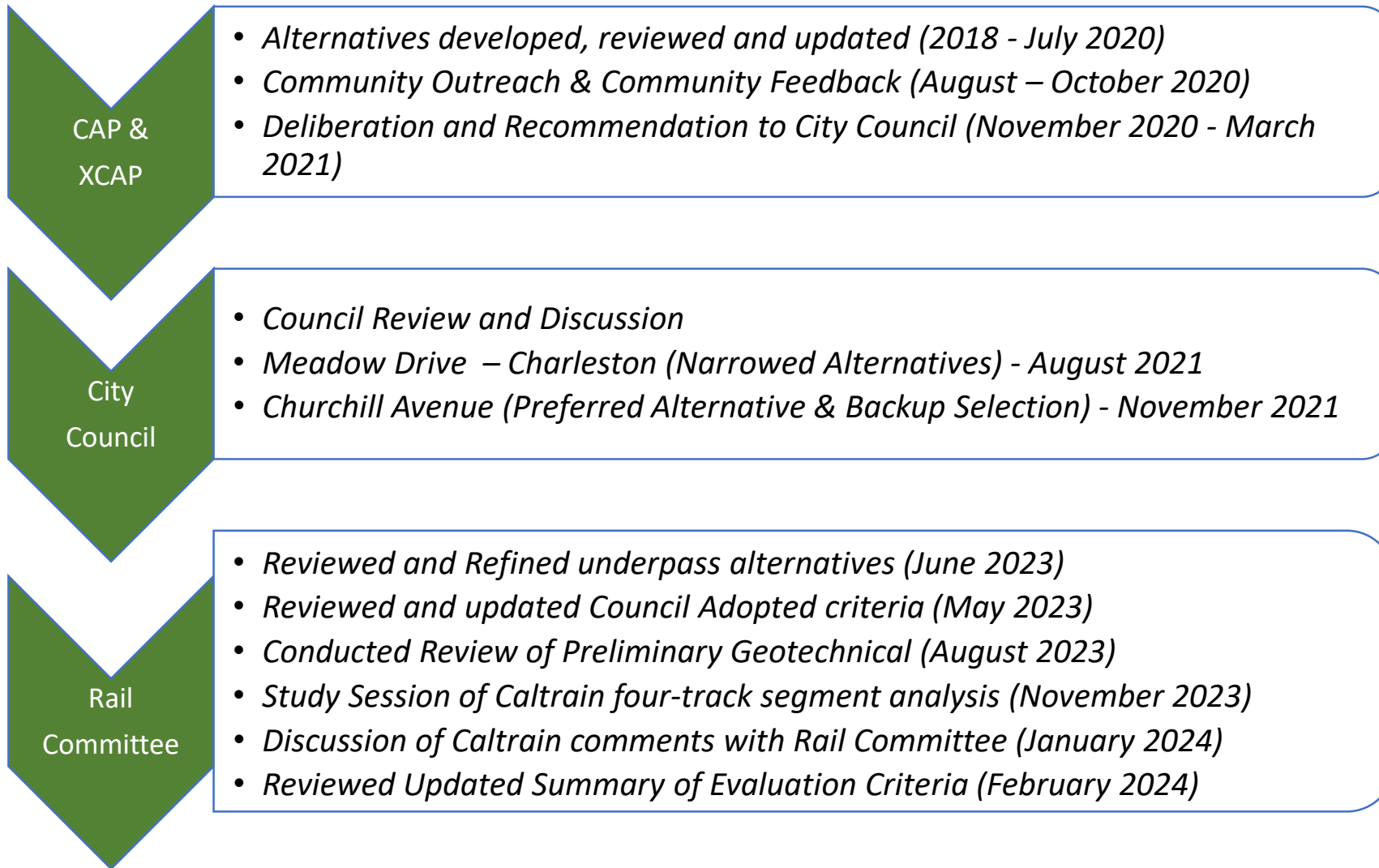
Purpose

Purpose



- Review of the Grade Separation Alternatives for Churchill Avenue, Meadow Drive, and Charleston Road Crossings, including Consideration of Caltrain's Review and Results
- Rail Committee's reviews and provide guidance and directions to staff.
- Recommend that Council Advances (or Eliminates) Specific Alternative(s) for Preliminary Engineering and Environmental Documentation.

Background





AGENDA

- — **Schedule**
- — **Caltrain's Guiding Principles**
- — **Executive Summary**
- — **Caltrain's Results of Process by Alternative**
- — **Next Steps**

Project Planning

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov
City	City and Caltrain to collaborate for Selection of alternatives to advance into next phase										
Caltrain	City and Caltrain collaborate to develop and execute agreement with FRA										
			Develop Service Agreement and/or Cooperative Agreement with VTA, Caltrain, City for PE & Env Phase					Begin PE & Environmental			
VTA											
FRA	Prepare and Execute Funding Agreement										
Rail Committee	Review Alternatives Recommend Local Preferred Alternative(s)										
City Council			City Council to review and select Locally Preferred Alternative(s) for next phase								
			Execute FRA Funding Agreement								

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 and selection of preferred alternative for recommendation to the City Council
- Study session with City Council (April 2024)
- City Council to select preferred alternative for advancement into Preliminary Engineering & Environmental Documentation phase for Meadow and Charleston Crossing (May/June 2024)
- Execute Agreement with FRA and Service Agreement/Cooperative Agreement for Preliminary Engineering & Environmental with Caltrain & VTA

CONNECTING PALO ALTO CONCEPTUAL ALTERNATIVES TECHNICAL REVIEW

MARCH 19, 2024



Caltrain's Engagement

Caltrain's engagement on Connecting Palo Alto Alternatives

- **Execute** Service agreement
- **Initial review** against Caltrain's 2024 standards and policies
- **Meetings** with Palo Alto staff to share initial observations
- **Presentation** to Palo Alto's January Rail Committee of initial observations
- **Today** - presentation with an intent to focus on developing solutions

Caltrain's Partnership

Developed **draft solutions** based on available **planning level information**

- Deeper dive analysis to **support decision-making**
- Seeking to **balance** needs of railroad and community
 - Maintain utility of region's investment in Caltrain
 - Enable community's vision for Palo Alto
- Intent to **minimize** additional private property impacts

Caltrain Partnership

Steps Guiding Solution-Oriented Thinking

<u>1/29</u>	<ul style="list-style-type: none">• Engineering Team workshop of potential design and constructability solutions for all alternatives (internal)
<u>1/30</u>	<ul style="list-style-type: none">• Shared potential design and constructability solutions with City• Received Questions from City
<u>1/31</u>	<ul style="list-style-type: none">• Caltrain Team met with Chief Safety Officer, Chief Operating Officer, Director of Engineering regarding solutions and questions (internal)• Shared feedback on design and constructability solutions with City
<u>2/1</u>	<ul style="list-style-type: none">• Caltrain Team met with Executive Director regarding solutions and Caltrain expectations (internal)
<u>2/2 - 2/9</u>	<ul style="list-style-type: none">• Caltrain Team begins applying direction to exhibits and materials (internal)• Ongoing coordination between City staff and Caltrain
<u>2/13 and 2/16</u>	<ul style="list-style-type: none">• Caltrain Team shares materials with City staff
<u>3/19</u>	<ul style="list-style-type: none">• Rail Committee presentation

Caltrain's Focus of Review

Reviewed Connecting Palo Alto Alternatives with a focus on

- **Safety** – Constructability
- **Engineering** – Practical Constraints
- **Maintenance and Operations**
- **Policy and Agreements** – Ensure projects are designed to meet Caltrain's future railroad needs and preserve property rights.
 - Design Criteria “*Preserve the existing ROW*” (2007, 2011, 2020, 2024)
 - Rail Corridor Use Policy (RCUP) (2020)
 - Property Conveyance and fee schedule policy (2010, 2021)
 - California High Speed Rail Authority agreements
 - Union Pacific Railroad agreements

Caltrain's Guiding Principles

Railroad property is Caltrain's most *valuable and durable asset*

- Caltrain will explore encroachments through **revocable license** agreements subject to appraisals, annual fees escalated at CPI, and **Board approval** via the RCUP and Property Conveyance processes.
- For all alternatives and configurations requiring temporary use of Palo Alto right-of-way, a future "construction, operation, and maintenance agreement" between the City and Caltrain is needed.

Caltrain's Guiding Principles

Caltrain must be able to **retain the utility and durability of Caltrain's ROW** now and in the future. Caltrain is seeking to be held fiscally harmless from the City of Palo Alto's selected alternative.



Current at-grade crossings support Caltrain's use of its **full ROW width** for railroad purposes

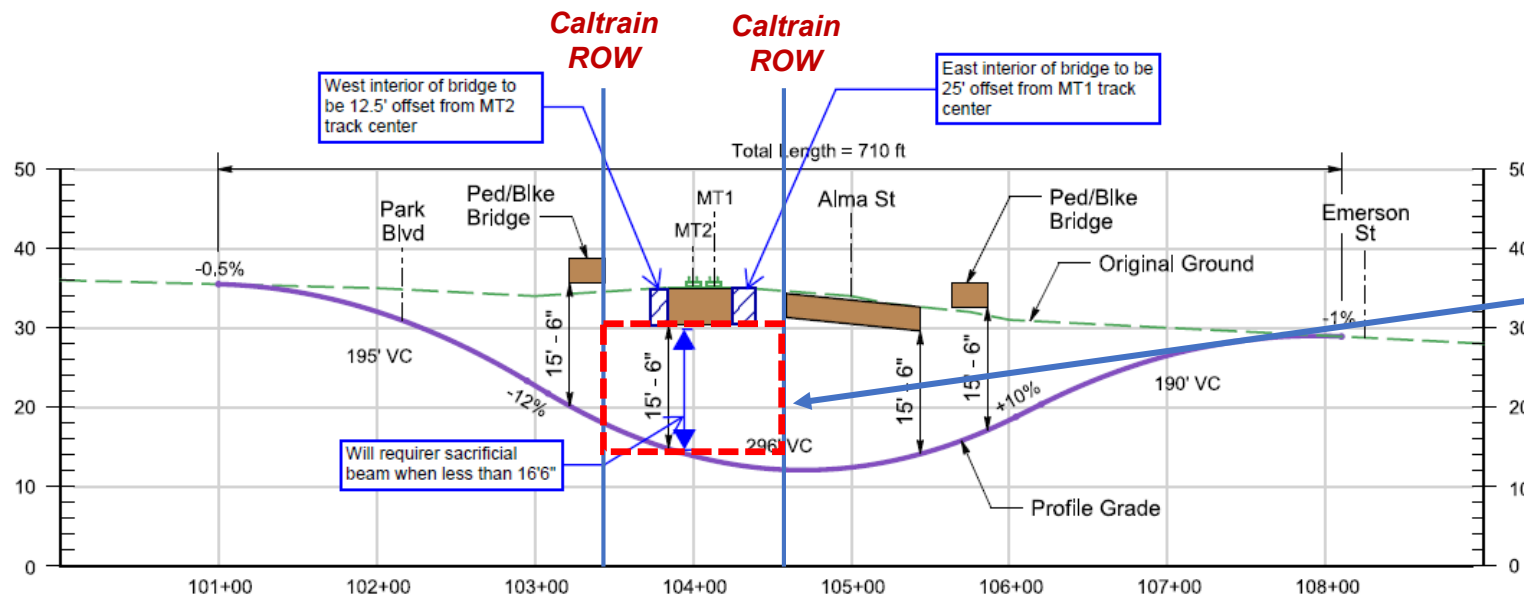
2021 Conveyance Policy

*"Staff will analyze the request to ensure . . . applicant's improvements are designed to be compatible with the **broadest range** of possible transportation alternatives for the **entire width of the ROW**"*



Caltrain's Guiding Principles

Caltrain must be able to **retain the utility and durability of Caltrain's ROW** now and in the future. Caltrain is seeking to be held fiscally harmless from the City of Palo Alto's selected alternative.

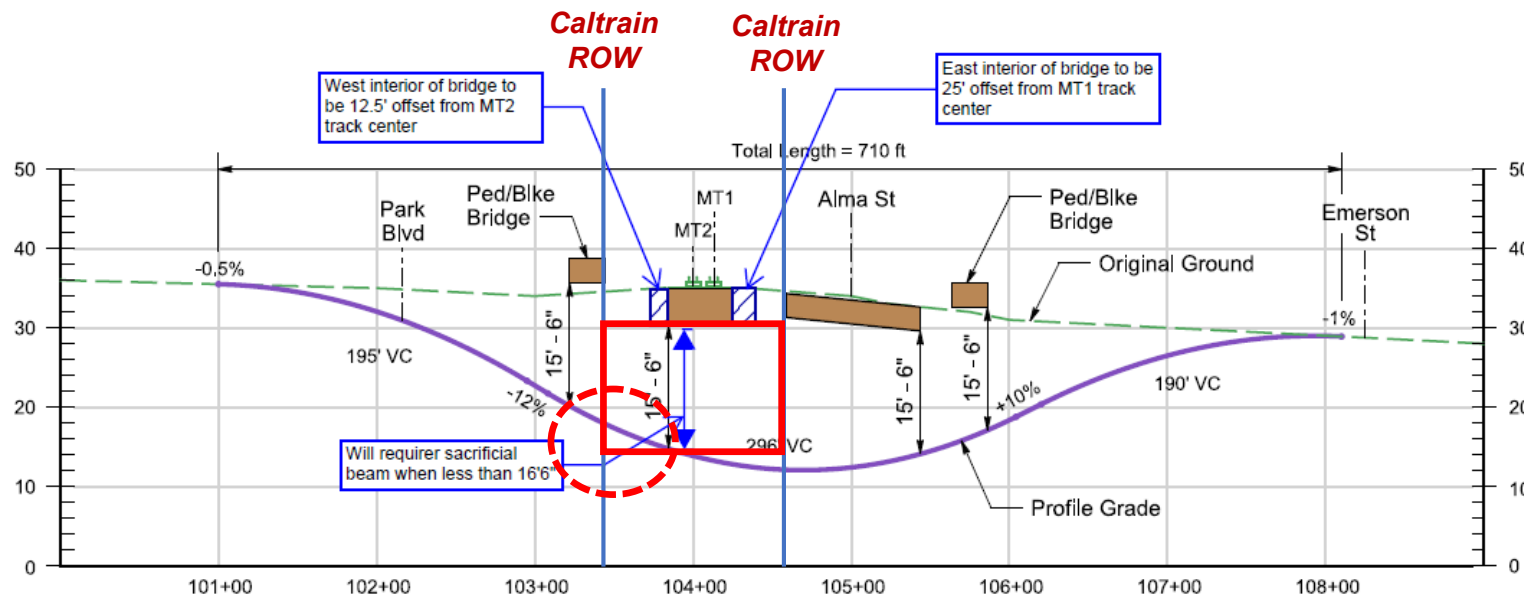


Provide a minimum **15'-6"** vertical clearance with **variance** and sacrificial beams across **entire width** of Railroad ROW

Caltrain's Guiding Principles

Caltrain must be able to **retain the utility and durability of Caltrain's ROW** now and in the future. Caltrain is seeking to be held fiscally harmless from the City of Palo Alto's selected alternative.

- *City designs that **do not allow** for above **may proceed**, but City will be responsible for re-building roads, or the incremental cost to the railroad to utilize the Caltrain ROW.*



Executive Summary

Churchill Summary of Findings

Alternative	Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
High-level Findings	<ul style="list-style-type: none">• Roadway and railroad improvements viable with refinements to Alma Street cross section• Bikeway western encroachment into Caltrain ROW not viable• Reduce width of pathway facility to fit within available 25' expired easement or widen to the west• Or relocate pathway undercrossing to Seale Ave/Peers Park (under preliminary review by others)	<ul style="list-style-type: none">• Moderately viable with refinements, less than optimal eastern ramp width (~7')• Wider eastern ramp would impact Alma Street travel lanes	<ul style="list-style-type: none">• Viable as shown

Meadow/Charleston Summary of Findings

Alternative	Hybrid	Viaduct	Underpass
High-level Findings	<ul style="list-style-type: none"> • Viable with refinements • Includes elevating width of Caltrain's ROW to retain utility • Shoofly tracks will impact Alma travel lanes (12') during construction 	<ul style="list-style-type: none"> • Viable with refinements • Permanent impact to Alma travel lanes for approach structures (19') • Reducing the impact to Alma travel lanes for approach structures requires a new shoofly track (6') • To retain use of Alma travel lanes below viaduct requires a more complex structure • Caltrain to retain existing at grade tracks for railroad purposes 	<ul style="list-style-type: none"> • Viable with refinements

**Trench Alternative: At the City of Palo Alto's request, Caltrain was not charged with reviewing the trench alternative after it was replaced by the viaduct alternative within the Service Agreement.*



Caltrain's Results of Preliminary Review by Alternative

Churchill Alternatives

Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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Caltrain's Results of Preliminary Review by Alternative

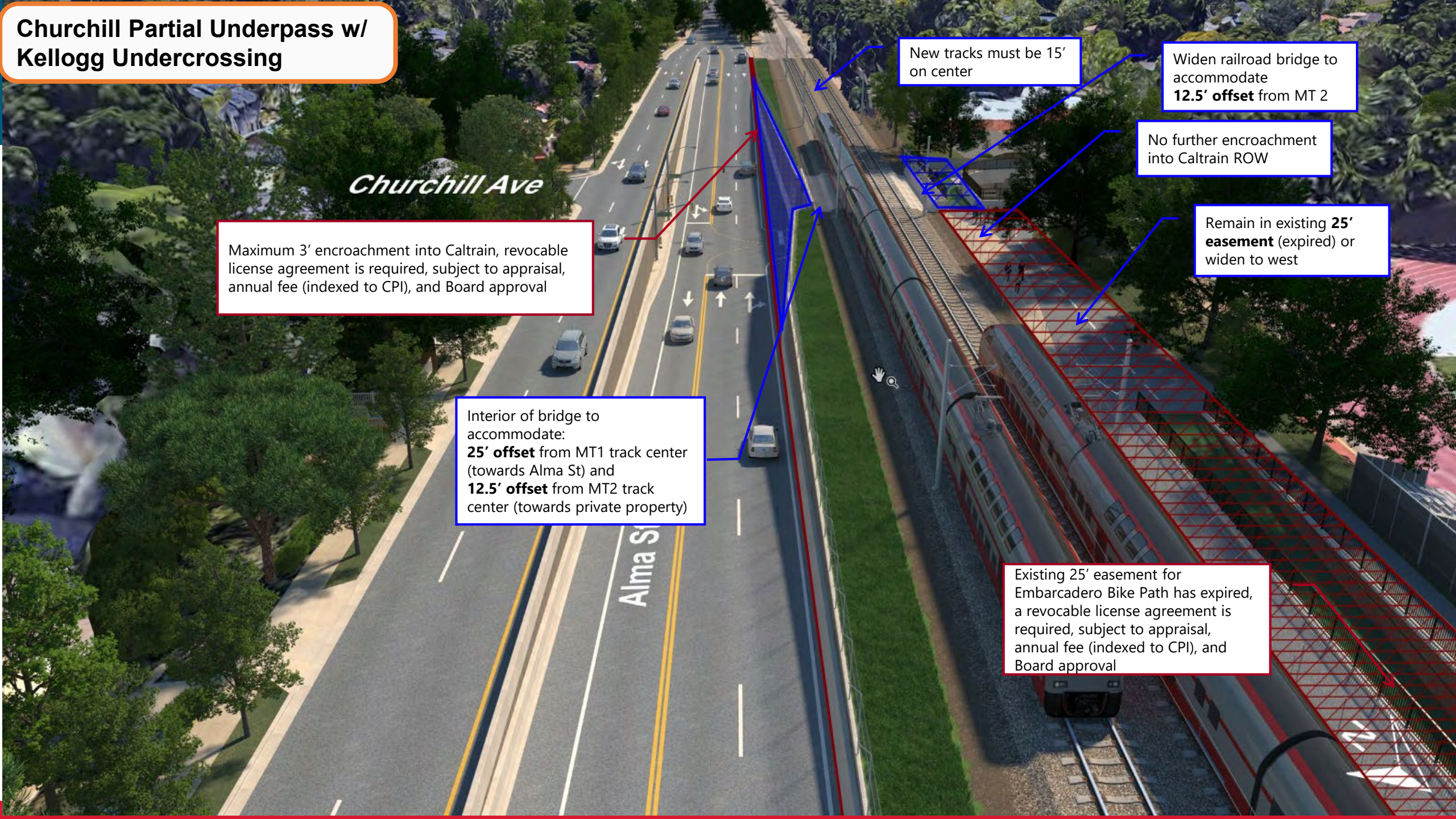
Churchill Alternatives

Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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Churchill Partial Underpass w/
Kellogg Undercrossing



Churchill Ave

Maximum 3' encroachment into Caltrain, revocable license agreement is required, subject to appraisal, annual fee (indexed to CPI), and Board approval

Interior of bridge to accommodate:
25' offset from MT1 track center (towards Alma St) and
12.5' offset from MT2 track center (towards private property)

New tracks must be 15' on center

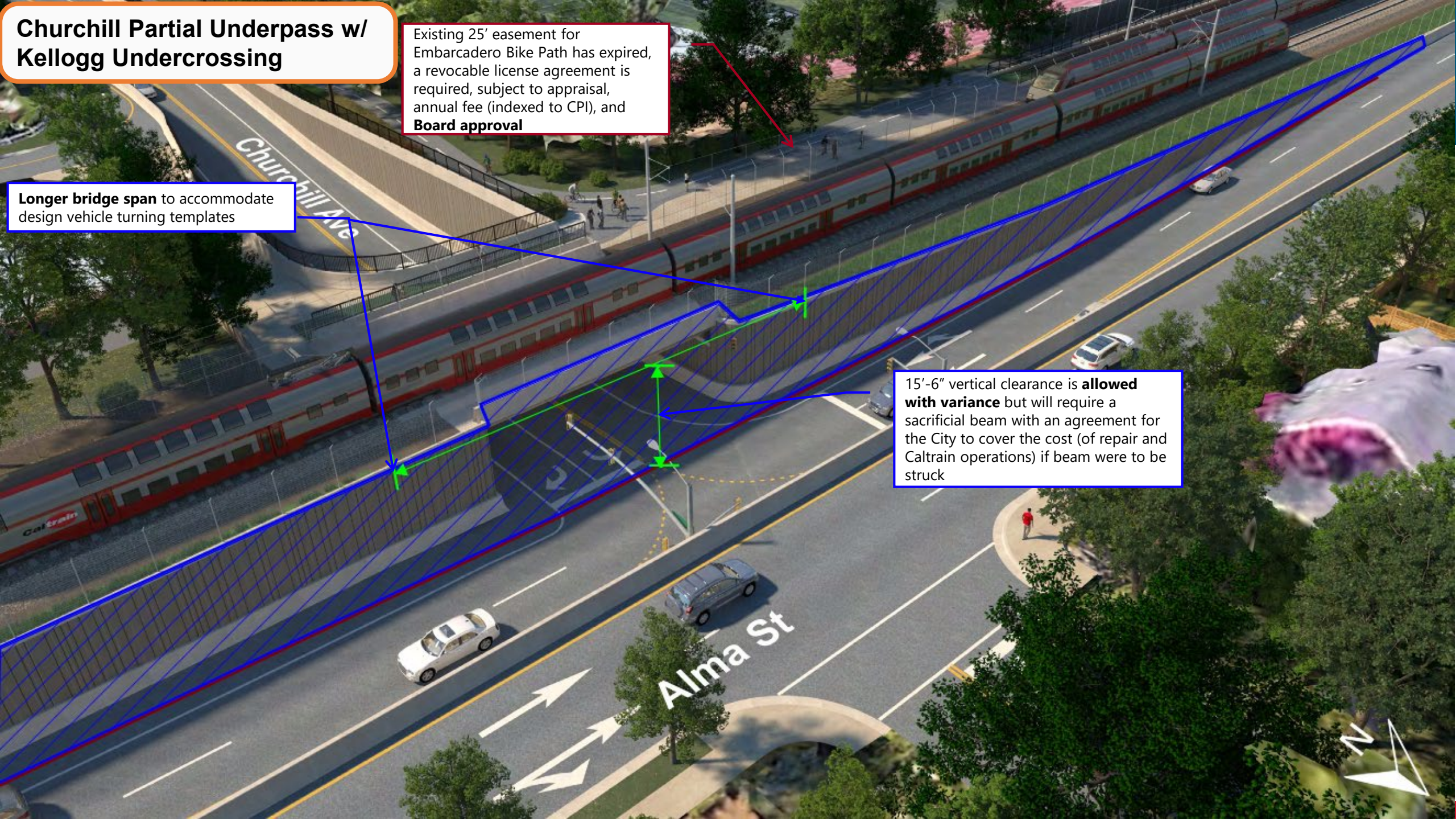
Widen railroad bridge to accommodate
12.5' offset from MT 2

No further encroachment into Caltrain ROW

Remain in existing **25' easement** (expired) or widen to west

Existing 25' easement for Embarcadero Bike Path has expired, a revocable license agreement is required, subject to appraisal, annual fee (indexed to CPI), and Board approval

Alma St



Churchill Partial Underpass w/ Kellogg Undercrossing

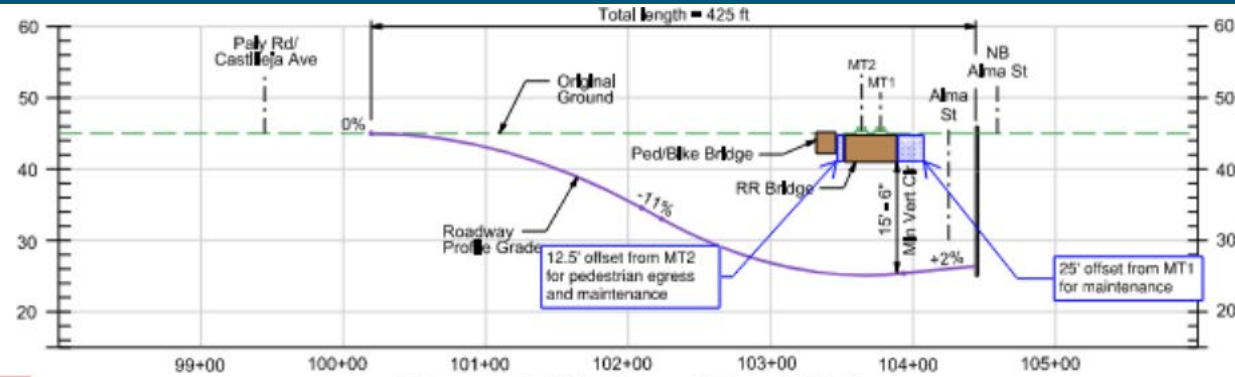
Existing 25' easement for Embarcadero Bike Path has expired, a revocable license agreement is required, subject to appraisal, annual fee (indexed to CPI), and **Board approval**

Longer bridge span to accommodate design vehicle turning templates

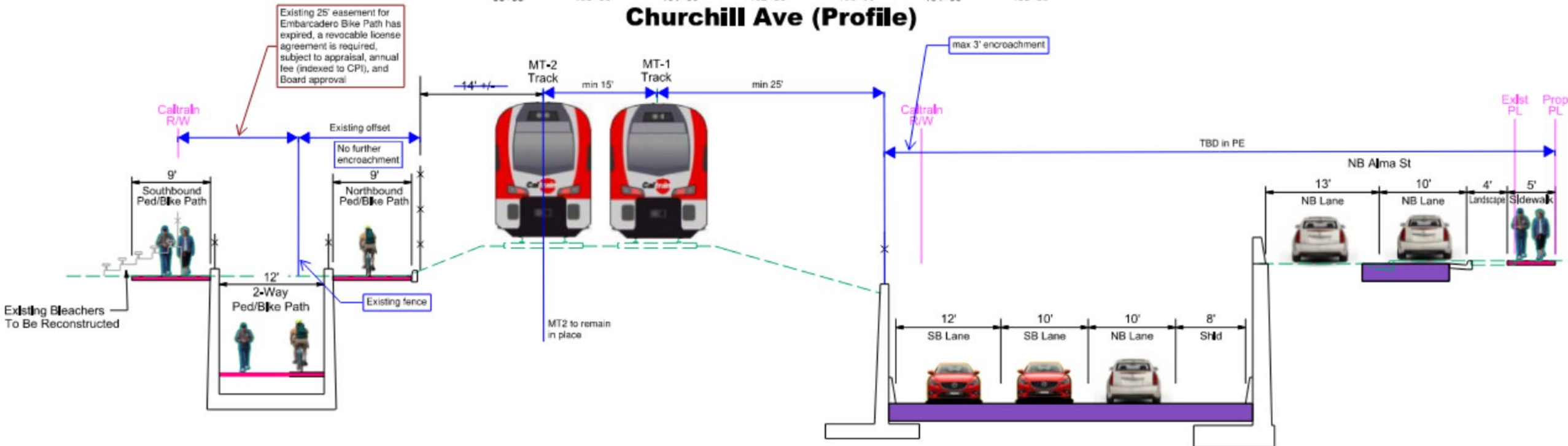
15'-6" vertical clearance is **allowed with variance** but will require a sacrificial beam with an agreement for the City to cover the cost (of repair and Caltrain operations) if beam were to be struck



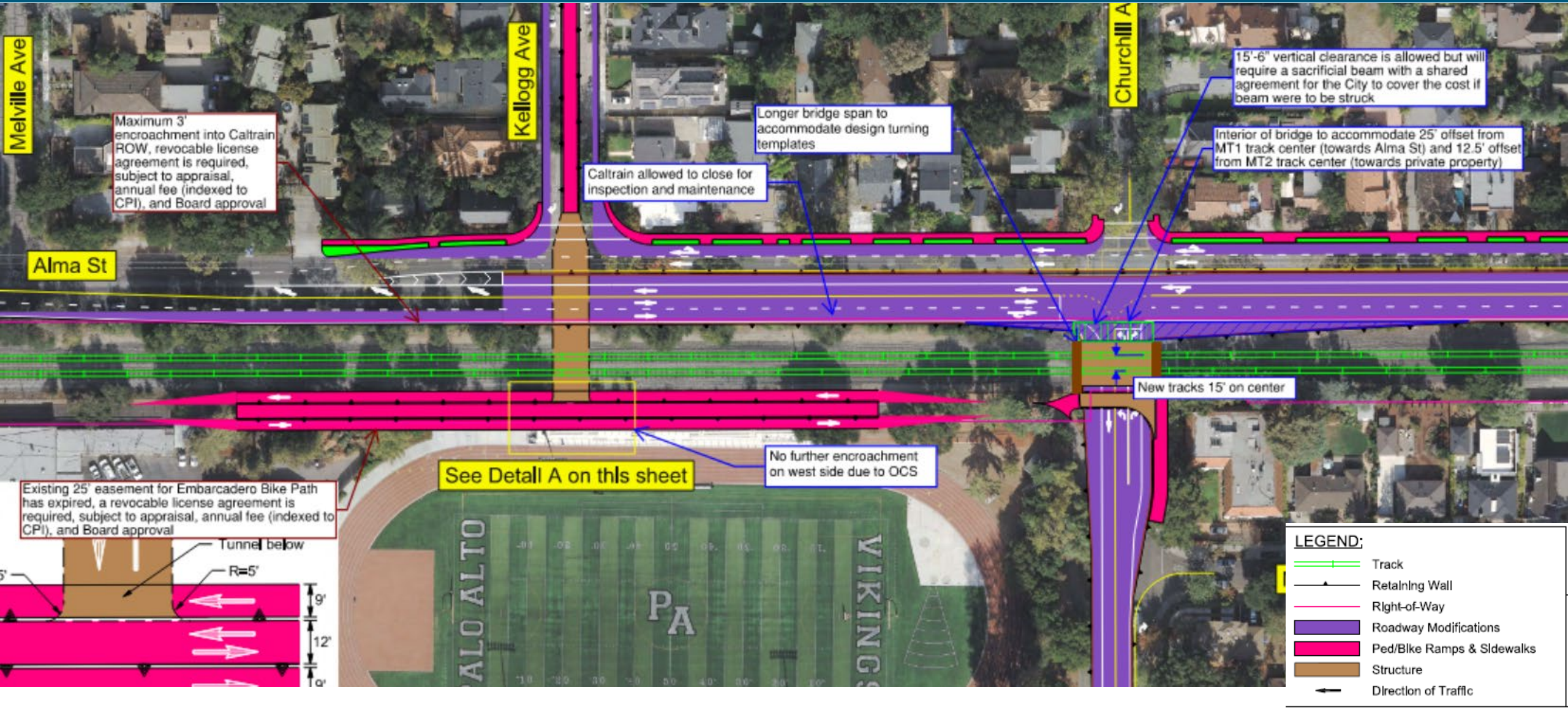
Churchill Partial Underpass w/ Kellogg Undercrossing



Churchill Ave (Profile)



Churchill Partial Underpass with Kellogg Undercrossing Summary



Caltrain's Results of Preliminary Review by Alternative

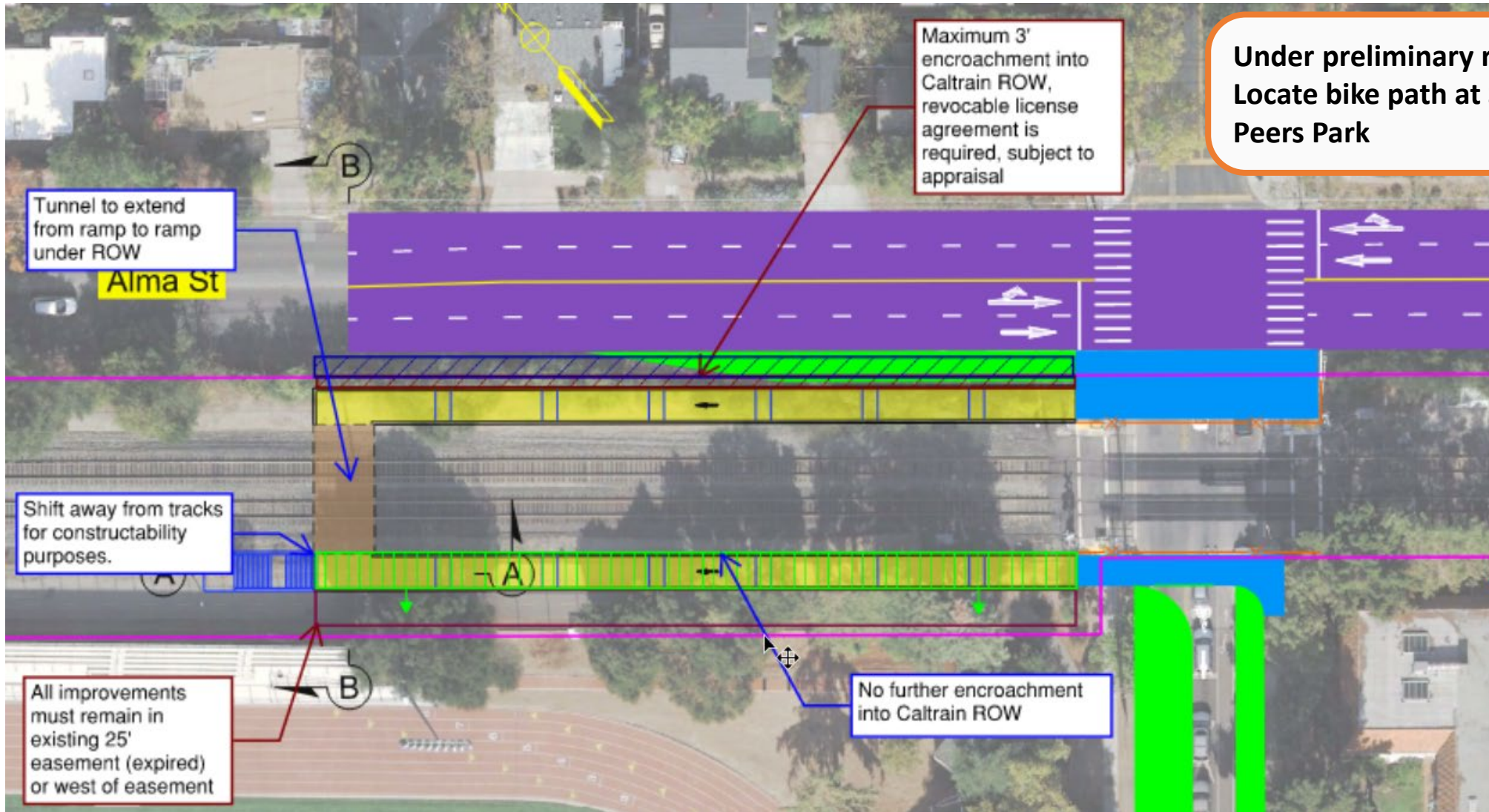
Churchill Alternatives

Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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Churchill Closure w/ Kellogg Underpass Summary



**Under preliminary review by others:
Locate bike path at Seale Ave connecting
Peers Park**

Caltrain's Results of Preliminary Review by Alternative

Churchill Alternatives

Viable as shown

Partial Underpass (With Kellogg Undercrossing LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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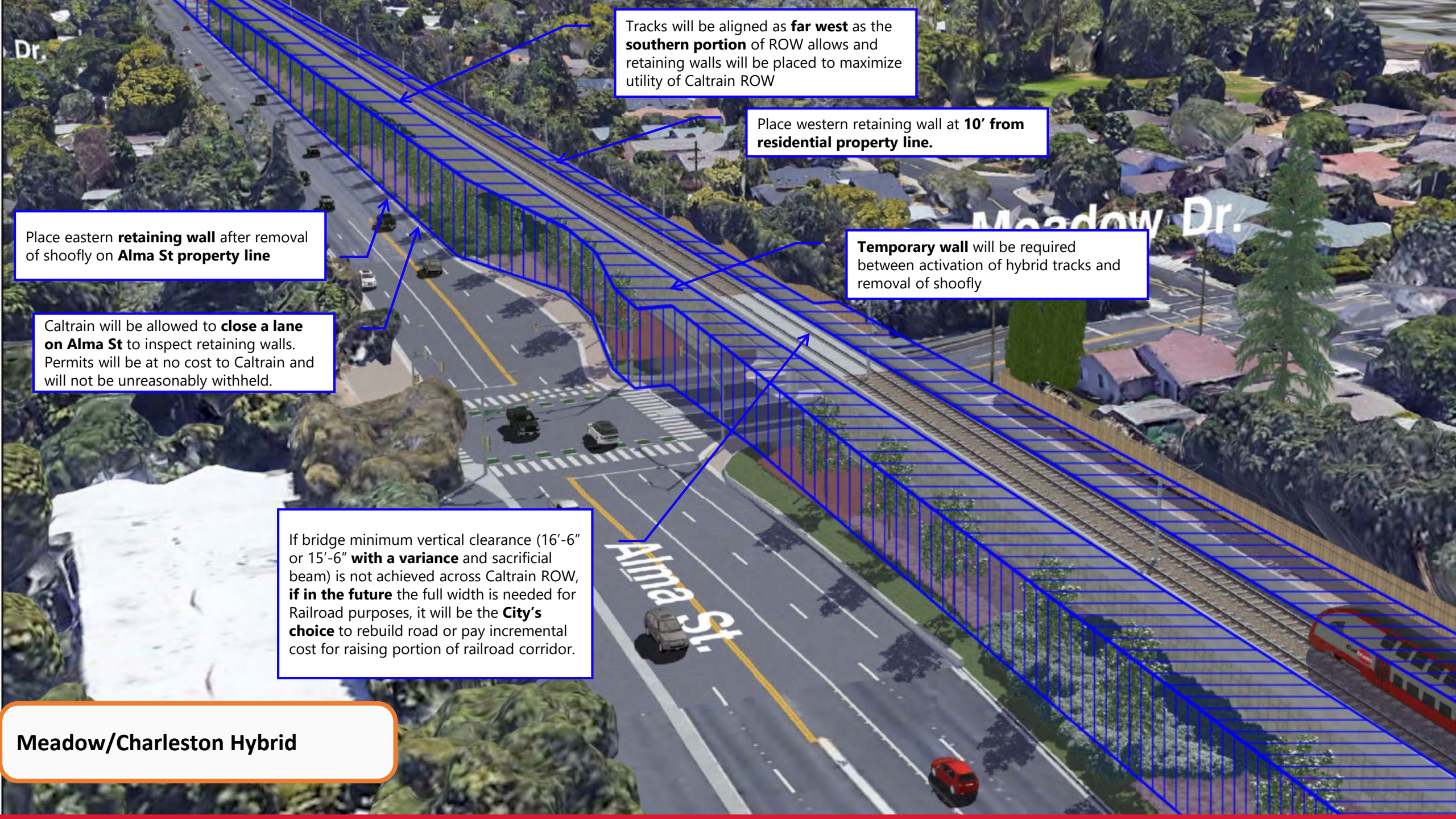
Caltrain's Results of Preliminary Review by Alternative

Churchill Alternatives

Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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Tracks will be aligned as **far west** as the **southern portion** of ROW allows and retaining walls will be placed to maximize utility of Caltrain ROW

Place western retaining wall at **10' from residential property line.**

Place eastern **retaining wall** after removal of shoofly on **Alma St property line**

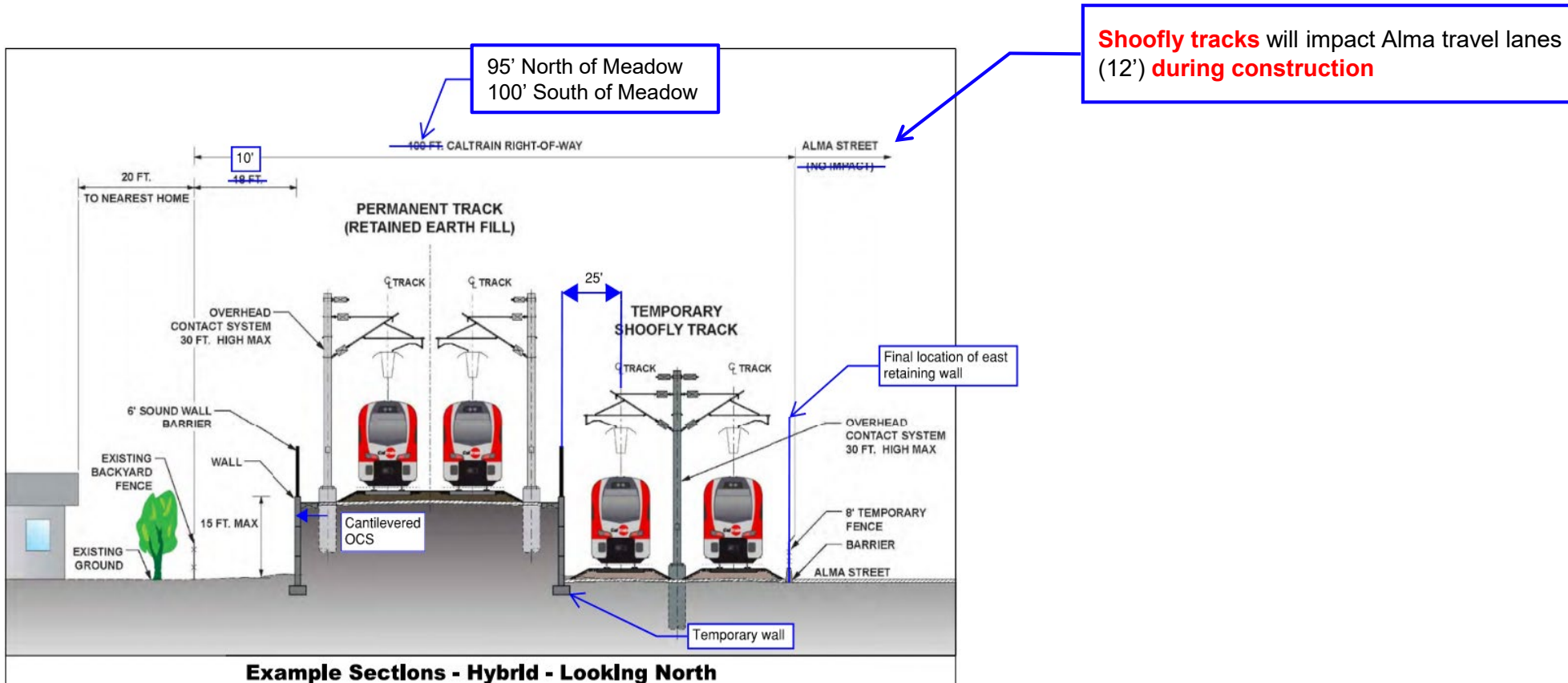
Caltrain will be allowed to **close a lane on Alma St** to inspect retaining walls. Permits will be at no cost to Caltrain and will not be unreasonably withheld.

Temporary wall will be required between activation of hybrid tracks and removal of shoofly

If bridge minimum vertical clearance (16'-6" or 15'-6" **with a variance** and sacrificial beam) is not achieved across Caltrain ROW, **if in the future** the full width is needed for Railroad purposes, it will be the **City's choice** to rebuild road or pay incremental cost for raising portion of railroad corridor.

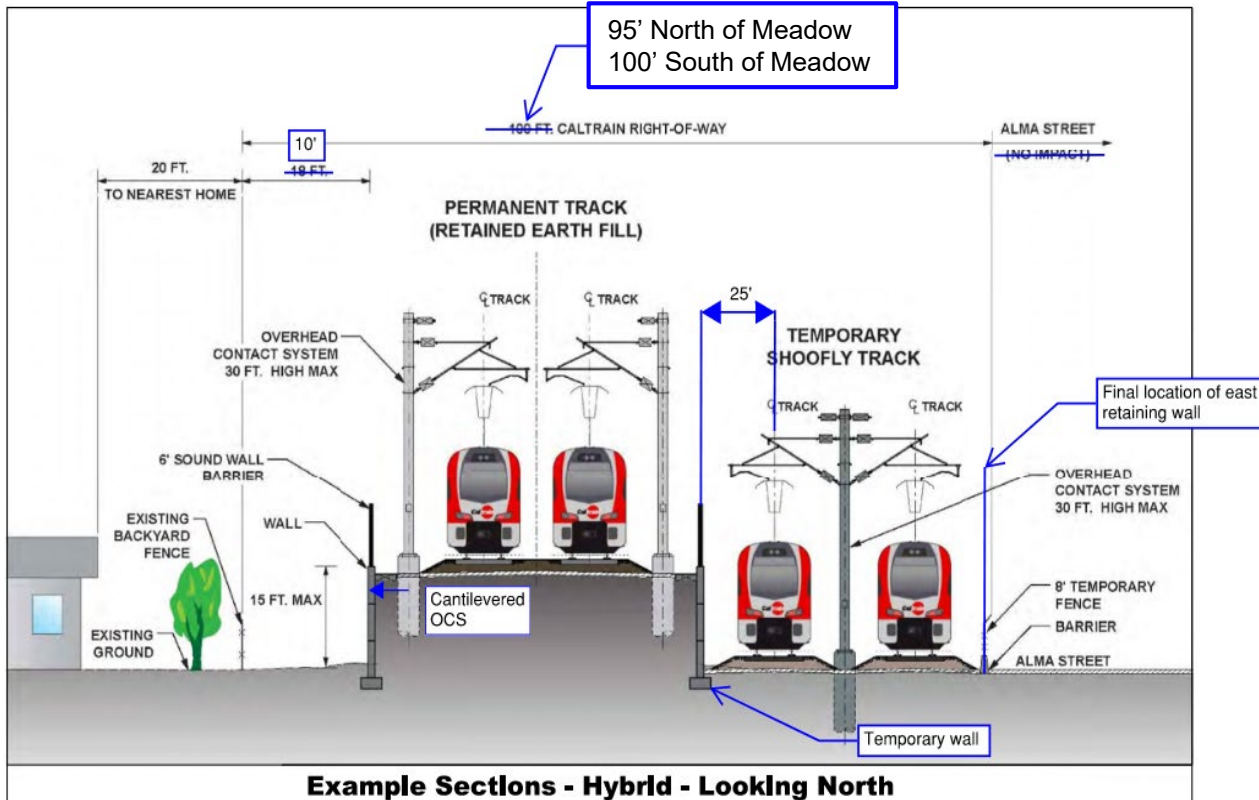
Meadow/Charleston Hybrid

Meadow/Charleston Hybrid

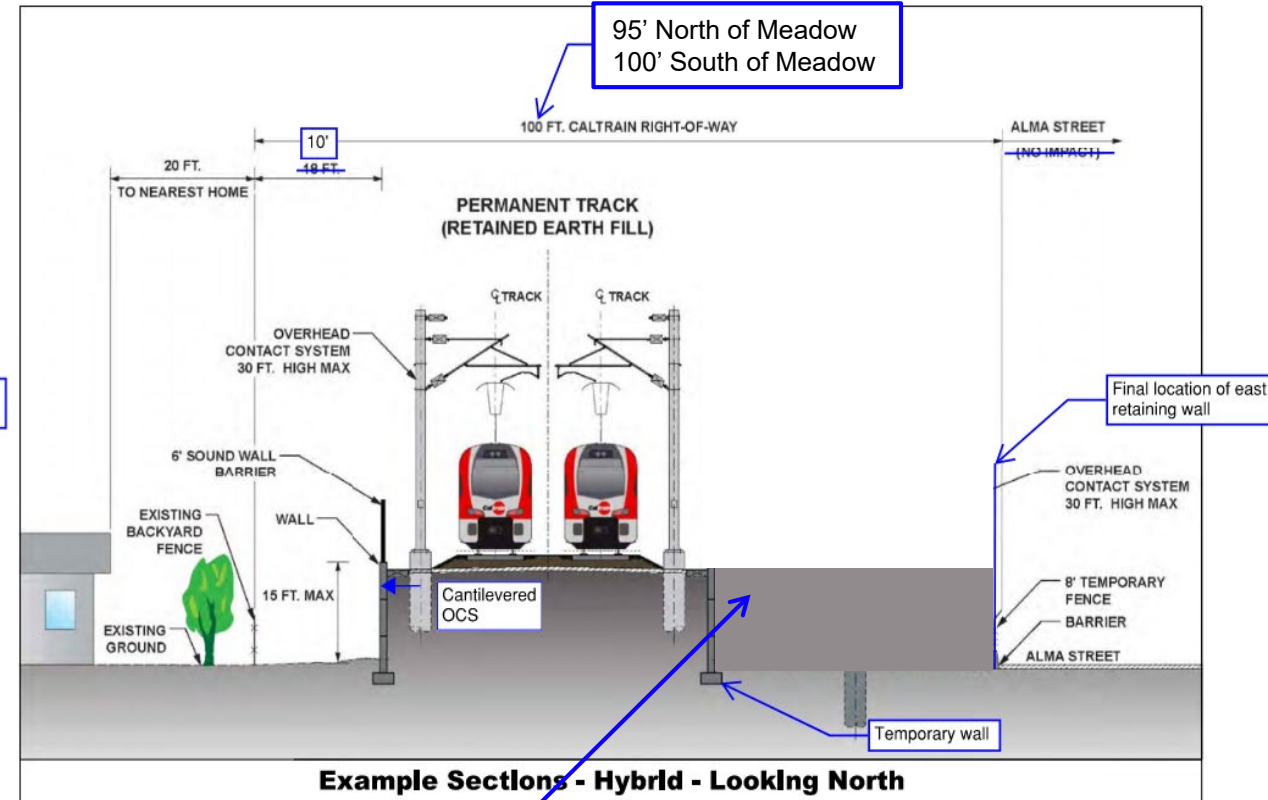


Interim Condition

Meadow/Charleston Hybrid



Interim Condition



Retained fill between temporary wall and Alma Street wall to maintain utility of Caltrain operating ROW.

Final Condition

Meadow/Charleston Hybrid

Implications of ROW Offset
at Meadow Drive



Meadow/Charleston Hybrid

Example South of Meadow

Existing Condition

ALMA ST

MT1

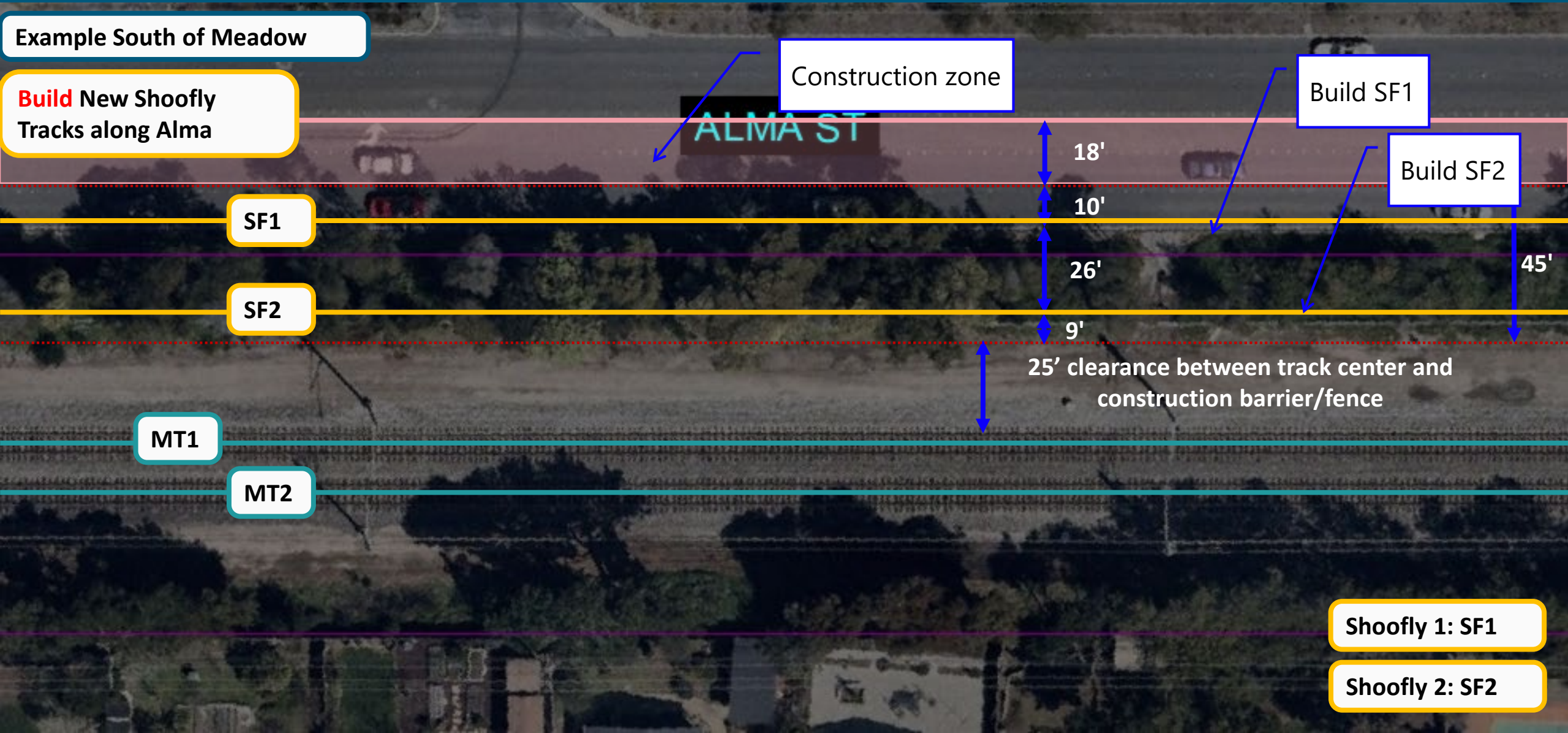
MT2

Main Track 1: MT1

Main Track 2: MT2



Meadow/Charleston Hybrid



Meadow/Charleston Hybrid

Example South of Meadow

Shoofly Tracks along Alma
operational

ALMA ST

SF1

SF2

45'



Meadow/Charleston Hybrid

Example South of Meadow

Build Hybrid and Approach Structures with Permanent MT1 and MT2

ALMA ST

SF1

SF2

MT1

MT2

25' clearance between track center and temporary retaining wall

New Main Track 1: MT1

New Main Track 2: MT2

Meadow/Charleston Hybrid

Example South of Meadow

Remove Temporary Shoofly tracks along Alma Street

Construction zone

ALMA ST

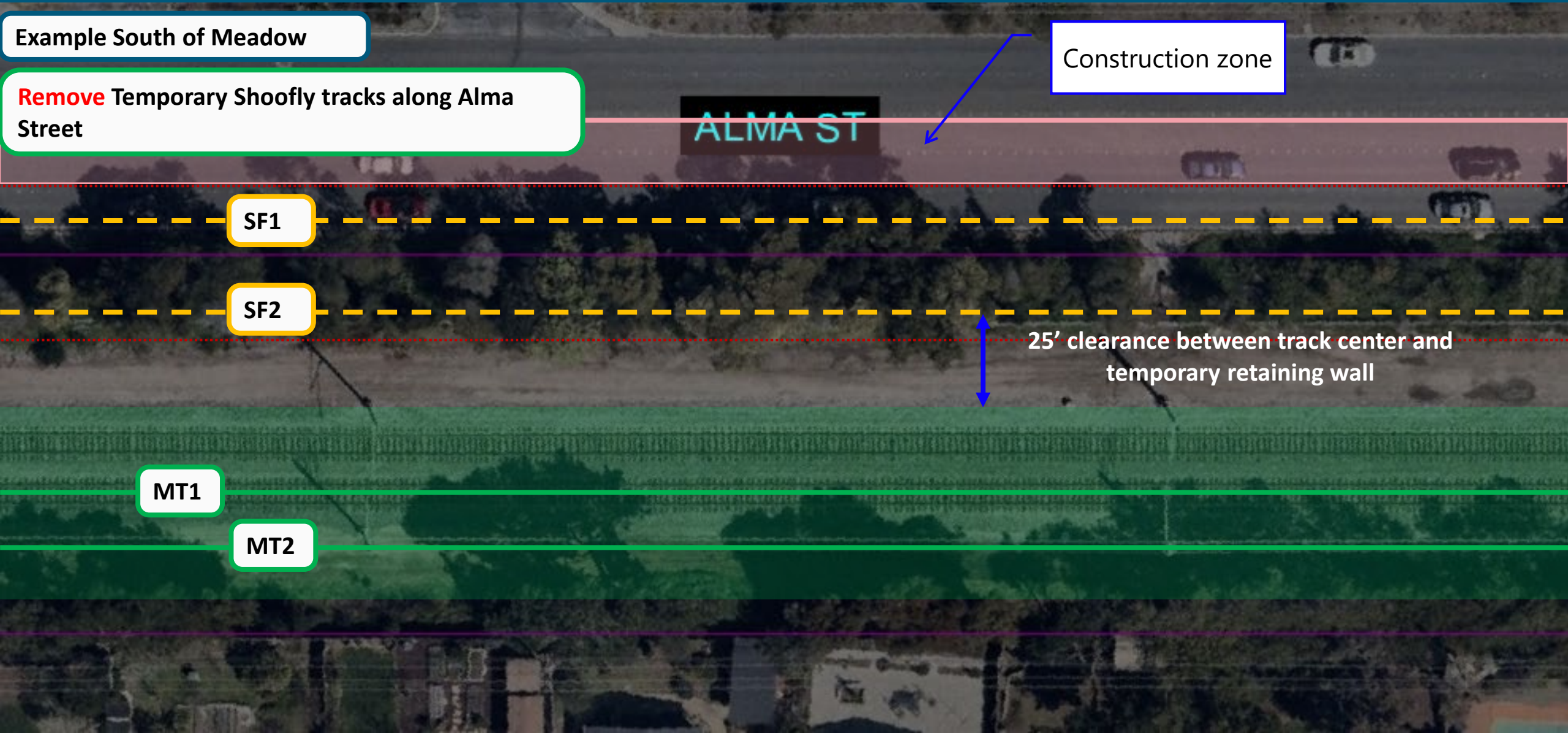
SF1

SF2

25' clearance between track center and temporary retaining wall

MT1

MT2



Meadow/Charleston Hybrid

Example South of Meadow

Shoofly tracks removed, **prepare** for next phase

ALMA ST

Construction zone

MT1

MT2



Meadow/Charleston Hybrid

Example South of Meadow

Build Final Eastern Retaining Wall and Retain Fill

ALMA ST

Construction zone

Final Retaining Wall

MT1

MT2



Meadow/Charleston Hybrid

Example South of Meadow

Final Condition

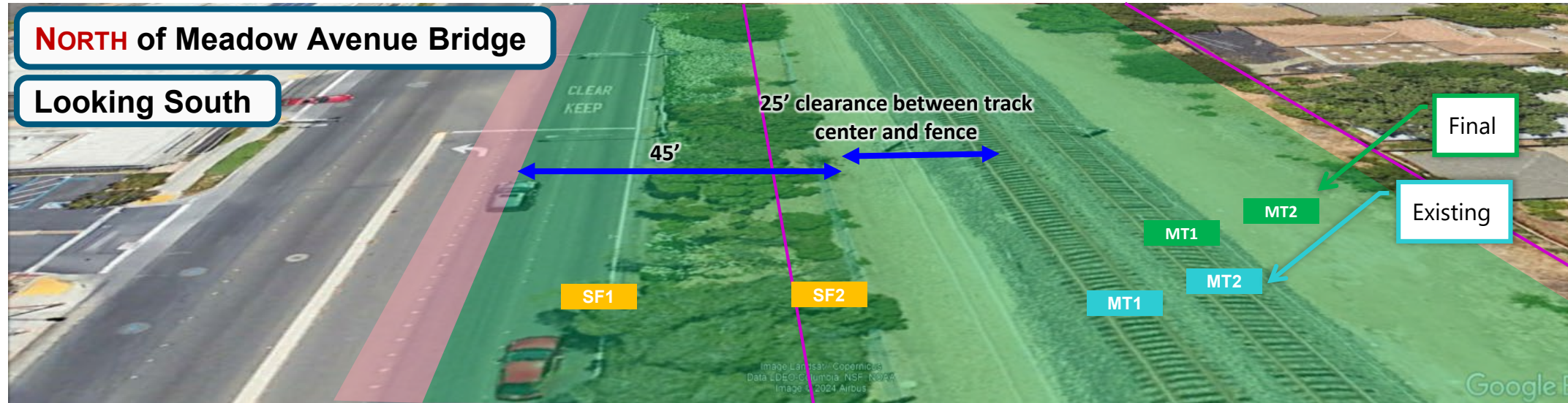
ALMA ST

MT1

MT2



Meadow/Charleston Hybrid



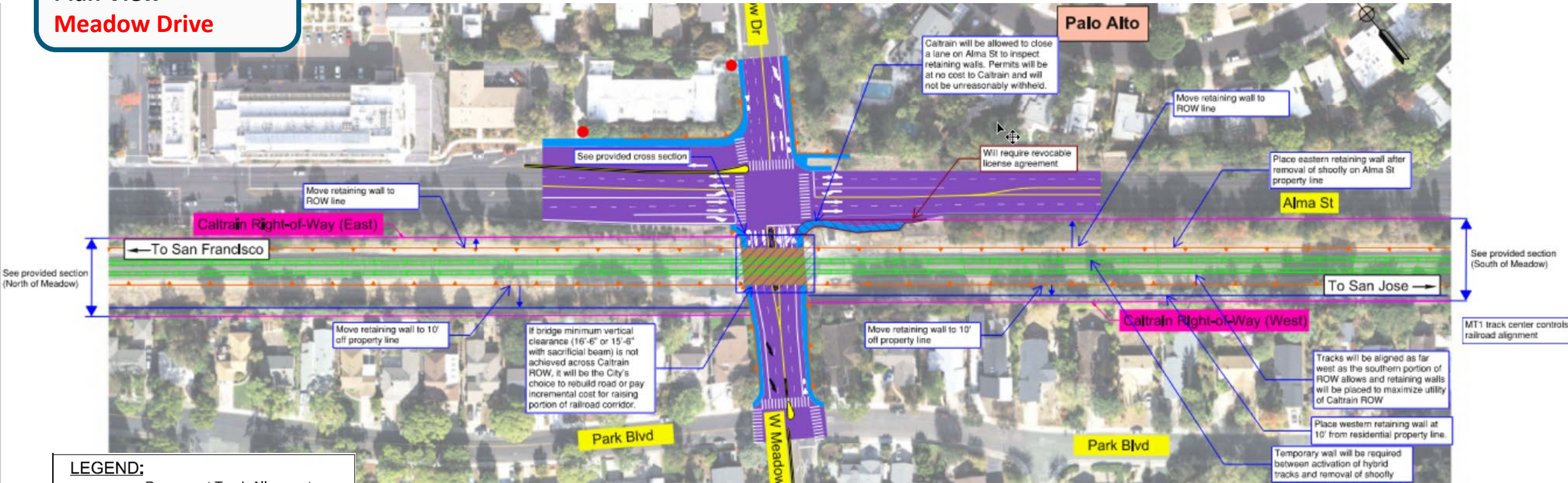
Source: Google Earth, Google Street View, April 2023, Accessed February 2024



Meadow/Charleston Hybrid Summary

Plan View

Meadow Drive



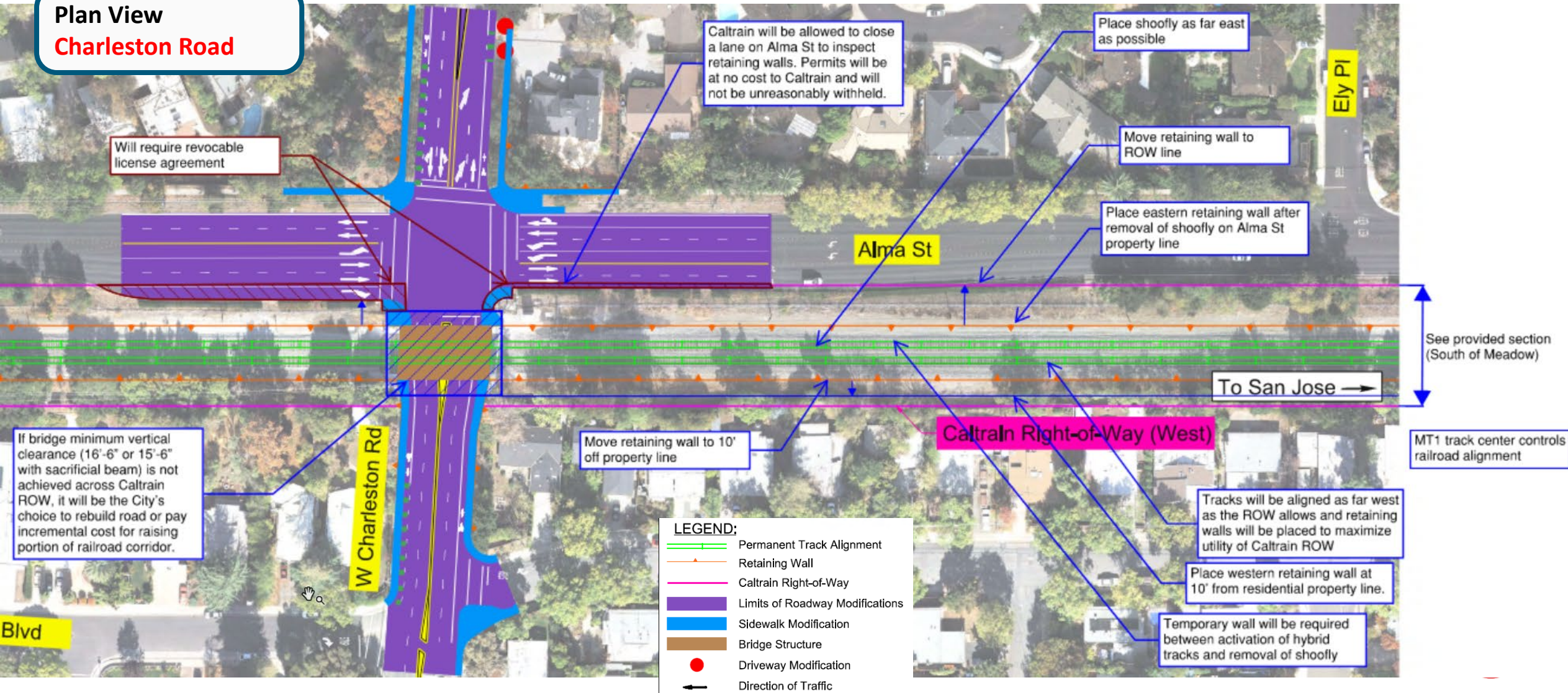
LEGEND:

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

Meadow/Charleston Hybrid Summary

Plan View

Charleston Road



Caltrain's Results of Preliminary Review by Alternative

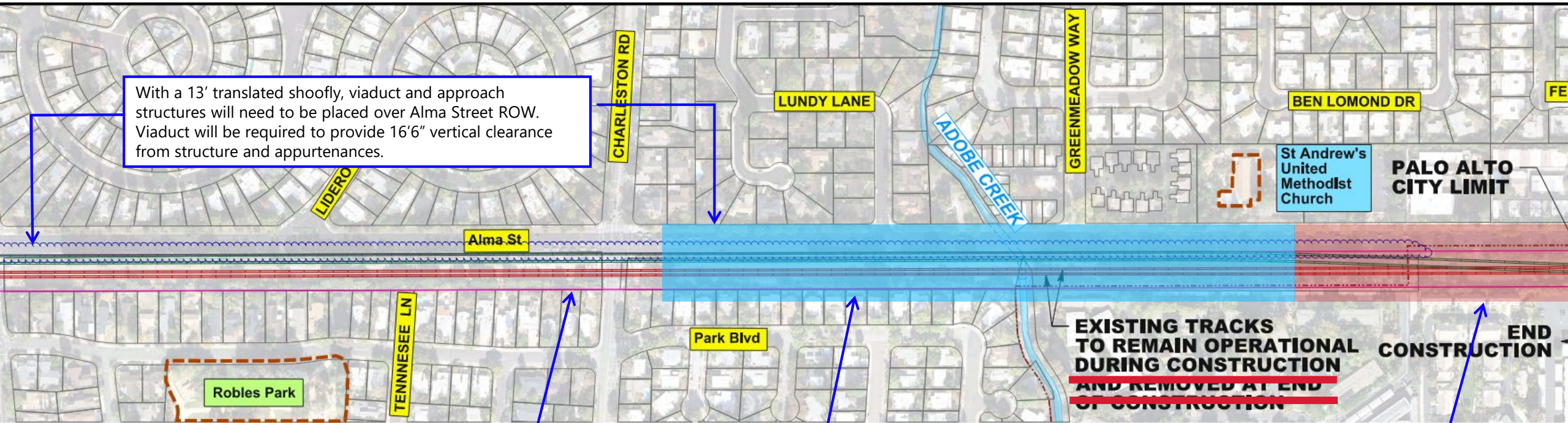
Churchill Alternatives

Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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Meadow/Charleston Viaduct



With a 13' translated shoofly, viaduct and approach structures will need to be placed over Alma Street ROW. Viaduct will be required to provide 16'6" vertical clearance from structure and appurtenances.

Caltrain will retain use of remaining tracks for railroad purposes as it deems necessary.

Approach structure approximately **1,600 feet** long **south** of Charleston Road

Tie-ins will require additional engineering and constructability evaluation during Preliminary Engineering

Meadow/Charleston Viaduct

Example South of Charleston

Existing Condition

ALMA ST

MT1

MT2

Main Track 1: MT1

Main Track 2: MT2

Meadow/Charleston Viaduct

Example South of Charleston

Viaduct and Approach Structure
Footprint **without** Shoofly

Construction zone

ALMA ST

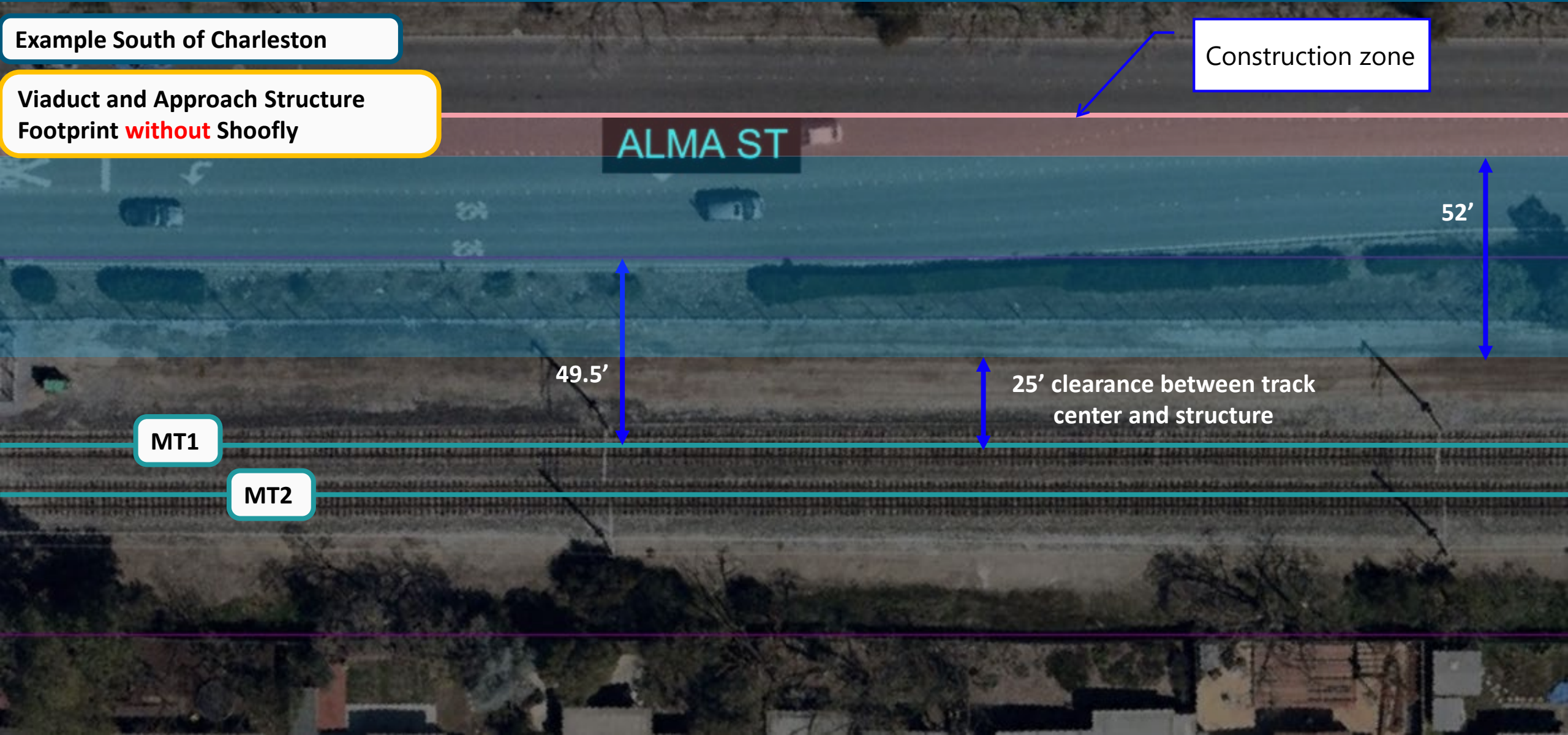
52'

49.5'

25' clearance between track
center and structure

MT1

MT2



Meadow/Charleston Viaduct

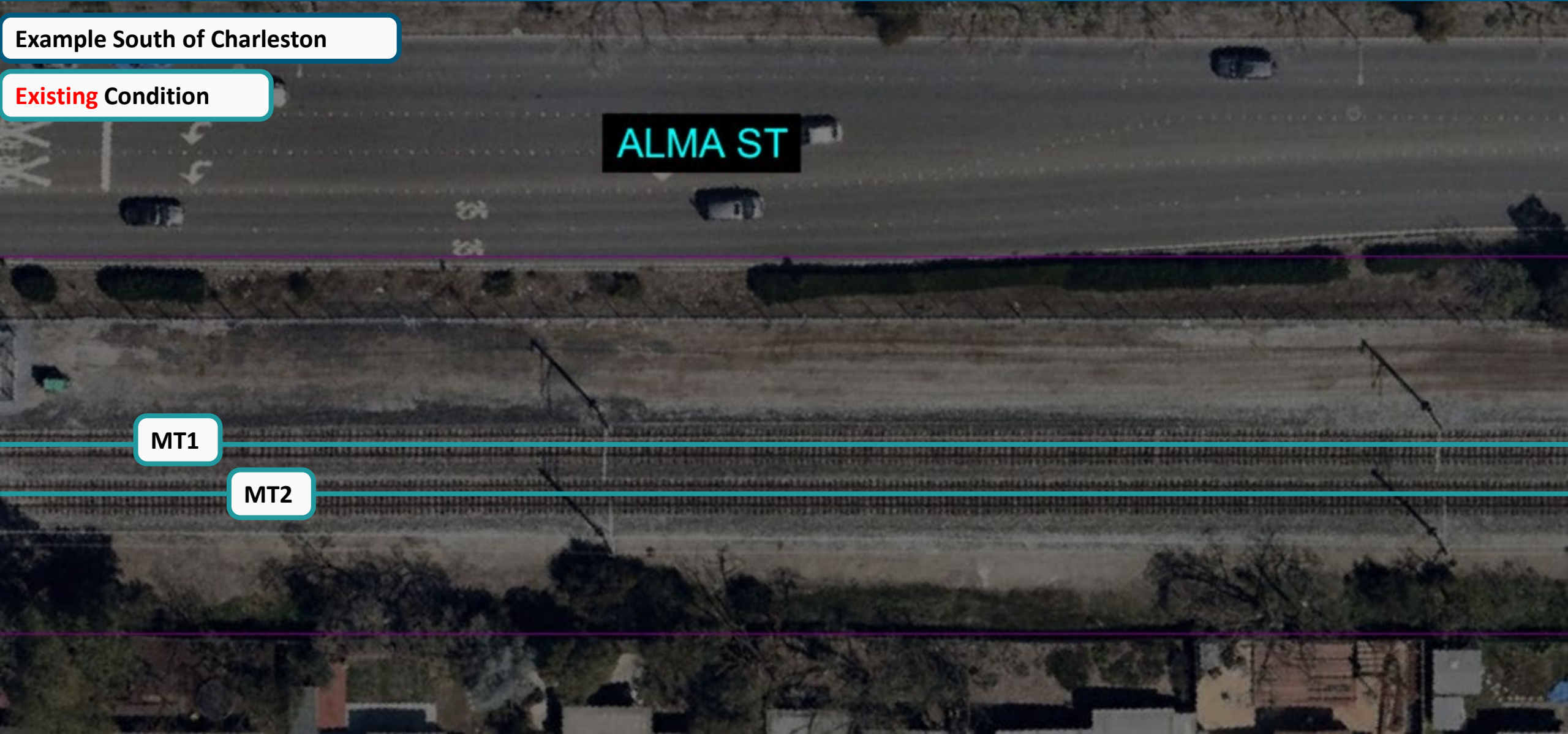
Example South of Charleston

Existing Condition

ALMA ST

MT1

MT2



Meadow/Charleston Viaduct

Example South of Charleston

Build New Shoofly 2

ALMA ST

MT1

MT2

SF2

Build SF2

Shoofly 2: SF2

Meadow/Charleston Viaduct

Example South of Charleston

Build Viaduct and Approach Structures with Permanent MT1 and MT2

ALMA ST

Construction zone

MT1

MT2

52'

SF1

SF2

25' clearance between track center and structure

Shoofly 1: SF1

Shoofly 2: SF2

Meadow/Charleston Viaduct

Example South of Charleston

Final Condition

ALMA ST

MT1

MT2

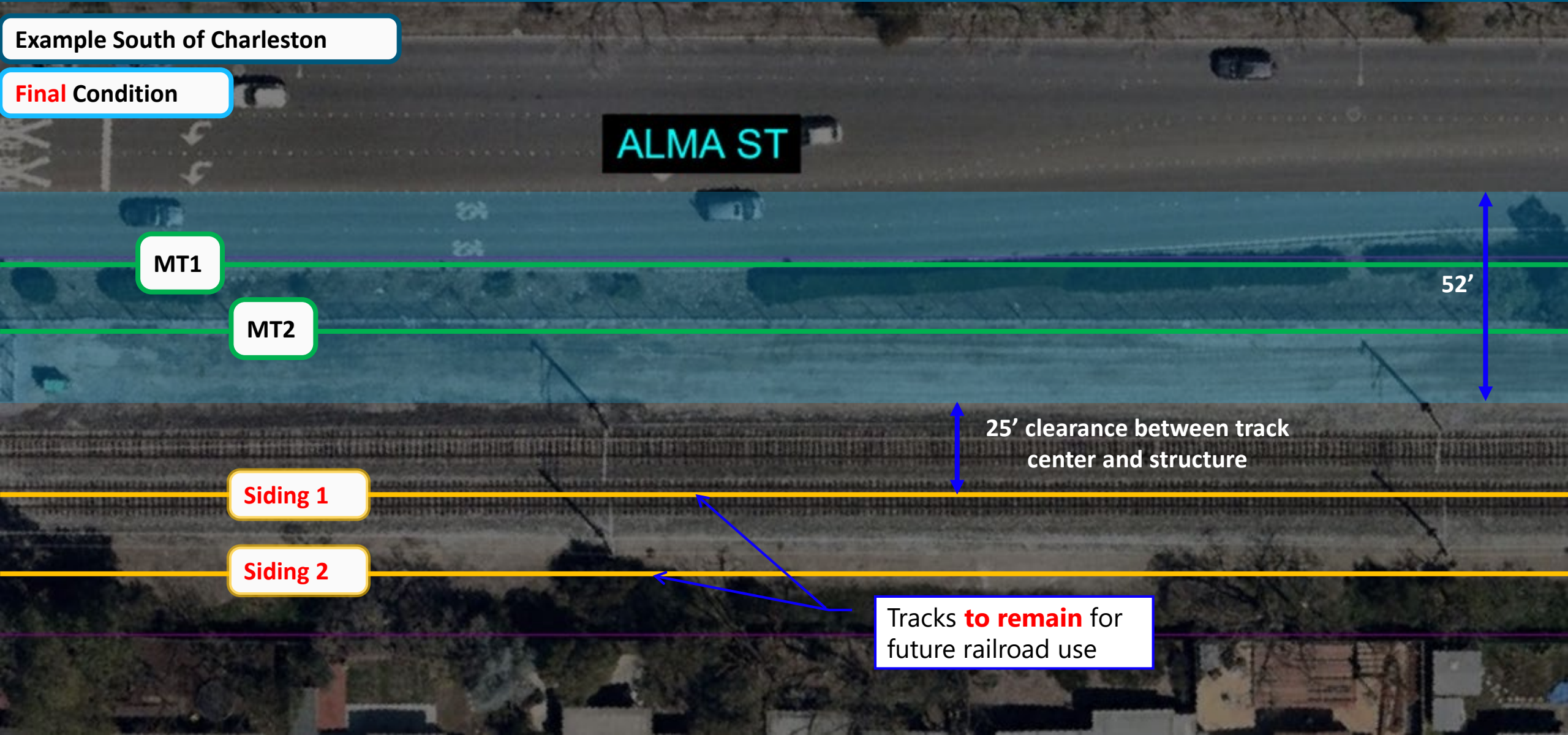
52'

Siding 1

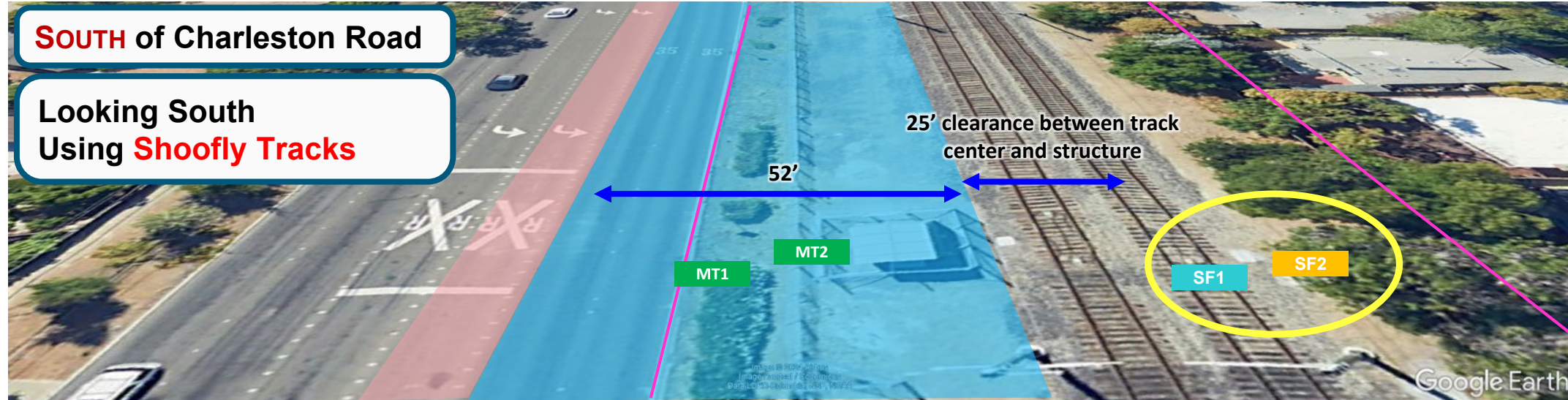
Siding 2

25' clearance between track center and structure

Tracks **to remain** for future railroad use



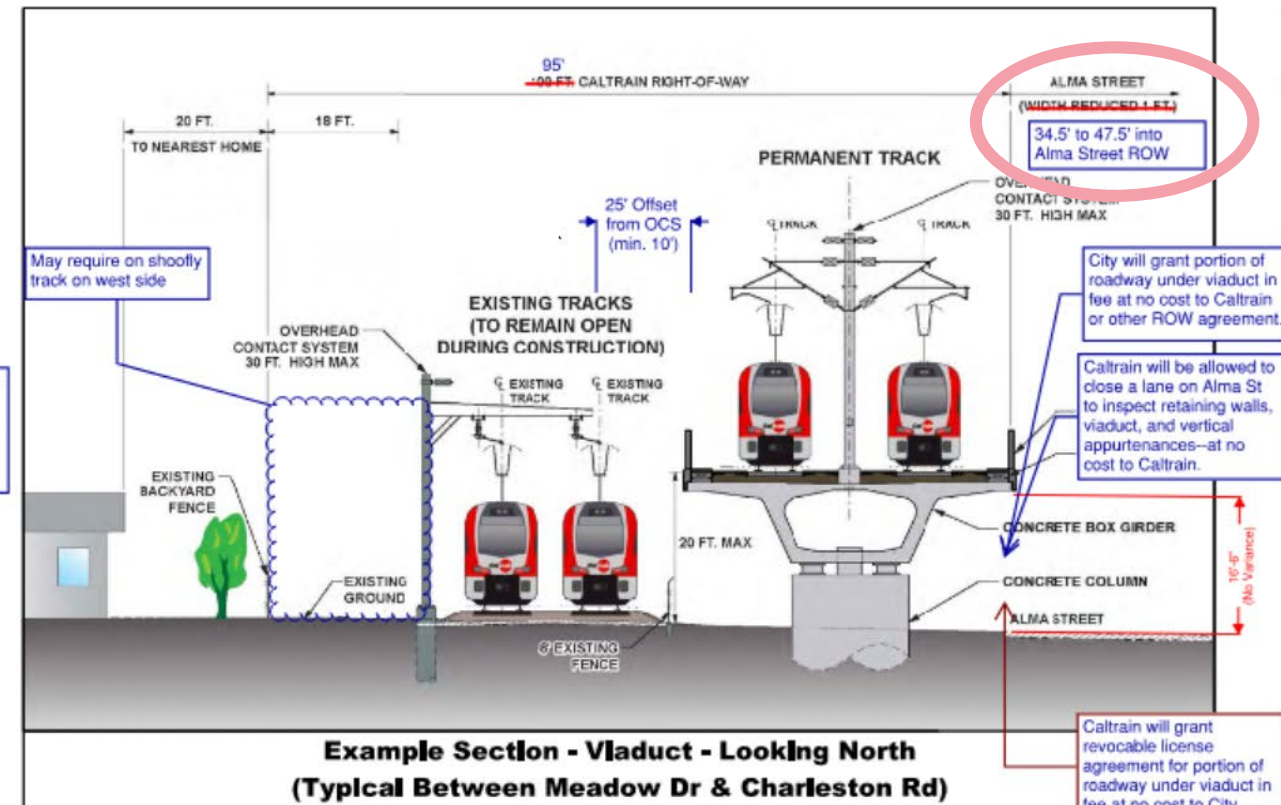
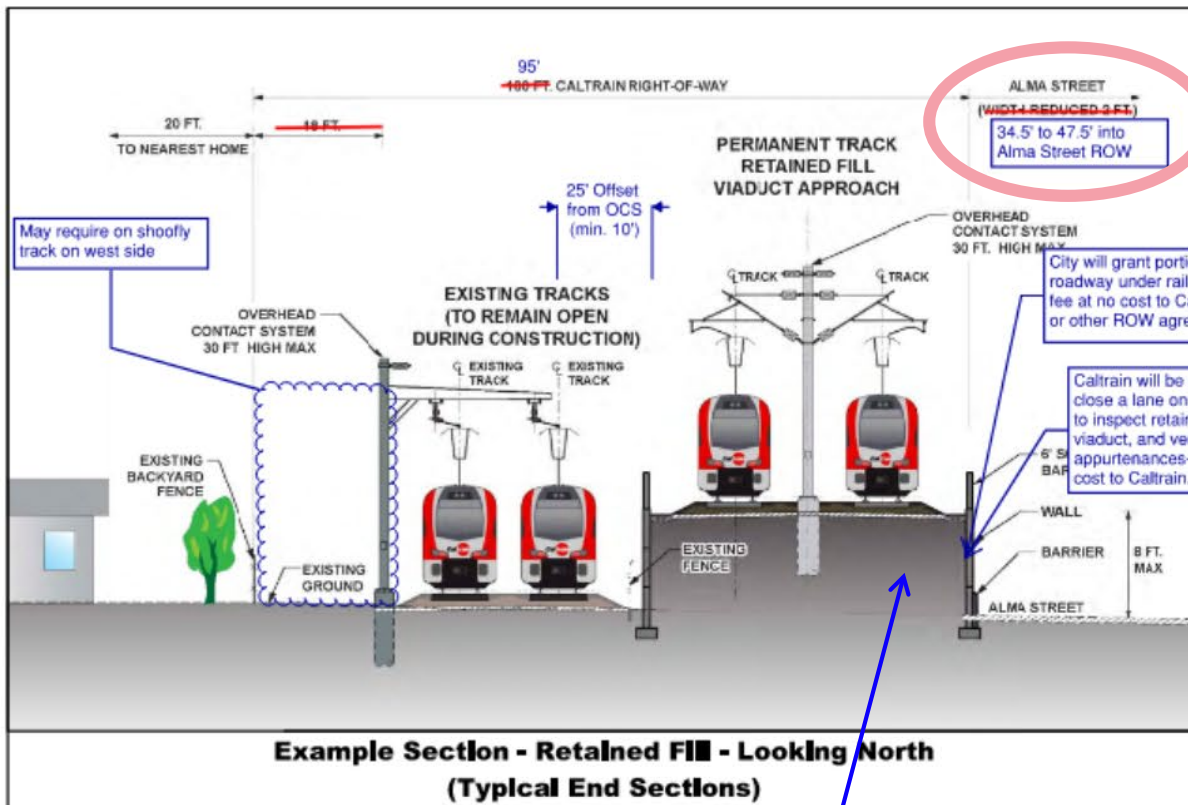
Meadow/Charleston Viaduct



Source: Google Earth, Google Street View, April 2023, Accessed February 2024

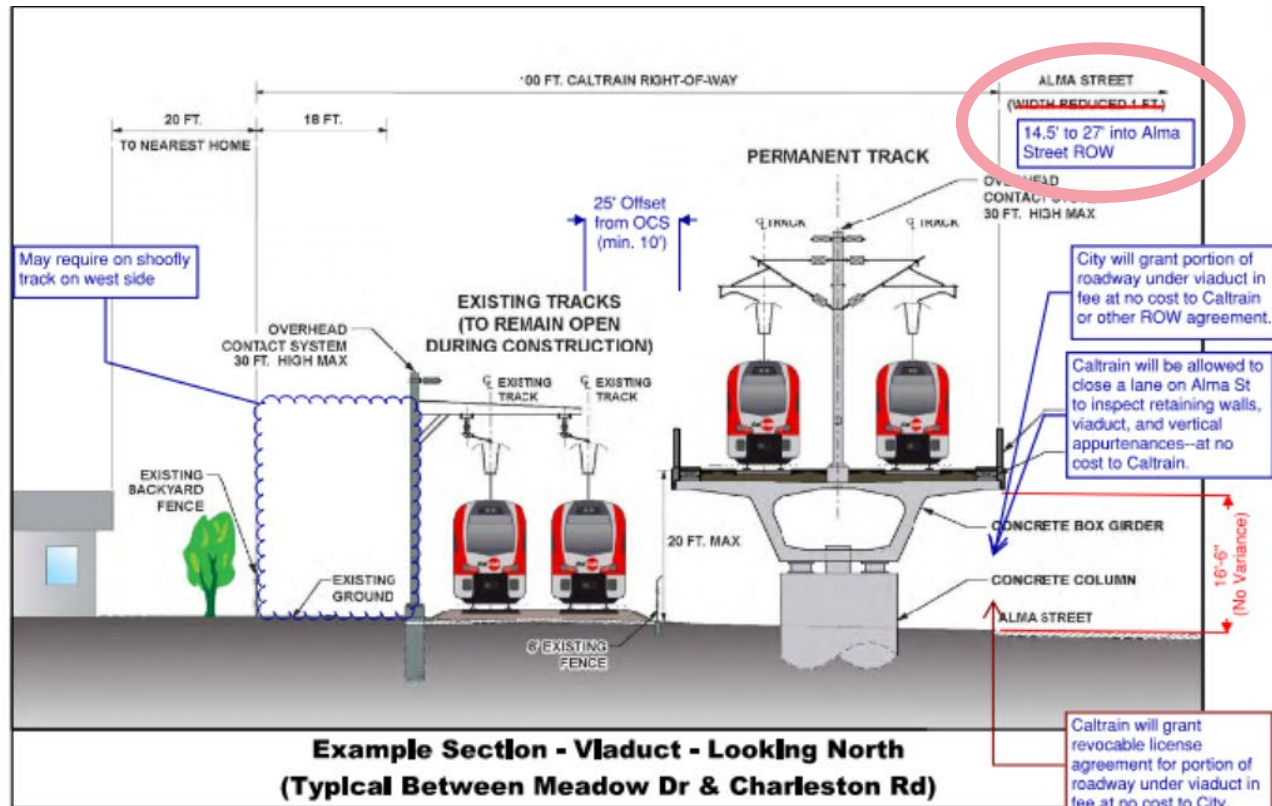
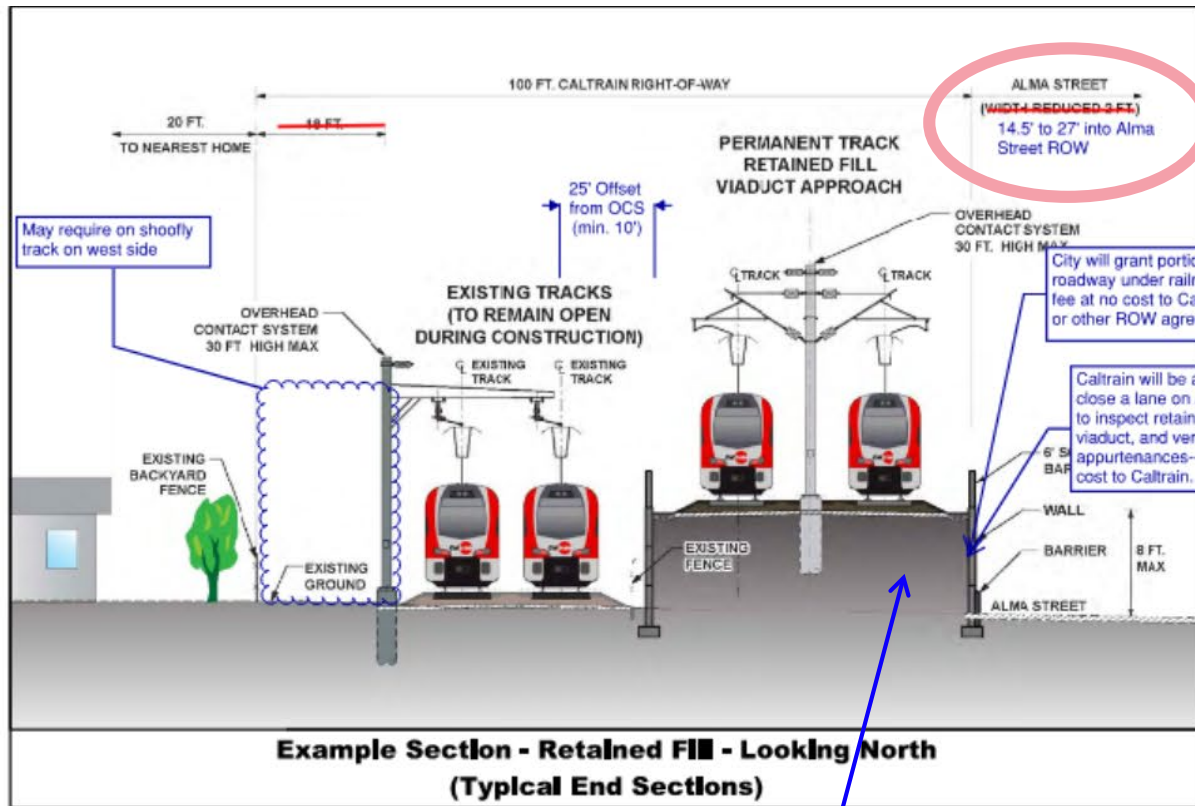


North of Meadow Viaduct



Approach structure approximately **1,600 feet** long **south** of Charleston Road and **2,000 feet** long **north** of Meadow Dr

South of Meadow Viaduct



Approach structure approximately **1,600 feet** long **south** of Charleston Road and **2,000 feet** long **north** of Meadow Dr

Meadow/Charleston Viaduct



**Proposed Viaduct Solution Overview - Looking South West
Meadow Drive Intersection**

Viaduct and approach structures will need to be placed **over/on** Alma Street ROW

Existing Tracks at Grade to Remain in Place

Caltrain's Results of Preliminary Review by Alternative

Churchill Alternatives

Partial Underpass w/ Kellogg Undercrossing (LPA)	Closure Option 1 (With Mitigations)	Closure Option 2 (With Mitigations)
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Meadow/Charleston Alternatives

Hybrid	Viaduct	Underpass
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Meadow Underpass

Will require revocable license agreement

Maintenance vehicle crossing

Interior of bridge extend 25' from MT1 (towards Alma Street) and 12.5' from MT2 (towards private property)

Pedestrian bridges typically have additional vertical clearance due to vulnerable users

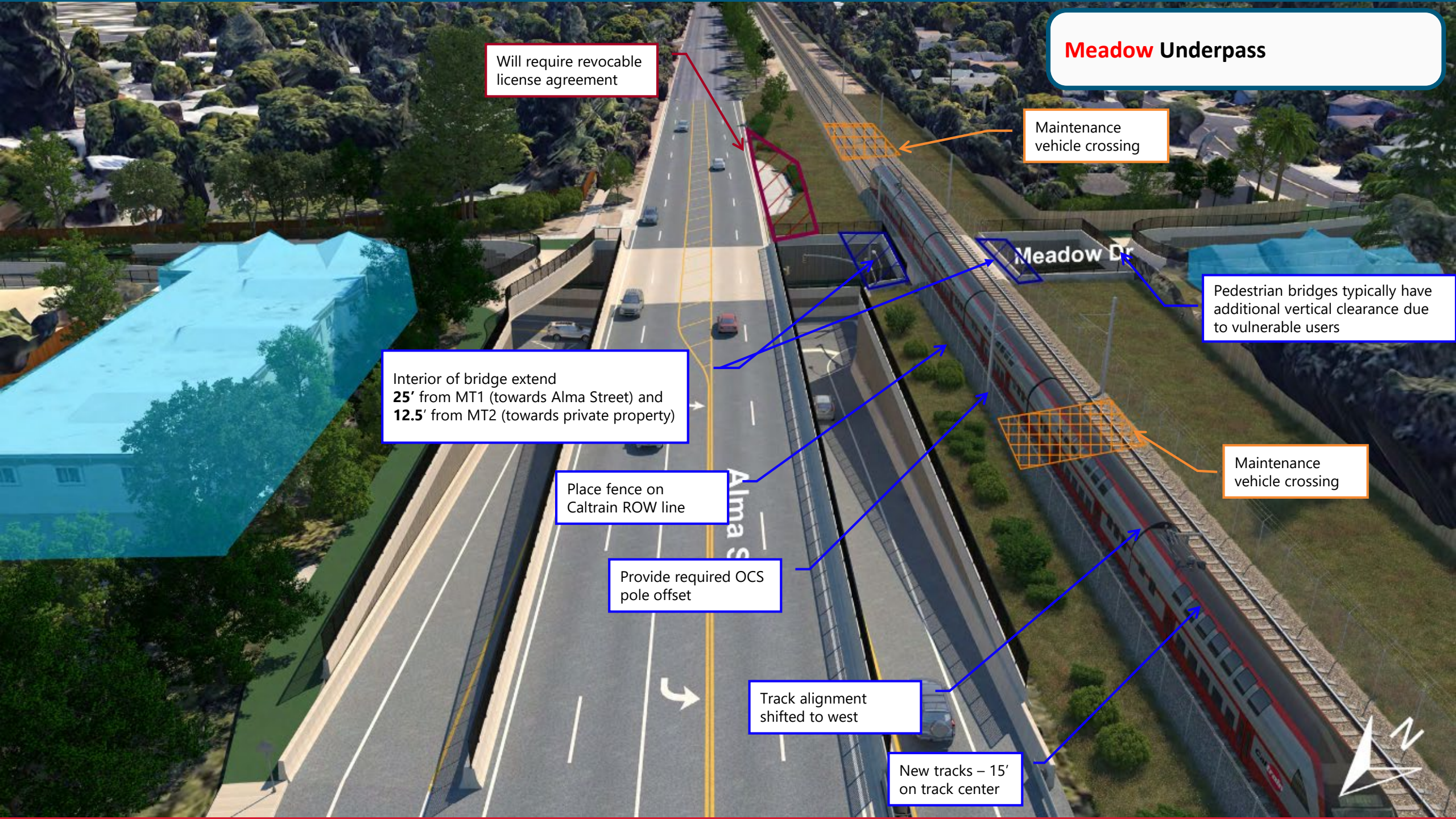
Place fence on Caltrain ROW line

Provide required OCS pole offset

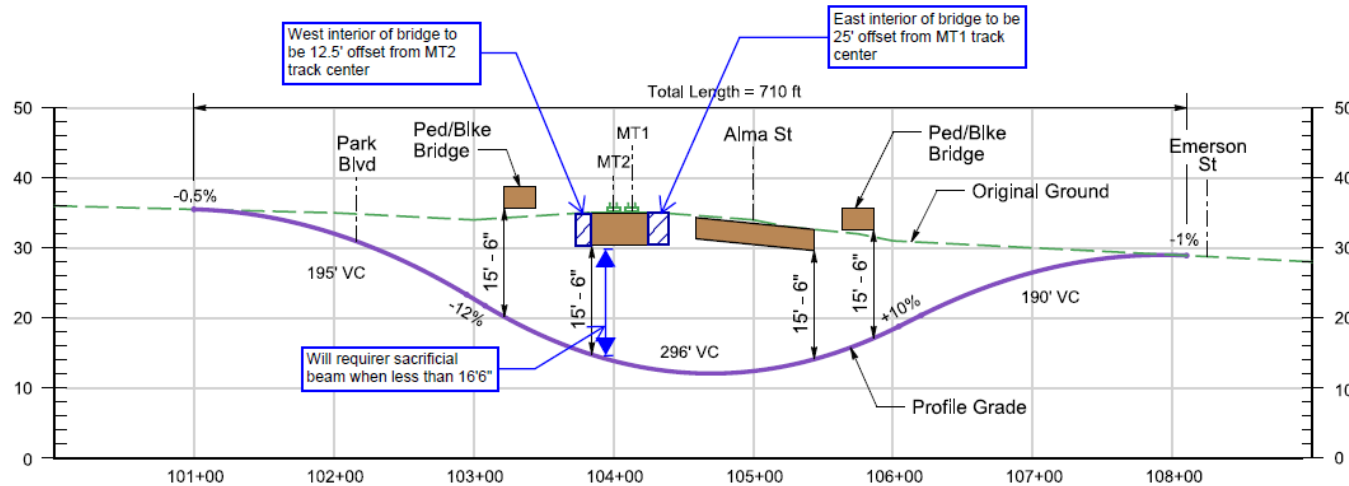
Track alignment shifted to west

New tracks – 15' on track center

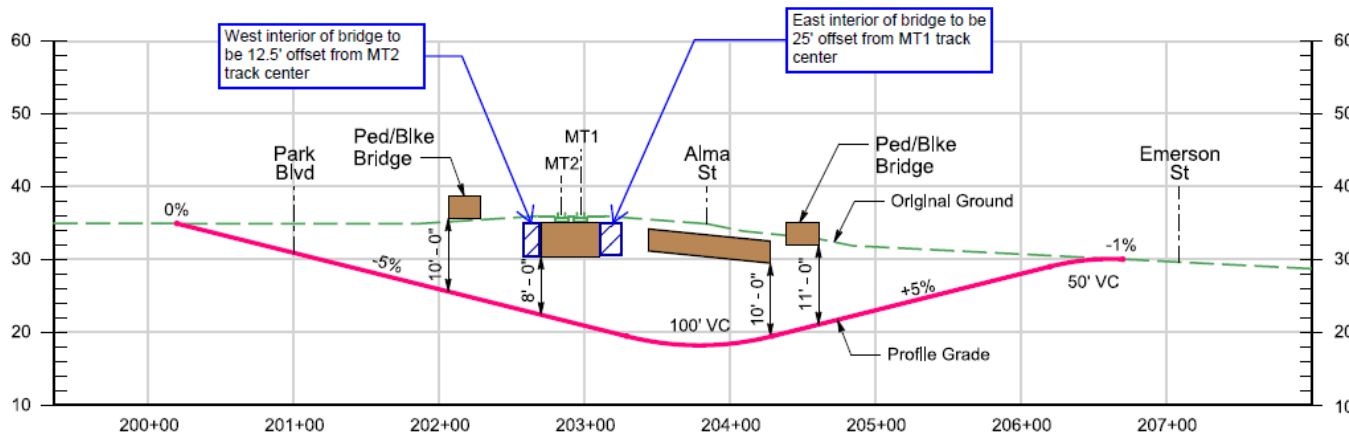
Maintenance vehicle crossing



Meadow Underpass



Meadow Dr Profile



Ped/Bike Profile from Park Blvd to Emerson St

- Interior of bridge over Meadow Dr to accommodate **25'** offset from proposed MT1 track center (towards Alma St) and **12.5'** from MT2 (towards private property)
- Add maintenance **crossovers** on either side of bridge over Meadow Dr
- **15'-6"** vertical clearance is allowed but will require a **variance** and sacrificial beam with an **agreement** for the City to cover the cost (of repair and Caltrain operations) if beam were to be struck

Meadow Underpass Summary



Charleston Underpass

Track alignment
shifted to west

New tracks - 15' on
track center

Provide required OCS
pole offset

Maintenance
vehicle crossing

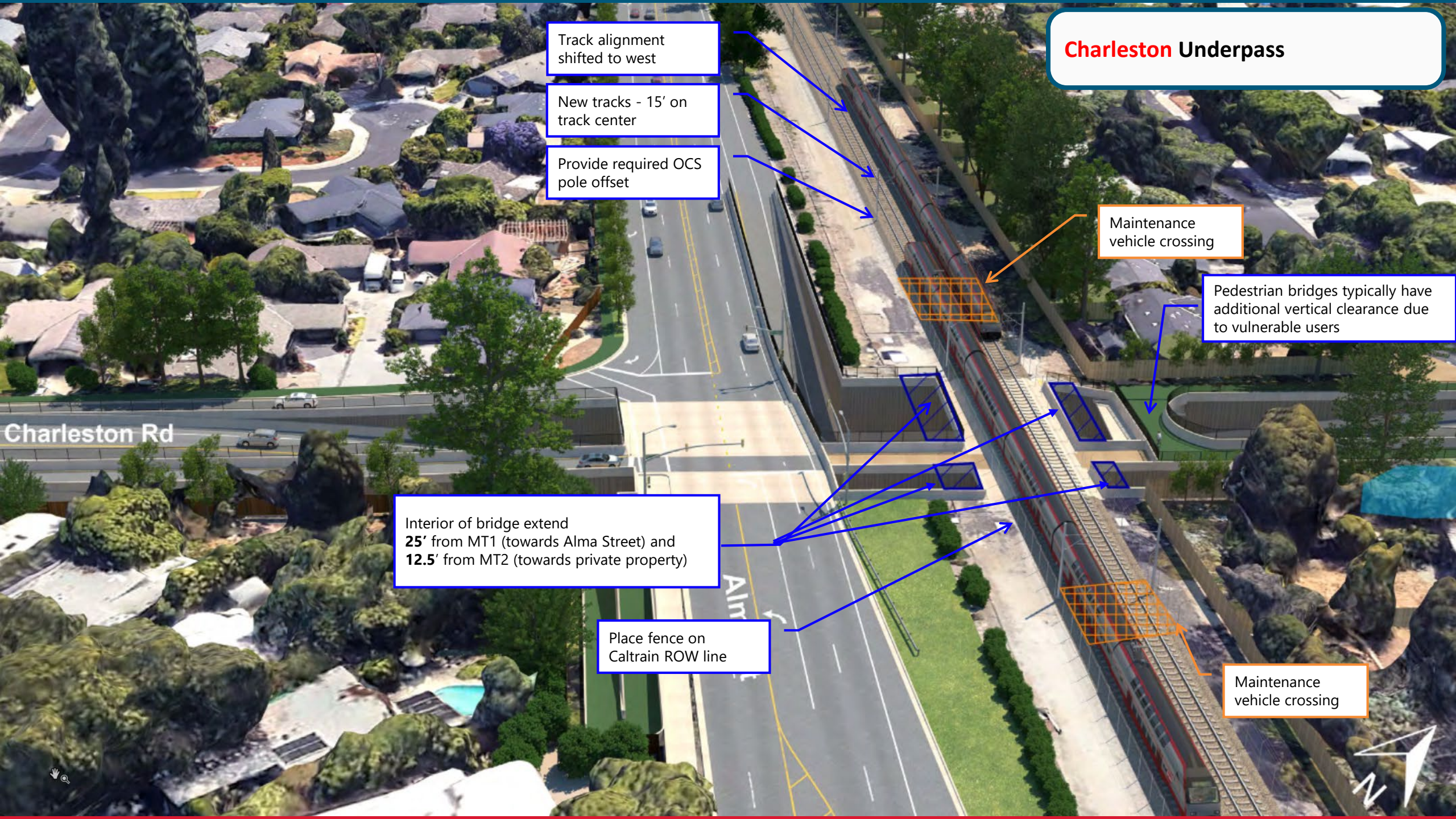
Pedestrian bridges typically have
additional vertical clearance due to
vulnerable users

Charleston Rd

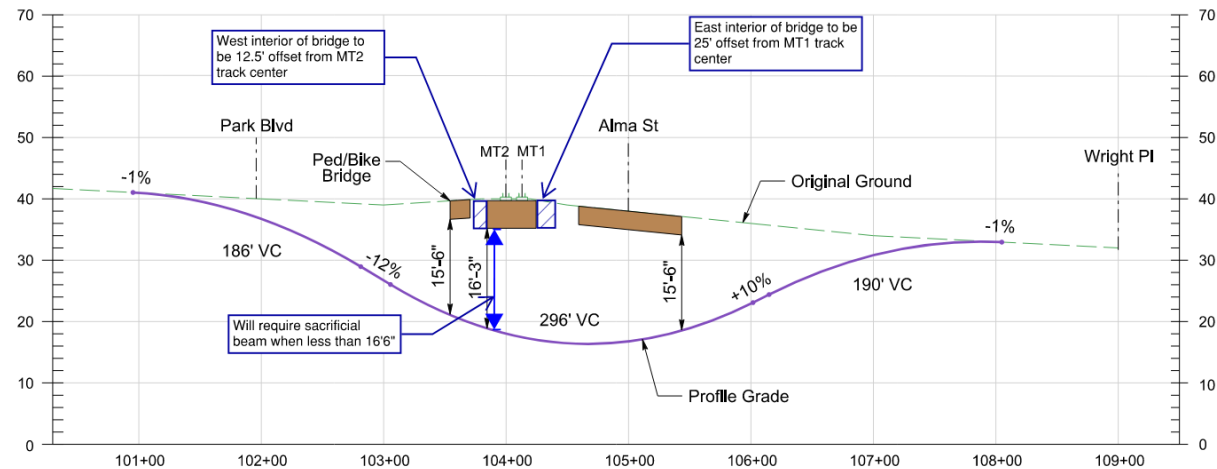
Interior of bridge extend
25' from MT1 (towards Alma Street) and
12.5' from MT2 (towards private property)

Place fence on
Caltrain ROW line

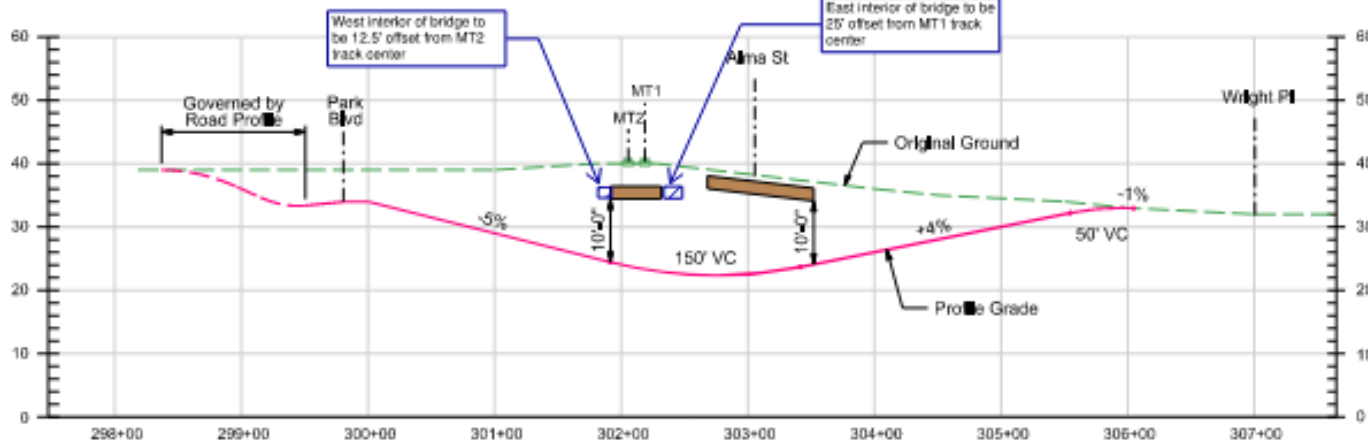
Maintenance
vehicle crossing



Charleston Underpass



Charleston Rd Profile

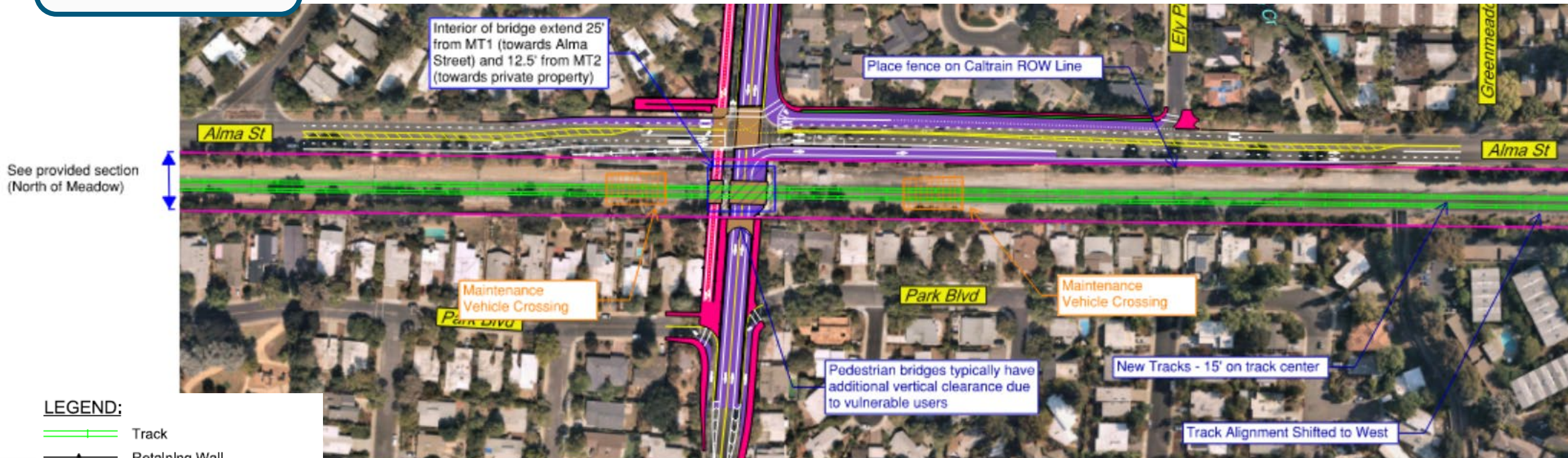


Ped/Bike Profile from Park Blvd to Wright Pl

- Interior of bridge over Charleston Rd to accommodate **25'** offset from proposed MT1 track center (towards Alma St) and **12.5'** offset from proposed MT 2 track center (towards private property)
- Add maintenance **crossovers** on either side of bridge over Charleston Rd
- **15'-6"** vertical clearance is allowed but will require a **variance** and sacrificial beam with an **agreement** for the City to cover the cost (of repair and Caltrain operations) if beam were to be struck

Charleston Underpass Summary

Plan View Charleston Road



LEGEND:

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

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 and selection of preferred alternative for recommendation to the City Council
- Study session with City Council (April 2024)
- City Council to select preferred alternative for advancement into Preliminary Engineering & Environmental Documentation phase for Meadow and Charleston Crossing (May/June 2024)
- Execute Agreement with FRA and Service Agreement/Cooperative Agreement for Preliminary Engineering & Environmental with Caltrain & VTA



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