City of Palo Alto

City Council Staff Report

(ID # 10989)

Report Type: Action Items **Meeting Date: 1/21/2020**

Council Priority: Grade Separations

Summary Title: Connecting Palo Alto: Project Update and Possible Action on Rail Grade Separation Alternatives

Title: Connecting Palo Alto Rail Grade Separation: A) Receive an Update and Recommendation From the Expanded Community Advisory Panel (XCAP) and Potential Modification of the List of Grade Separation Alternatives to add up to Three Concepts (Additional Alternatives for Study) at the Churchill, Charleston, and Meadow Grade Crossings; and B) Provide Direction to Staff Regarding Next Steps Including Consultant Contract Amendment for Scope, Budget, and Schedule Modifications

From: City Manager

Lead Department: City Manager

Recommendations

Staff recommends that the City Council:

Receive an update and recommendation (**Attachment A**) from the Expanded Community Advisory Panel (XCAP) and potentially modify the list of grade separation alternatives to add three concepts (additional alternatives for study) at the Churchill, Charleston, and Meadow Grade Crossings; and

Provide feedback to XCAP and direct staff to continue evaluation of the three proposed new alternatives and return to Council with a recommended AECOM contract amendment to reflect a revised scope of services, budget, and schedule.

Background

At its September 9, 2019 meeting, the City Council took the following action regarding the community planning activities related to railroad grade separations:

A. *Continue the XCAP and authorize the XCAP to appoint a Chair and Co-Chair, to help shape the agendas, take votes, make recommendations, and provide no less than bi-monthly updates to Council;*
B. *Reiterate the April Motion and allow additional alternatives to be studied including:*
    i. *Allow the XCAP to brainstorm some alternatives such as at Embarcadero, Meadow, and Charleston;*
    ii. *Ensure the trench alternative minimizes construction impacts;*
    iii. *Rank alternatives using established criteria;*
C. *Have the XCAP present preferred alternatives by April 30, 2020;*
D. *Direct Staff to refine scope, purpose and timeline for an [Rail Blue Ribbon Commission] (RBRC) to focus on community awareness and engagement, and surveys, regional cooperation and funding and bring it back to Council prior to December 1, 2019; and*
E. *Staff and Council to continue to work with VTA, Caltrain, Stanford and others on potential funding sources.*

Following this City Council direction, on October 28, 2019, the City Council received an overview of a potential communications and community engagement strategy to support City Council decision-making on preferred alternatives for further development in Spring 2020. The City Council also received its first verbal update from the Chair of the XCAP.

On December 9, 2019, the City Council received another communications and community engagement update with the list of upcoming Town Hall meetings (https://connectingpaloalto.com/wp-content/uploads/2020/01/ConnectingPaloAltoRailGradeDigitalCard.jpg; **Attachment D**); another update from the Expanded Community Advisory Panel (XCAP) (**Attachment B**); and also heard an update about the status of the RBRC. The City Council voted to eliminate consideration of the RBRC.

Discussion

Receive an Update and Recommendation from the Expanded Community Advisory Panel (XCAP) and Potentially Modify the List of Grade Separation Alternatives to add Three Concepts (Additional Alternatives for Study) at the Churchill, Charleston, and Meadow Grade Crossings

XCAP Update and Recommendations

As shown in the adopted language of the September 9, 2019 City Council meeting, the City Council approved an expanded role and responsibilities for the Expanded Community Advisory Panel (XCAP). The changes allowed the XCAP to elect a Chair and Vice Chair as well as to take votes on recommendations, among other things. In the

motion, the City Council also asked the XCAP to provide updates no less than every other month to the City Council.

City Council received the first update on October 28, 2019 (pages 12-25: https://www.cityofpaloalto.org/civicax/filebank/blobdload.aspx?t=59288.75&BlobID=73855) and the second update on December 9, 2019 (https://connectingpaloalto.com/wp-content/uploads/2019/12/FINAL-Nadia-Dec-9-City-Council-Update-for-Dec-9-2019.docx).

For the January XCAP update (**Attachment A**), the XCAP Chairperson will be presenting general updates as well as the following XCAP recommendation (passed at their December 18, 2019 meeting): To consider adding the following new ideas to the list of existing seven (7) alternatives for rail grade separation:

Table 1: Description of New Ideas as Recommended by XCAP

	Crossing Impacted	Type of Grade Separation	New Idea Description and Author	Resources for Further Details
1	Churchill Ave.	Closure with a viaduct and roundabout	Author: Tony Carrasco Description: This concept is a closure of Churchill and replaces the current street overpass at Embarcadero with a roundabout at-grade and rail viaduct overhead.	Original Presentation: https://connectingpaloalto.com/wp-content/uploads/2019/11/Item4-Attachment3-EmbarcaderoTrafficAlternative-Tony.pdf Analysis of Alternative: (See next subsection of this report)
2	Churchill Ave.	Road under rail	Author: Michael Price Description: This concept depresses/lowers Alma and Churchill west of Alma in order to retain traffic connections under the existing tracks.	Original Presentation: https://connectingpaloalto.com/wp-content/uploads/2019/11/Item4-Attachment1-Churchill-Alternativev9-Michael.pdf Analysis of Alternative: (See next subsection of this report)

	Crossing Impacted	Type of Grade Separation	New Idea Description and Author	Resources for Further Details
3	Meadow Dr. Charleston Rd.	Road under rail with a roundabout near Mumford	Author: Elizabeth Alexis Description: This concept has changed since it was originally presented thus the analysis here and the resource information may not reflect the exact current idea. However, as best understood as of Dec. 17, 2019, this concept is to depress/lower the crossing roads under the rail in order to avoid the need for shoofly (temporary) track construction. Both Meadow and Charleston would be depressed and pass under the rail and Alma. This concept requires a roundabout on the east side of Charleston and undetermined modifications on Meadow.	Original Presentation: https://connectingpaloalto.com/wp-content/uploads/2019/11/Item4-Attachment4-Charleston_Meadow-Underpass-Concept-Elizabeth.pdf Follow-up Presentation: https://connectingpaloalto.com/wp-content/uploads/2019/12/Item5-Charleston_E.-Meadow-Two-Lane-Underpass-Concept-Elizabeth.pdf Analysis of Alternative: (See next subsection of this report)

The XCAP Chairperson will be describing each of these ideas in her update to the City Council and will provide details about them (**Attachment A**). The ideas are concepts and will need to be evaluated further.

Evaluation of XCAP Recommendation to add Three Concepts to the List of Alternatives

As shown above, the XCAP recommends that the City Council consider adding three (3) new alternatives to the list of seven (7) current alternatives for grade separation in Palo Alto at the Churchill, Charleston, and Meadow Crossings. The current list of City Council-authorized alternatives as of the last action on the alternatives (May 13, 2019) is:

- Churchill Avenue:
    1. Closure with Traffic Mitigations
    2. Viaduct (Rail Fully Elevated Above the Road)

- Charleston Road and Meadow Drive:
    3. South Palo Alto Tunnel with At-Grade Freight Trains
    4. South Palo Alto Tunnel with Passenger and Freight Rail
    5. Hybrid (Rail Elevated and Road Lowered)
    6. Trench (Rail Below Ground in an Open-Air Trench)

7. Viaduct (Rail Fully Elevated Above the Road)

Through an extensive review process, the City Council has been working over the past two years to narrow the grade separation alternatives. To date, they have narrowed down from 37 choices to seven (7) with the help of the City Council Rail Committee as well as feedback from the former Community Advisory Panel (CAP) and community input. The City Council reduced the number of alternatives to have a manageable list of alternatives to study because there is a cost for each alternative that the City considers. When the City Council expanded and changed the CAP into the XCAP, they asked the XCAP to brainstorm some alternatives, such as those at Embarcadero, Meadow, and Charleston, with the expectation that the City Council would have to review those ideas before deciding to expend project funds to further study the ideas.

Analysis on the Three XCAP Recommended New Ideas:

This subsection provides feedback on the three (3) new ideas to assist the City Council in evaluating the XCAP recommendation. The attached memo (**Attachment C**) provides high-level, preliminary analysis from AECOM about the three (3) new ideas. Staff revised the attached analysis to focus only those ideas recommended by XCAP.

As shown in the attached memo, the key points related to each new idea are:

Table 2: Key analysis Points Related to New Ideas

	Crossing Impacted	**Type of Grade Separation**	**Key Points Related to New Idea**
1	Churchill Ave. (Tony Carrasco New Idea)	Closure with a viaduct and roundabout	- Requires rail be raised 20+ feet over its current elevation, resulting in rail impacts extending 1,000 feet further north than the Churchill viaduct - The existing rail and road bridges over Embarcadero would be demolished and reconstructed as a roundabout - May have property impacts - Requires evaluation of the relative merit of an Alma/Embarcadero roundabout versus Alma/Embarcadero grade separation on existing traffic issues in the Embarcadero area
2	Churchill Ave. (Michael Price New Idea)	Road under rail	- Has some traffic flow impacts - Has some right-of-way property impacts - Presents an opportunity to keep Churchill open without having to do a viaduct

	Crossing Impacted	Type of Grade Separation	Key Points Related to New Idea
3	Meadow Dr. Charleston Rd. (Elizabeth Alexis New Idea)	Road under rail with a roundabout	- This idea has shifted a few times. The AECOM preliminary analysis may not capture all the aspects of this idea to-date. - Has some right-of-way property impacts - Traffic flow needs to be thoroughly analyzed - Physical viability at Meadow uncertain - Presents opportunity to potentially reduce construction timeframe, but will be uncertain until final design

A preliminary review by the City's consultant AECOM is provided in **Attachment C**, as well as the information presented by the XCAP (**Attachment A**). Should the City Council direct proceeding with further analysis of the three (3) new ideas, staff will work with our consultants and return to Council with necessary revisions to the workplan, schedule, and budget for a contract amendment.

Direct Staff to Take the Three Proposed New Alternatives/Ideas and Return with a Workplan, Revised Schedule, and Necessary Contract Amendments

The current timeline for the City Council to decide on a preferred alternative for each crossing is Spring 2020 after receiving feedback from the community through planned community engagement efforts, as well as the XCAP final recommendation (by April 30, 2020). A timeline that details steps from now until a City Council decision can be seen on slide 9 at the link below. The timeline for the steps after a Council decision can be seen on slide 10 in the presentation from the November 7 Community Meeting (https://connectingpaloalto.com/wp-content/uploads/2019/11/20191107-PaloAlto_Community-mtg_v3-Optimized.pdf).

Estimated Cost and Timeline to Evaluate New Ideas:

To inform the City Council as to the potential costs and time needed to evaluate these three new ideas, staff requested the City's consultant AECOM to provide estimates of work needed. The following information is a preliminary estimate based on information known today. Staff recommends that the City Council refer any of the XCAP recommendations to City staff to work with AECOM to present a revised schedule, cost, and sequencing approach needed for the overall evaluation. Such direction would also allow staff to prepare any necessary contract amendments.

The preliminary estimated costs and schedule implications, according to AECOM, for the additional analysis would be approximately $65,000 to develop conceptual engineering plans, cross-sections, and construction cost estimates for each of the ideas. Additional costs would be incurred to modify the current outreach plan to incorporate these new ideas as well as potentially additional costs for renderings and animation.

The technical work required to evaluate these additional ideas will require several weeks, as will development of communication materials for distribution and community meetings. If all three new ideas are moved forward, reaching the April deadline for the Charleston, Meadow, and Churchill crossings will likely be difficult. Staff is therefore in discussions with AECOM on the potential to sequence the needed analysis to complete work related to Charleston and Meadow first. Among the new ideas presented, the additional work required for Charleston/Meadow at this time can likely be accomplished with minimal schedule impact. Staff will need to work with AECOM to determine a workplan, cost, and schedule and return to Council with that information.

Maintaining the Council-directed schedule for the identification of a preferred alternative at Charleston/Meadow will nonetheless require continued focused work by the XCAP to complete its discussion and conclusions regarding the existing alternatives.

Resource Impact

The following fiscal analysis is based on the City Council's consideration of adding the new XCAP ideas to the project planning effort. These additonal costs would include traffic analysis and additional community engagement and outreach.

Based on the $2,484,786 total contract amount with AECOM (including Amendment #1 from June 2019), and other expenses related to the grade separation planning project, funding for an increase to the AECOM contract can be allocated within existing appropriations, recognizing that the AECOM contract is funded over multiple fiscal years. The Railroad Grade Separation capital project (PL-17001) has an allocation of $4,879,846 in FY 2020 with $1,283,558 encumbered to-date in this fiscal year. The $4,879,846 funding anticipates funding received from VTA Measure B grade separation. The FY 2020 project funds not yet encumbered are expected to be used in the environmental process which would commence after the City Council identifies preferred alternatives. Further funding spent on study is funding that would otherwise be used for the next phase of the project or for doing other street repaving and road projects in town.

Stakeholder Engagement

The XCAP continues to be engaged in this overall effort. Staff is engaging the community at-large on Connecting Palo Alto and is seeking input to inform the City Council's decisions. Staff is also collaborating with several transportation agencies on this initiative.

For the link to the Community Conversations flyer go here:
https://connectingpaloalto.com/wp-content/uploads/2020/01/ConnectingPaloAltoRailGradeDigitalCard.jpg

Attachments:

- Attachment A-XCAP City Council presentation #3 FINAL with Resource Slide
- Attachment B-FINAL Dec 9 City Council Update for Dec 9 2019-Naik
- Attachment C-AECOM Technical Memo
- Attachment D-Connecting Palo Alto Rail Flyer

Attachment A -
XCAP Update and
Recommendation to Council

EXPANDED COMMUNITY ADVISORY PANEL (XCAP) UPDATE #3

For City Council, January 21, 2020

Presented by Nadia Naik and Keith Reckdahl

AGENDA

1. Update on XCAP's work
2. Presentation of new community generated concepts that XCAP decided have merit and are worthy of Council consideration.
   a. We are asking City Council to decide whether new ideas warrant further study
3. Council feedback and guidance on what we should include in final XCAP recommendations report to Council

WORK COMPLETE TO DATE

New iterations/ideas presented to XCAP

- Five iterations/ideas passed "pre-screening"
  - *Iteration on South Palo Alto Tunnel (Roland LeBrun)*
  - *Iteration on Partial Churchill underpass (Mike Price)*
  - *2 Roundabout concepts for Embarcadero/Alma (Tony Carrasco)*
  - *Constant Flow Underpass for South Palo Alto (Elizabeth Alexis)*
- XCAP Technical Group (subcommittee) & volunteer Civil Engineers met with AECOM and City Staff to discuss new ideas and vet them for "fatal flaws"
- XCAP received the information and then voted
- XCAP **recommended 3 concepts should be presented** to City Council

COUNCIL CONSIDERATIONS FOR NEW CONCEPTS

- These are **general concepts** presented by citizens – not refined designs
- They need professional vetting and refinement
- They attempt to solve major problems identified in existing alternatives
- XCAP pre-screened concepts with the understanding new concept review costs the City money and time
- XCAP voted to recommend that the following 3 concepts are worth spending money on

QUICK SUMMARY EXISTING ALTERNATIVES

	South Palo Alto				Churchill	
	Hybrid	Viaduct	Trench	South PA Tunnels (2 Alternatives)	Closure	Viaduct
Cost	$200-$250M	$400-$500M	$800-$950M	$1,173-$1,827M	$50-$65M	$300-$400M
Construction Time	4 years	2 years	6 years	6 years	2 years	2 years
Visual Impacts	Elevated 15 ft	Elevated 20 ft	High Fencing	High Fencing at portals/freight on grade	No change	20 ft elevated
Water/Utilities Impacts	Major Utility relocation / pumping	Minor utility relocation	Major utility relocation and Creek and ground water impacts	Major utility relocation and Creek and ground water impacts	Pumping of Bike/ped crossing	Minor utility relocation

3 NEW CONCEPTS

Constant Flow Underpass for Charleston and Meadow
(Elizabeth Alexis)

Churchill Partial Underpass
(Mike Price)

Re-think Embarcadero at Alma
(Tony Carrasco and others)

Constant Flow Underpass for Charleston and Meadow

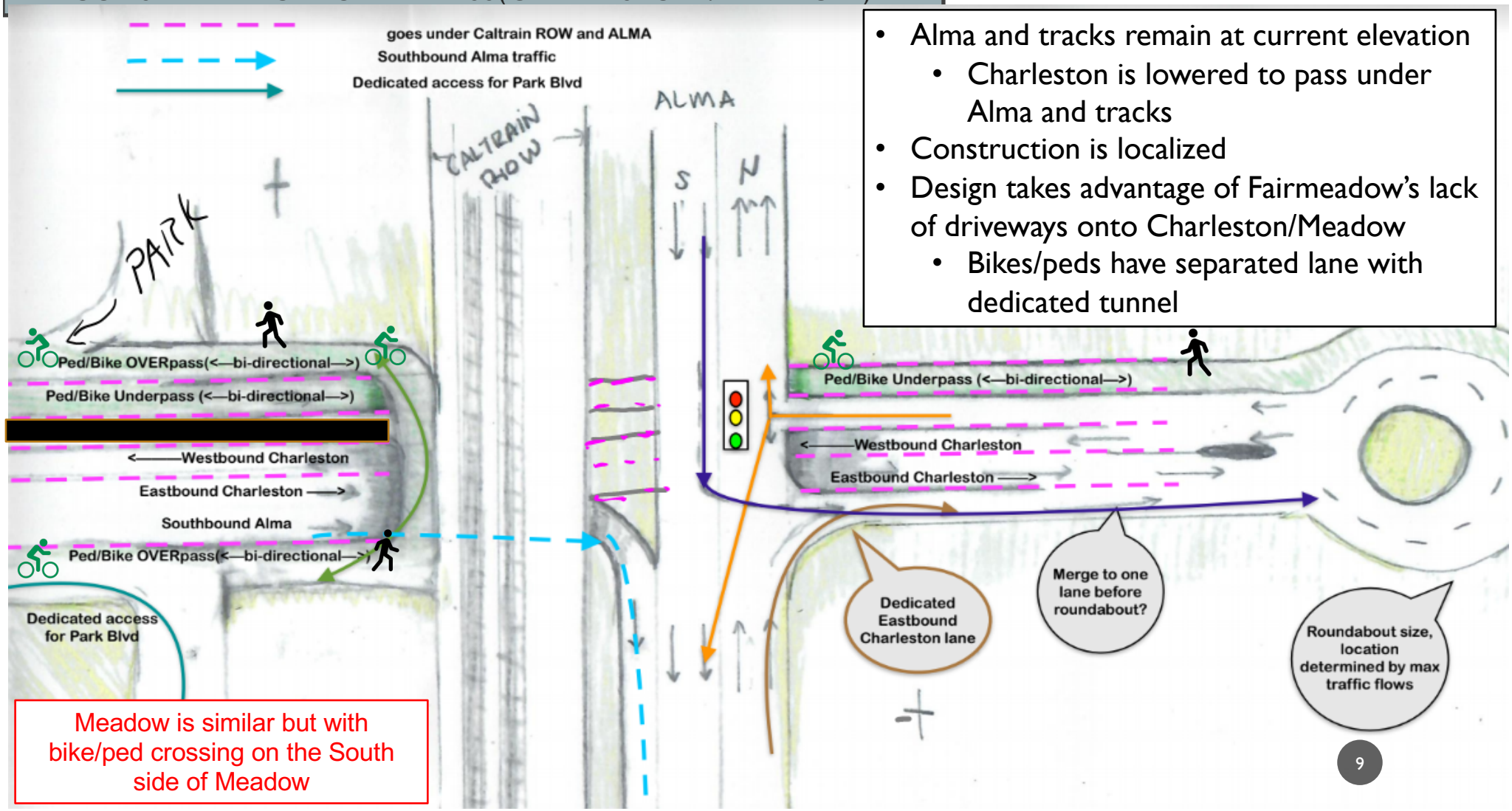
Constant Flow Underpass
for Charleston/Meadow

SHORTCOMINGS OF EXISTING ALTERNATIVES

Existing Alternatives have significant drawbacks:

- Viability: Tunnel and Trench have potentially significant groundwater impacts
- Neighborhood Impacts: Elevated-rail solutions are unpopular with many residents
- Cost: All existing alternatives are very expensive
  - Hybrid likely very under-costed – limited Caltrain work windows = more $$
  - Complicated, busy corridor and limited design work to date means prices are likely to increase further
- Long Construction period: Existing alternatives require
  - Alma detours, lane reductions
  - Construction will disrupts traffic network for years
- Existing Alternatives do not improve circulation:
  - Missed opportunity to improve bike/ped travel
  - Bikes/peds bunch together waiting for cars at Alma

CONSTANT FLOW UNDERPASS(CHARLESTON / MEADOW)

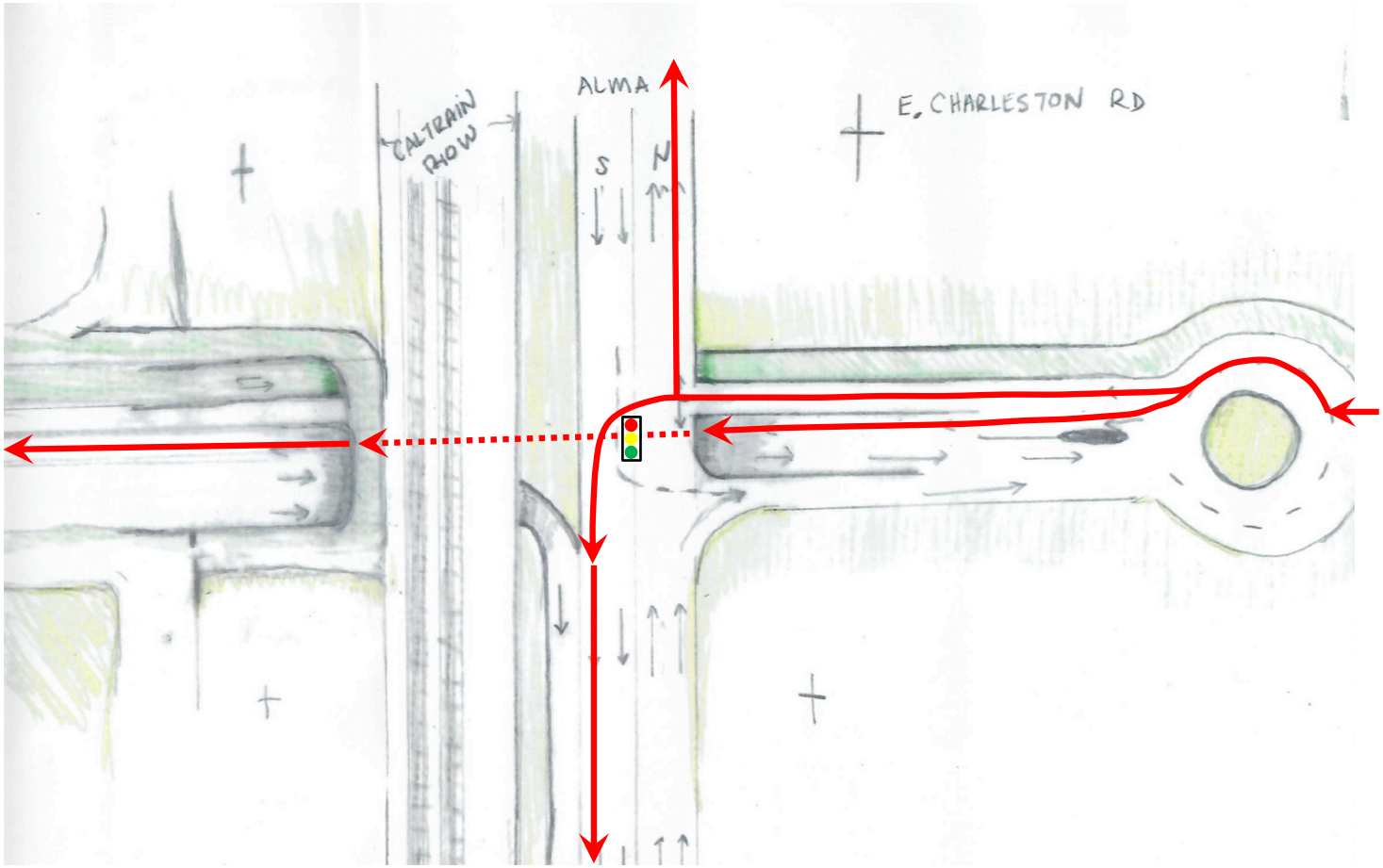


- Alma and tracks remain at current elevation
  - Charleston is lowered to pass under Alma and tracks
- Construction is localized
- Design takes advantage of Fairmeadow's lack of driveways onto Charleston/Meadow
  - Bikes/peds have separated lane with dedicated tunnel

Meadow is similar but with bike/ped crossing on the South side of Meadow

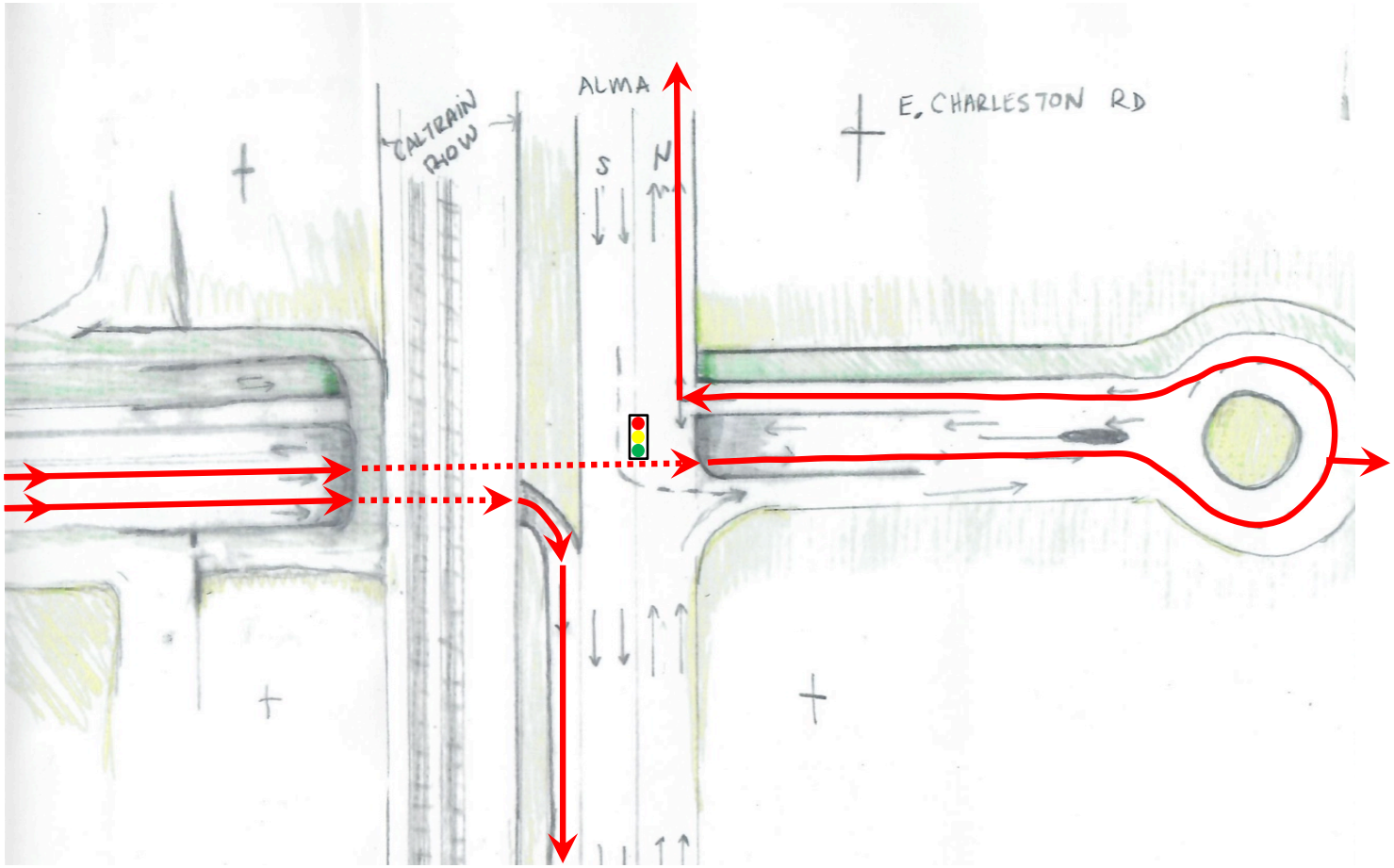
WESTBOUND CHARLESTON TRAFFIC FLOW

- Westbound traffic passes through roundabout, then continues under Alma
- Northbound traffic passes through roundabout, then turns right onto northbound Alma
- Southbound traffic passes through roundabout, then turns left onto southbound Alma



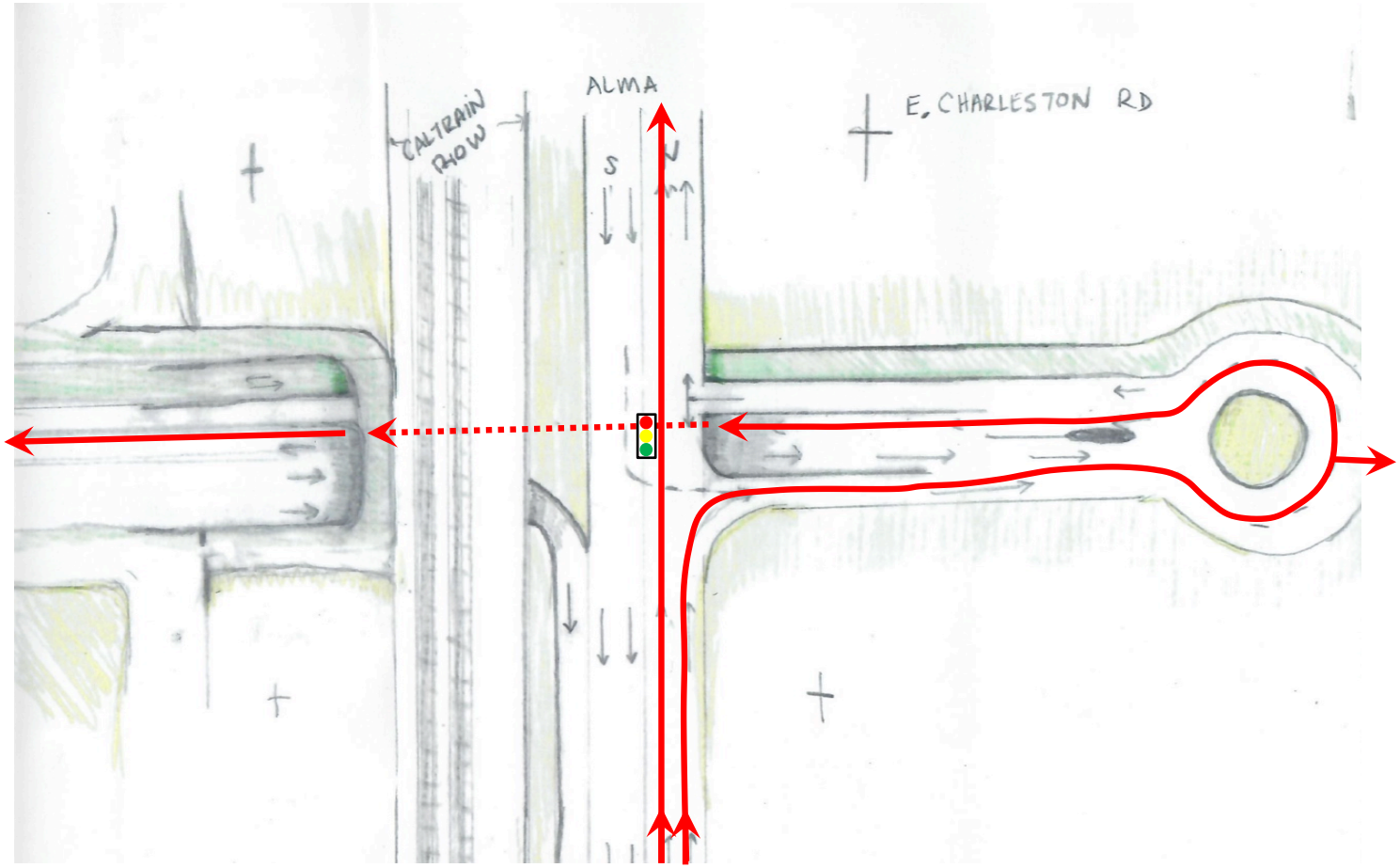
EASTBOUND CHARLESTON TRAFFIC FLOW

- Southbound traffic passes under the tracks and takes a right directly onto southbound Alma
- Eastbound traffic passes under Alma, continuing through roundabout
- Northbound traffic passes under Alma, reverses direction at roundabout, then turns right onto northbound Alma



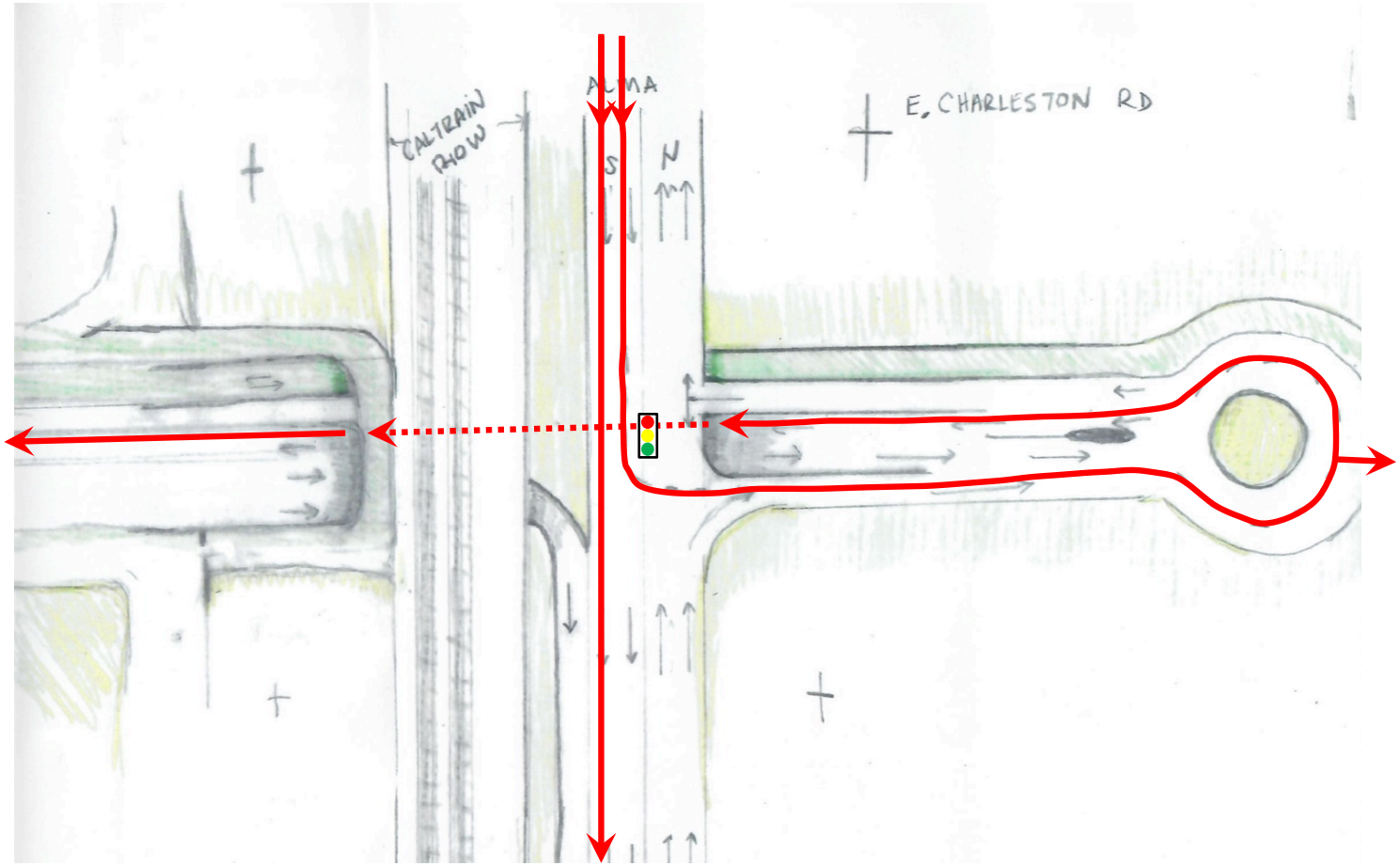
NORTHBOUND ALMA TRAFFIC FLOW

- Northbound traffic continues straight on Alma
- Eastbound traffic turns right onto eastbound Charleston, passing through roundabout
- Westbound traffic turns right onto Charleston, reverses direction at roundabout, and continues west under Alma



SOUTHBOUND ALMA TRAFFIC FLOW

- Southbound traffic continues straight on Alma
- Eastbound traffic turns left onto eastbound Charleston, passing through roundabout
- Westbound traffic turns left onto Charleston, reverses direction at roundabout, continuing west under Alma



Constant Flow Underpass
for Charleston/Meadow

KEY DESIGN FEATURES

Goal - Minimize length, width and depth of underpass to:

- Minimize property impacts
- Maximize bike/ped facilities
- Maintain neighborhood feel

- Road and bike/ped go under tracks and Alma
- Minimize car bike/ped (ideally separated completely)
- Cost saving design features:
  - Only <u>one</u> lane in each direction under Alma/train
  - Thin bridge deck design reduces depth
  - Low design speed allows steeper slopes to reduce footprint and cost
    - Similar to Jefferson Ave in Redwood City (which is 20 mph)

<u>Innovative design:</u>

- Bikes and peds in separate two-way tunnel (north side of Charleston, south side of Meadow)
- Dedicated turn lane from Eastbound Charleston to Alma South (similar to Oregon Expressway with longer merge)
- All turns are allowed, but some turns require doubling-back (at a turnback or roundabout) east of Alma

Constant Flow Underpass
for Charleston/Meadow

FLAWS IN 2014 HMM STUDY TO CAUSE ROAD UNDERPASS TO BE REJECTED

- Road Underpass studied in 2014 by consultant (HMM) – two variations considered:
  1. *Lower Alma and Charleston - same intersection as today but sunken*
  2. *Just lower Charleston, no turns allowed*
- HMM's assumptions would have created unneeded extra capacity and cost
- Assumed VERY thick Caltrain bridge
  - Forced the road to dip down much deeper than needed
  - Caused a larger footprint and increased cost
- Wider road assumptions had significant impacts to houses along Charleston/Meadow because of driveway access

Constant Flow Underpass
for Charleston/Meadow

DESIGN VARIATIONS THAT NEED REFINEMENT

- Additional design aspects that need further study:
  - Further investigate innovative construction methods like those used on Long Island Rail Road (NY)
    - Minimize construction time
    - Cut cost
    - **Eliminate shoo-fly tracks**
  - Consider limiting auto access to Wright Place
    - Limits cut-throughs and improves safety of two-way bike/ped lane
  - Determine exact location of turnaround and method of weaving traffic streams
  - Different access options on/off of Park Blvd
  - Meadow intersection similar to Charleston - less traffic but less room

Constant Flow Underpass
for Charleston/Meadow

JACKED BOX CONCEPT – LIRR

- Tunnel was constructed next to the rail, then inserted under the tracks over a weekend
- Videos of the construction are available on YouTube

ITALIAN ROUNDABOUT

- Located outside of Venice, Italy (45°30'33.9"N 12°13'32.2"E)
  - Via Paccagnella roadway is lowered to pass under Via Pionara and railroad
  - Intersection requires some turns to double-back at roundabout

ITALIAN ROUNDABOUT

- A single lane in each direction is lowered under the tracks
- The turning lanes (on the right side) remain at the original elevation
- Traffic turning under the tracks uses the roundabout to reverse direction

Constant Flow Underpass
for Charleston/Meadow

WEAKNESSES & STRENGTHS

Potential Weaknesses

- Seems more circuitous until people grasp the **constant flow** concept that makes it work
- Does not require any property acquisitions, but acquisition of 1-2 may improve design

Potential Strengths

- No visual impacts – train stays as today
- Safety improvement - access to tracks would be fenced
- Area of construction very localized
- Potentially significantly cheaper – tracks not moved, potentially no shoo-fly
- Significantly less construction time and impacts - many months or years less than fastest alternatives
- Only alternative consistent with initial VTA criteria

Churchill Partial Underpass

CONCEPTS FOR CHURCHILL REVIEWED TO DATE

Hybrid Design (eliminated by City Council)

- Involves significant full property impacts

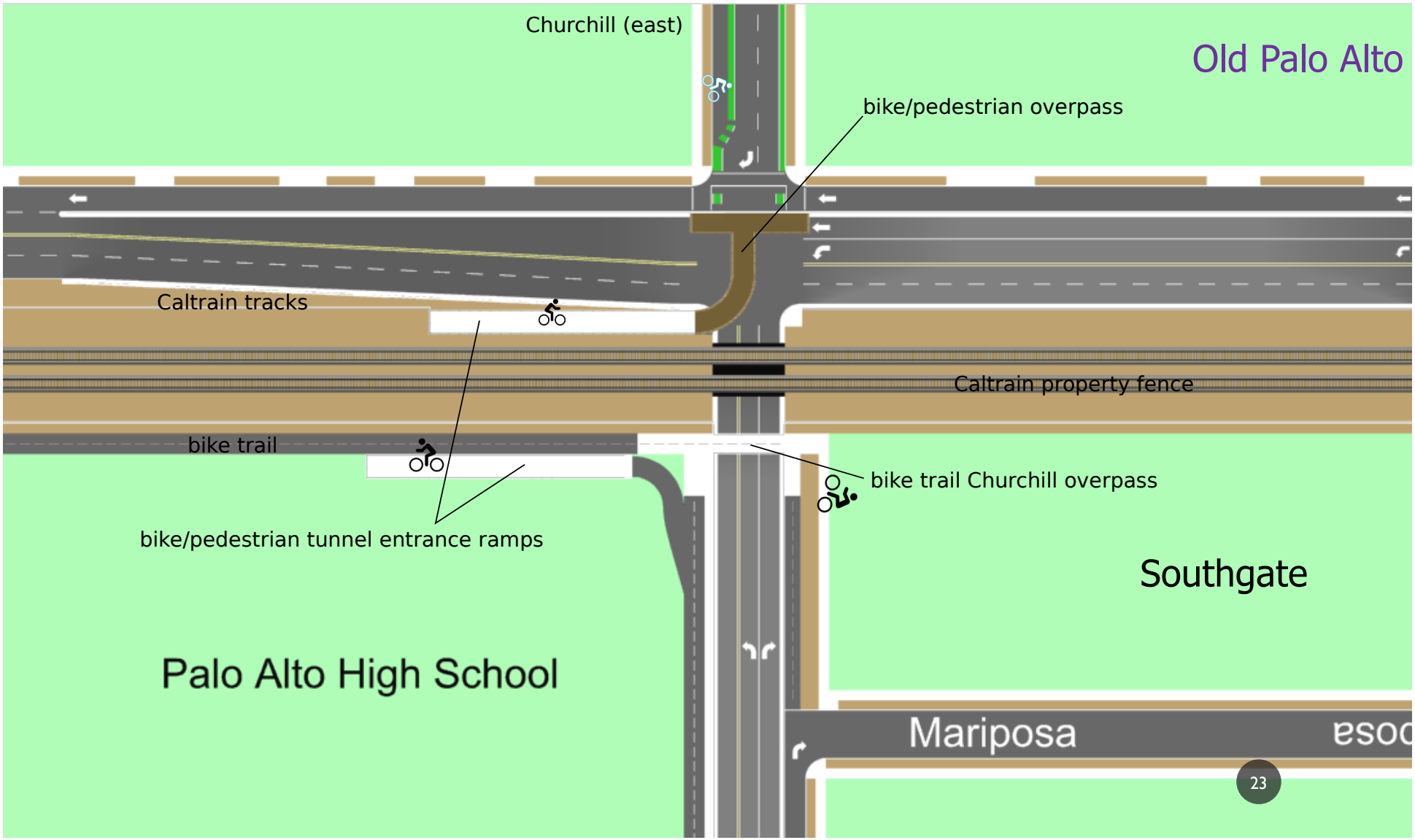
Close Churchill Avenue (under consideration)

- Only separates Bikes and Peds at location – diverts 9,500 cars elsewhere daily
- Some Southgate residents are opposed to closing Churchill Avenue.

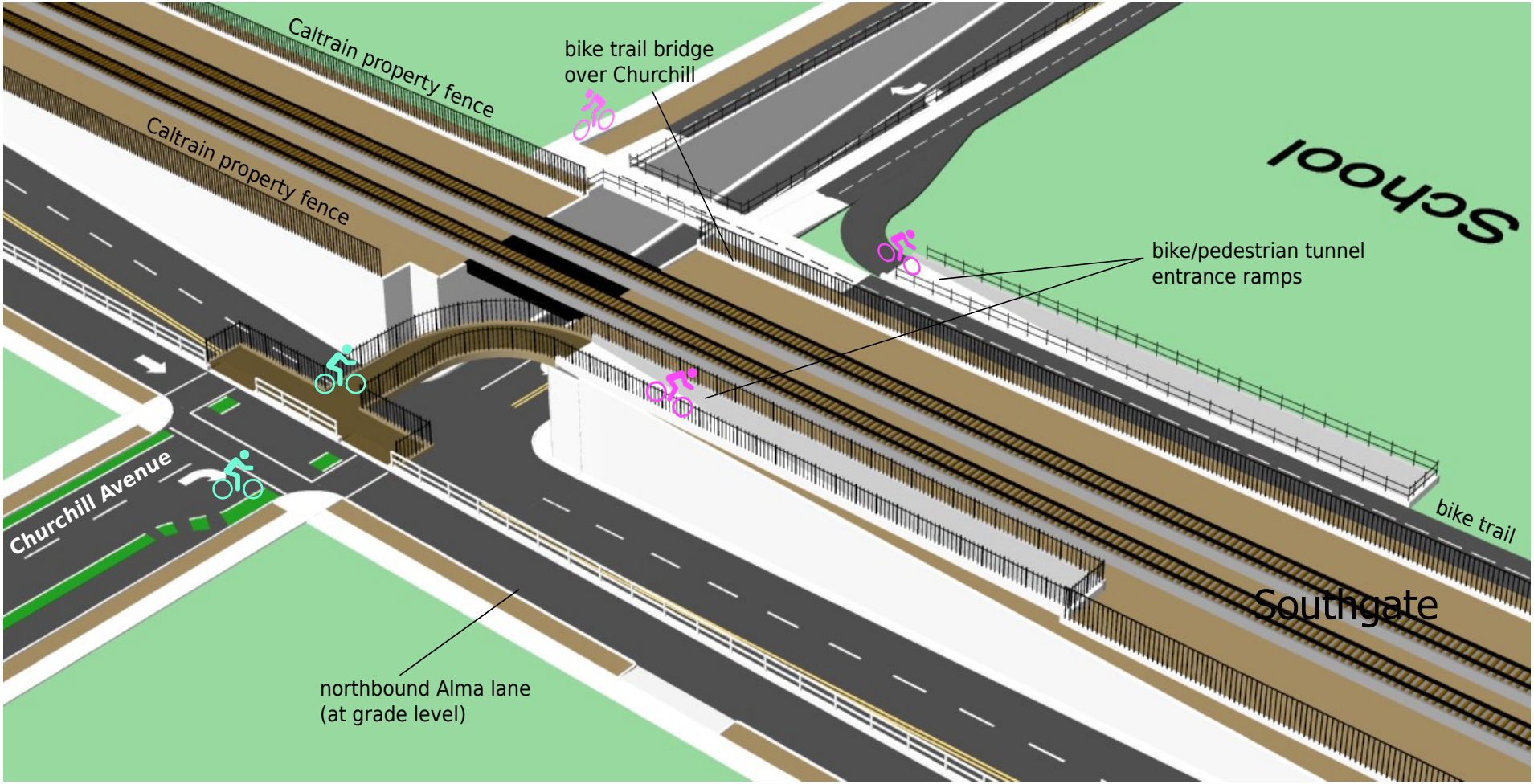
Churchill-only Viaduct (under consideration)

- Opposed by many adjacent to the tracks for privacy, views, overall quality of life
- Elevated structure viewed as radical transformation of visual landscape
- Concerns about noise radiating outward

CHURCHILL PARTIAL UNDERPASS



CHURCHILL PARTIAL UNDERPASS



VIEW FROM NORTHEAST CORNER OF CHURCHILL/ALMA

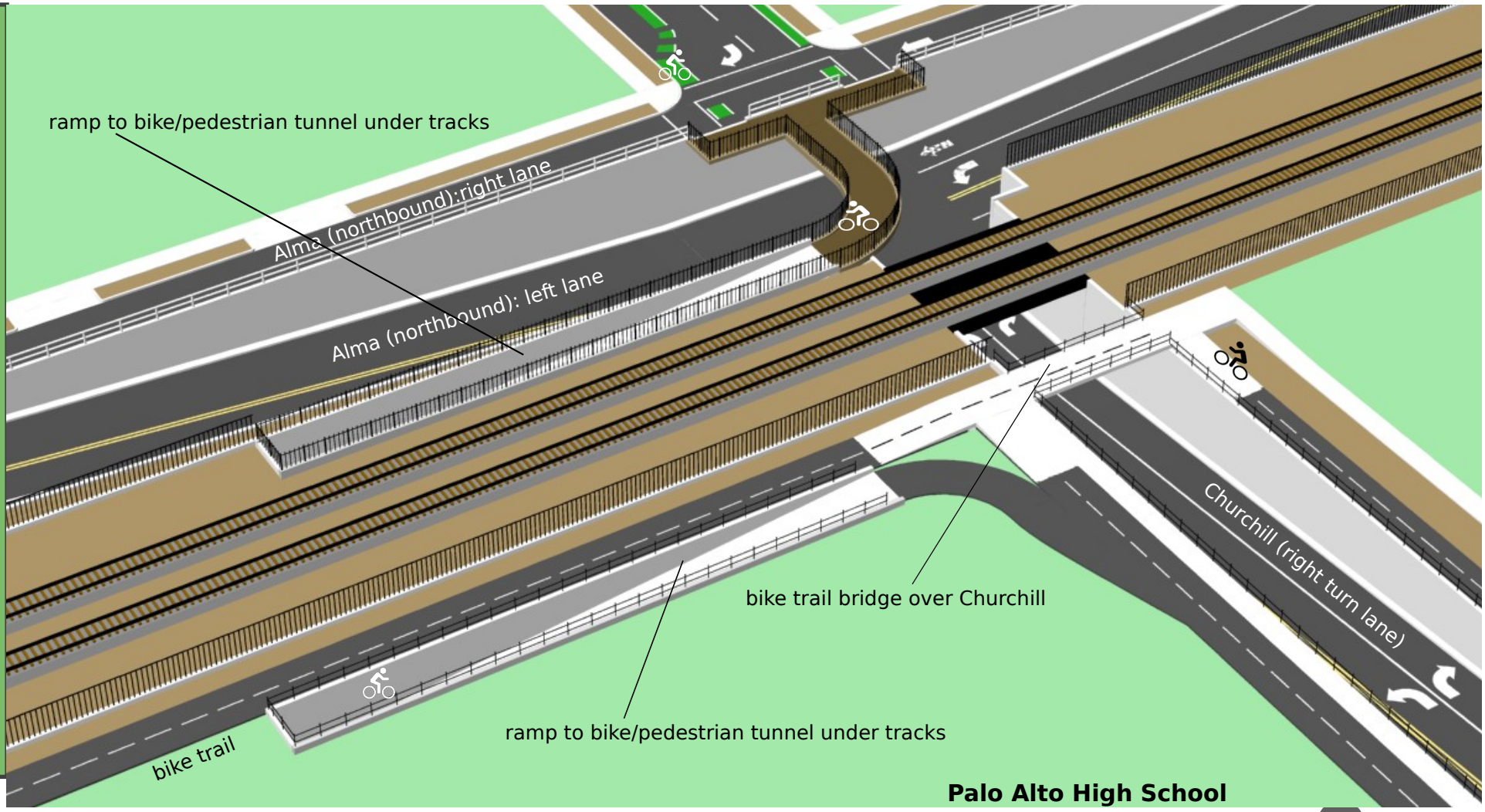
CHURCHILL PARTIAL UNDERPASS

LOOKING SOUTHBOUND ON ALMA JUST NORTH OF CHURCHILL

CHURCHILL PARTIAL UNDERPASS

LOOKING NORTHBOUND ON ALMA JUST SOUTH OF CHURCHILL

CHURCHILL PARTIAL UNDERPASS



PERSPECTIVE VIEW FROM PALO ALTO HIGH SCHOOL

CHURCHILL PARTIAL UNDERPASS

OBJECTIVES

1. Separate Caltrain tracks from Churchill Avenue
2. Take no private properties
3. Allow vehicular access to Alma from Churchill Avenue
4. Improve bike and pedestrian safety while crossing Alma
5. Minimize train grade changes

- **FEATURES**

1. Separates Caltrain from Churchill Avenue
2. Requires no property takings
3. Partially closes Churchill Avenue, but preserves access to Alma – allowing residents West of Alma to access Downtown and South Palo Alto
4. Prevents use of Churchill as a cut-through to Embarcadero, thereby reducing traffic congestion on Churchill east of Alma (Churchill East).
5. Keeps Caltrain at grade level – i.e., no raising or lowering of tracks
6. Separates bicycle and pedestrian traffic crossing Alma from car traffic
7. Provides a bridge over Churchill Avenue to the bike trail next to Palo Alto High School
8. All infrastructure is at or below grade level, so it doesn't create an eyesore like that of a viaduct

IMPLEMENTATION ISSUES

There are three issues that need further study:

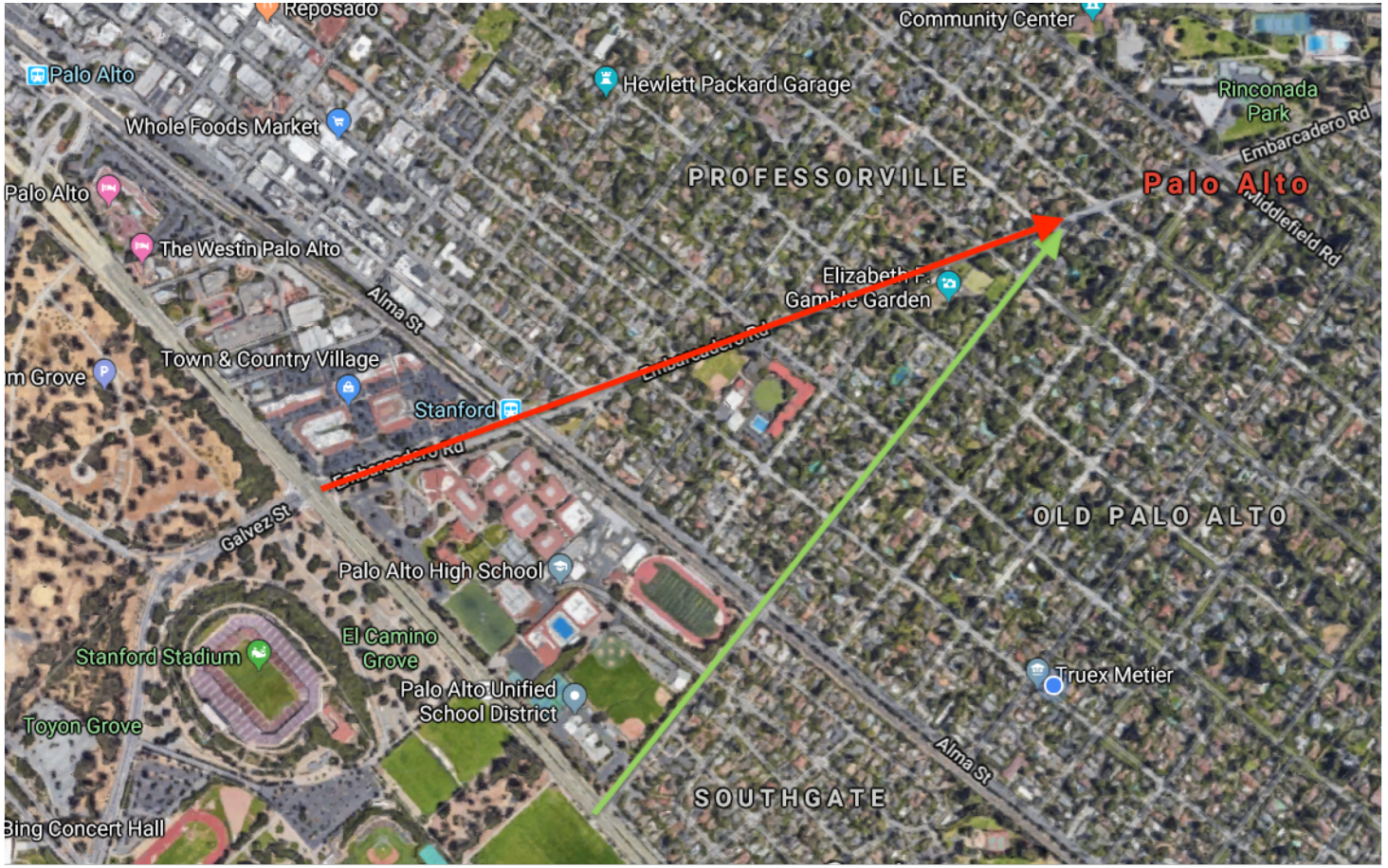
1. Will Caltrain permit the encroachment onto their right-of-way for the ramp leading to the tunnel under the tracks>
2. Splitting the lanes on Alma to prevent taking properties introduces some safety issues, such as an abutment between the two lanes that could be a hazard. This needs to be investigated, but there are mitigations for the safety issues. There are many examples of this configuration elsewhere in California.
3. The bike/pedestrian ramp will extend onto the Palo Alto High School property on the Alma side. The high school will need to be consulted.

Re-think Embarcadero

WHY RE-THINK EMBARCADERO WHEN THE TRAIN CROSSING BEING CONSIDERED IS AT CHURCHILL?

Viaduct at Churchill

- Expensive: $300M - $400M (more than the cost of the cheapest solution for Meadow/Charleston which is two crossings for $200M -$250M)
- Would improve current congestion at Churchill, but could inadvertently induce cut thru traffic to Old Palo Alto



RE-THINK EMBARCADERO

- Traffic studies show relationship between Embarcadero and Churchill
  - Churchill used more for traffic turning to go North/South on Alma
  - Embarcadero used more for traffic traveling East/West
- The existing grade separation is a hybrid that has limited turns and unsignalized movements onto Alma
- Embarcadero runs at an angle to Alma, making it harder to correct the design issues created by the old hybrid
- Closure of Churchill requires significant mitigations at Embarcadero (and other places) which has residents concerned given the area is already very congested

RE-THINK EMBARCADERO

- Mitigations for closure of Churchill require altering the existing grade separation:
  - widening the Embarcadero overpass along Alma
  - removing the Stanford Game Day Station
  - removing the stairs used by students coming to and from PALY and Castilleja on South side
- Embarcadero grade separation is the oldest in the City (1936) and may need seismic retrofits or full replacement in the future
- Area near the grade separation was previously earmarked for bike/ped improvements to make it safer
- What if, we started with a clean slate in that area – what would we choose to build?

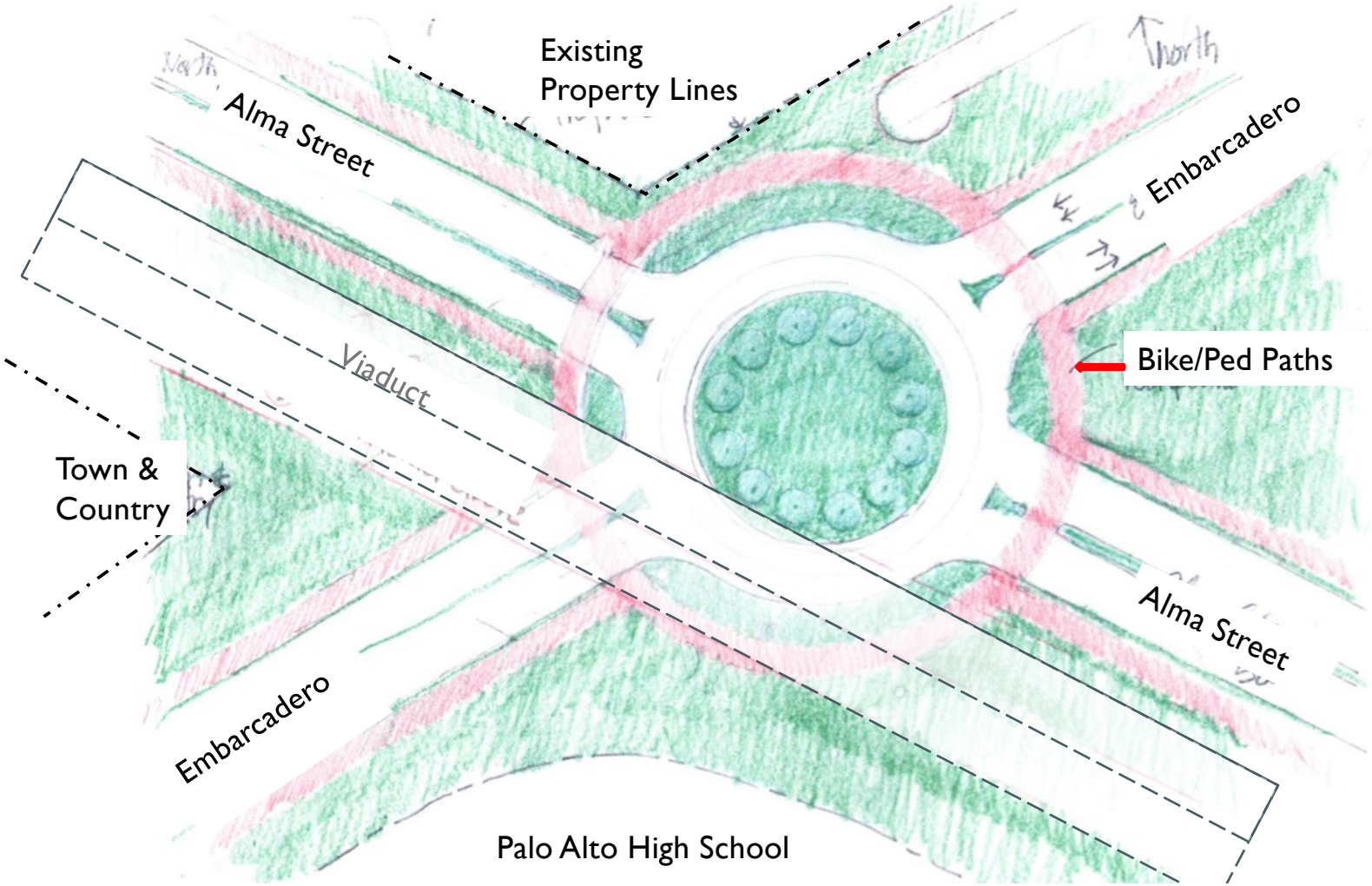
Two main concepts:

- What is the best way to separate the trains from the cars at Embarcadero and Alma?
- What is the best way to deal with the flow of all modes of traffic when a new separation is built?

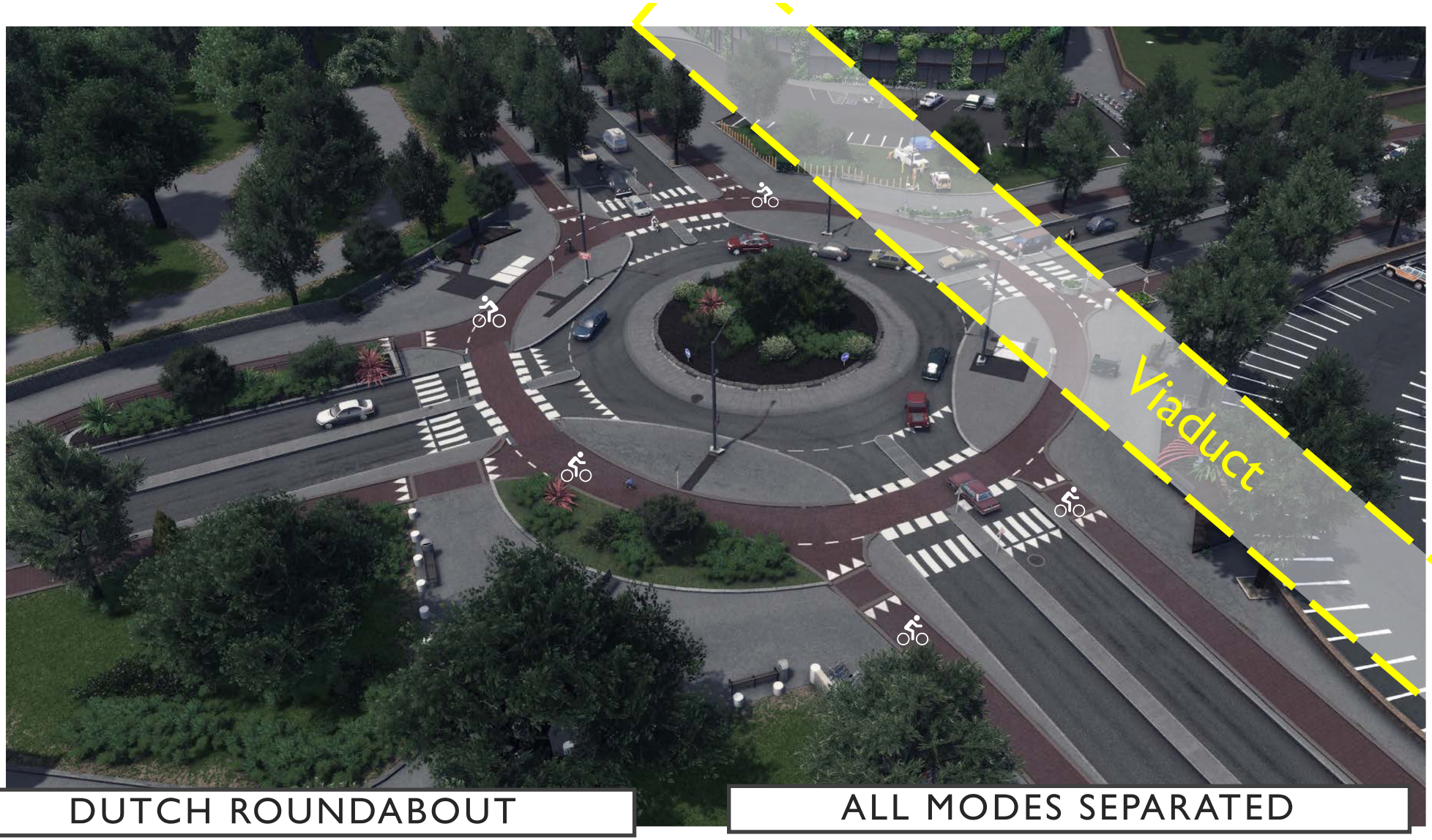
RE-THINK EMBARCADERO

RE-THINK EMBARCADERO

Roundabout



RE-THINK EMBARCADERO



DUTCH ROUNDABOUT

ALL MODES SEPARATED

RE-THINK EMBARCADERO

Train solution: Viaduct at Embarcadero –

- Would stretch to Churchill where it would be up about 5 ft high – making it possible to make a bike/ped tunnel that's less steep than the one proposed (like Homer tunnel)
- Could also be a better designed Hybrid, instead of a viaduct – taking advantage of existing dug out areas

Road Solution: Roundabout

- Returning streets to grade makes area more walkable and bikeable
- Rebuilding the grade separation allows us to redraw all car/ped/bike routes to fit our needs
- Could consider adding more exits to the roundabout to be able to enter Town & Country from corner near Trader Joe's or enter Palo Alto High school
- Could also be designed as a regular intersection or any other appropriate traffic interchange

RE-THINK EMBARCADERO

Potential Weaknesses

- Cost could be significant due to construction phasing and need for shoo-fly tracks
- Construction phasing and impacts could be a fatal flaw in executing this concept
- May not be eligible for Measure B Funding
- **Potential Strengths**
- More pedestrian and bike friendly – fits into Comp Plan goals
- Exciting urban design is more "Palo Alto" than current configuration
- Design knits together neighborhoods, Town & Country and PALY into a more cohesive area

XCAP WOULD LIKE TO HEAR:

Any council feedback or guidance?

What should XCAP include in their final recommendations report to Council?

FUTURE XCAP MEETING PRESENTERS

- Sebastian Petty – Caltrain
- Norm Matteoni – Eminent Domain Attorney

Summary of Evaluation with City Council-Adopted Criteria

CITY OF PALO ALTO

	Evaluation Criteria	Meadow / Charleston					Churchill	
		Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Closure	Viaduct
A	Facilitate movement across the corridor for all modes of transportation	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open.	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open.	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open. Viaduct provides opportunities for additional crossings for all modes.	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open	Churchill Ave will be closed to vehicles at the railroad tracks.	Churchill Avenue will be grade separated from the railroad for all modes and will remain open. Viaduct provides opportunities for additional crossings for all modes.
B	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 Dr and Charleston Rd will be removed. Thus, the traffic will not be interrupted by railroad crossing gates.	With construction of the grade separation, the railroad crossing gates and warning lights at Meadow Dr and Charleston Rd will be removed. Thus, the traffic will not be interrupted by railroad crossing gates.	With construction of the grade separation, the railroad crossing gates and warning lights at Meadow Dr and Charleston Rd will be removed. Thus, the traffic will not be interrupted by gates coming down.	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 gates coming down.	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 railroad crossing gates.	With closure of Churchill Ave, the traffic at nearby intersections will be impacted; however, this can be mitigated.	With construction of the grade separation, the railroad crossing gates and warning lights at Churchill Ave will be removed. Thus, the traffic will not be interrupted by railroad crossing gates.
C	Provide clear, safe routes for pedestrians and cyclists crossing the rail corridor, separate from vehicles	Pedestrians/cyclists will be separated from train traffic and bike lanes will be added to Charleston Rd.	Pedestrians/cyclists will be separated from train traffic and bike lanes will be added to Charleston Rd.	Pedestrians/cyclists will be separated from train traffic and bike lanes will be added to Charleston Rd.	Pedestrians/cyclists will be separated from train traffic.	Pedestrians/cyclists will be separated from passenger train traffic only.	Pedestrians/cyclists will be separated from train traffic and vehicles.	Pedestrians/cyclists will be separated from train traffic.
D	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.	A temporary railroad track will be required, and a crossover track located north of the San Antonio Caltrain Station will be relocated.	New railroad tracks can be built without a temporary track, and a crossover track located north of the San Antonio Caltrain Station will be relocated.	A temporary railroad track will be required at the boring pit areas to the north and south. A siding track will be relocated north of the California Avenue Caltrain Station. Due to the pump stations, there will be potential risks to train operations due to flooding.	A temporary railroad track will be required at the boring pit areas to the north and south. A siding track will be relocated north of the California Avenue Caltrain Station. Due to the pump stations, there will be potential risks to train operations due to flooding.	A temporary railroad track will not be required.	A temporary railroad track will be required. Stanford game day station will be eliminated due to grade issues.
E	Finance with feasible funding sources	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.	The hybrid would require lower levels of local funding, with a substantial portion of capital costs covered by Regional, State and Federal sources.	The viaduct would require substantial local funding resources more than the hybrid alternative, but less than the trench alternative.	The tunnel will require the greatest 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.	The tunnel will require the greatest 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. However, this alternative would not be eligible for grade separation funding as the at-grade crossing for freight would remain.	The closure would require lower levels of local funding, with a substantial portion of capital costs covered by Regional, State and Federal sources.	The viaduct would require substantial local funding resources significantly above the closure alternative.
F	Minimize right-of-way acquisition	Subsurface acquisitions will be required for the ground anchors for the trench retaining walls and right-of-way acquisitions will be required to construct pump stations.	No acquisition of private properties is required; however, driveway modifications will be required.	No acquisition of private properties is required.	Subsurface acquisitions will be required for the ground anchors for the trench retaining walls and right of way acquisitions will be required to construct pump stations.	Subsurface acquisitions will be required for the ground anchors for the trench retaining walls and right of way acquisitions will be required to construct pump stations.	No acquisition of private properties is required; however, there will be impacts to Palo Alto High School property and potentially Caltrain. There also may be some parking loss on the east side of Churchill Ave for the pedestrian/bike undercrossing (Option 2 only).	No acquisition of private properties will be required.
G	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 electric engines instead of diesel engines will also reduce noise. With the lowered track, train noise could reflect off walls and impact properties farther away, which can be mitigated.	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations. Utilizing electric engines instead of diesel engines will also reduce noise. With the elevated track, train wheel noise could radiate out, which can be mitigated with a sound barrier.	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations. Utilizing electric engines instead of diesel engines will also reduce noise. With the elevated track, train wheel noise could radiate out, which can be mitigated with a sound barrier.	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations. Utilizing electric engines instead of diesel engines will also reduce noise. In the trench section, train noise could reflect off walls and impact properties farther away, which can be mitigated. In the tunnel section, train wheel noise will be contained.	Train horn noise and warning bells will remain for the at-grade crossings to accommodate the freight trains. Utilizing electric engines instead of diesel engines will also reduce noise. In the trench section, train noise could reflect off walls and impact properties farther away, which can be mitigated. In the tunnel section, train wheel noise will be contained.	Train horn noise and warning bells will be eliminated with the removal of the at-grade crossings with roadway closure. Utilizing electric engines instead of diesel engines will also reduce noise.	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations. Utilizing electric engines instead of diesel engines will also reduce noise. With the elevated track, train wheel noise could radiate out, which can be mitigated.
H	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.	No diversion of regional traffic with construction of grade separations.	No diversion of regional traffic with construction of grade separations.	No diversion of regional traffic with construction of grade separations.	Diversion of regional traffic with the permanent lane reduction on Alma Street will impact residential streets.	Diversion of regional traffic with Churchill Ave closure will be mitigated.	No diversion of regional traffic with construction of a grade separations.
I	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 tiebacks are required for the trench retaining walls.	Railroad tracks will be approximately 15 feet above grade. Landscaping with trees will be incorporated for screening where feasible.	Railroad tracks will be approximately 20 feet above grade. Landscaping with trees will be incorporated for screening where feasible.	Railroad tracks will be below grade with high fencing at grade in the trench section. Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench section.	Passenger tracks will be below grade and freight tracks will be at-grade with high fencing. Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench section.	Railroad tracks remain at existing grade. Residual roadway areas from closure provide opportunities for landscaping.	Railroad tracks will be approximately 20 feet above grade. Landscaping with trees will be incorporated for screening where feasible.
J	Minimize disruption and duration of construction	Extended road closures at Meadow Dr and Charleston Rd are required. Construction would last for approximately 6 years.	Extended lane reductions at Alma St, Meadow Dr, and Charleston Rd will be required. Construction would last for approximately 4 years.	The viaduct will have minimal road closures (nights/weekends only). Construction would last for approximately 2 years.	Extended lane reductions on Alma Street are required. Construction would last for approximately 6 years.	Extended lane reductions on Alma Street are required. Construction would last for approximately 6 years.	The closure will have minimal road closures (nights/weekends only). Construction would last for approximately 2 years.	Extended lane reductions at Alma St (one lane in each direction) will be required. Construction would last for approximately 2 years.
	Order of Magnitude Cost	$800M to 950M*	$200M to $250M*	$400M to 500M*	$1,218M to $1,827M*	$1,173M to $1,759M*	$50M to $65M*	$300M to $400M*

* Total Preliminary Construction Costs in 2018 dollars with escalation to 2025 (Subject to Change).

Improvement ← → Impact

Summary of Engineering Challenges

CITY OF PALO ALTO

	Engineering Challenges	Meadow / Charleston					Churchill	
		Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Closure	Viaduct
L	Creek/Drainage Impacts	• Requires diversion of Adobe and Barron creeks resulting in the need for pump stations. • Numerous regulatory agency approvals required for creek diversion. • Pump stations also required to dewater the trench. • Increased risk of flooding due to pump stations.	• Pump stations required for lowered roadways. • Increased risk of flooding due to pump stations.	• No significant creek or drainage impacts.	• Requires diversion of Adobe and Matadero creeks resulting in the need for pump stations. • Numerous regulatory agency approvals required for creek diversion. • Pump stations also required to dewater the trench and tunnel. • Increased risk of flooding due to pump stations.	• Requires diversion of Adobe and Matadero creeks resulting in the need for pump stations. • Numerous regulatory agency approvals required for creek diversion. • Pump stations also required to dewater the trench and tunnel. • Increased risk of flooding due to pump stations.	• Pump station required for lowered pedestrian/bike way. • Increased risk of flooding with pump stations. • Relocation of the pump house at Embarcadero Rd required to accommodate widening of Alma St.	• No significant creek or drainage impacts.
M	Long-Term Maintenance	Increased maintenance costs due to: • Pump stations for creek diversions. • Pump stations for trench dewatering. • Below ground railroad alignment.	Increased maintenance costs due to: • Pump stations for trench dewatering. • Above ground railroad alignment with embankments and undercrossing structures.	Increased maintenance costs due to: • Above ground railroad alignment with embankments and viaduct structures.	Increased maintenance costs due to: • Pump stations for creek diversions • Pump stations for trench dewatering • Below ground railroad alignment.	Increased maintenance costs due to: • Pump stations for creek diversions • Pump stations for trench dewatering • Below ground railroad alignment as well as at-grade railroad alignment	Increased maintenance costs due to: • Pump stations for undercrossing dewatering.	Increased maintenance costs due to: • Above ground railroad alignment with embankments and viaduct structures.
N	Utility Relocations	• Major utility relocations for lowered railroad.	• Major utility relocations for lowered roadways.	• No major utility relocations.	• Major utility relocations for lowered railroad.	• Major utility relocations for lowered railroad.	• Potential utility relocations in Alma St and Churchill Ave for pedestrian/bike undercrossing. • Minor utility relocations for Embarcadero Rd/Alma St improvements.	• Minimal impacts to utilities.
O	Railroad Operations Impacts during Construction	• Temporary track (i.e., shoofly) is required.	• Temporary track (i.e., shoofly) is required, but a bit shorter than the trench shoofly.	• No temporary track (i.e., shoofly) required.	• Temporary track (shoofly) is required.	• Temporary track (shoofly) is required.	• No temporary track (i.e., shoofly) required, only single tracking during nights and weekends.	• Temporary track (i.e., shoofly) is required.
P	Local Street Circulation Impacts during Construction	• Removal of right turn lanes on Alma St at Meadow Dr and Charleston Rd; however, traffic will still be able to flow as needed despite lane reduction. • Closes Meadow Dr while Charleston Rd roadway bridges are constructed and visa versa.	• Removal of right turn lanes on Alma St at Meadow Dr and Charleston Rd; however, traffic will still be able to flow as needed despite lane reduction. • Alma St, Charleston Rd, and Meadow Dr reduced to 2 lanes.	• Reduced lane widths on Alma St, north of Meadow Dr and south of Charleston Rd. • Possible night time closures of Meadow Dr and Charleston Rd.	• Alma Street will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Avenue. • From Charleston Road to Ferne Avenue, there will be only one southbound lane on Alma Street.	• Alma Street will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Avenue.	• Path along Palo Alto High School will temporarily be impacted during construction. • Temporary night and weekend closures of lanes on Churchill Ave, Alma St and Embarcadero Rd.	• Alma St, reduced to two lanes. • Removal of right turn lanes on Alma St at Churchill Ave; however, traffic will still be able to flow as needed despite lane reduction. • Temporary night and weekend closures of lanes on Alma St and Churchill Ave.
Q	Caltrain Design Exceptions Needed	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	Temporary vertical clearance of 12 feet at undercrossing structures during construction. Minimum vertical clearance allowed by Caltrain is 15.5 feet.	1.4% grade on track required. Maximum grade allowed by Caltrain is 1%.	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	None required.	1.6% grade on track required. Maximum grade allowed by Caltrain is 1%.

Improvement ← → Impact

Other Resource Documents to Support this Update/Report:

- The Matrix on the prior slide: https://connectingpaloalto.com/wp-content/uploads/2019/11/PA_Matrices_Nov2019-1.pdf)

- Analysis from Technical Working Group on the New Ideas (and the original AECOM Memo that was the precursor to Attachment C to the staff report): https://connectingpaloalto.com/wp-content/uploads/2019/12/Item3-All-Attachments-Dec.18-XCAP.pdf

Memorandum

To: XCAP
From: Nadia Naik
Date: Monday, December 9 2019
Re: Update on Expanded Community Advisory Panel

The following work has been completed by the Expanded Community Advisory Panel (XCAP) since the last update presented to the City Council on 10/28/19:

1) Finalized the Guiding Principles and definition of Consensus Recommendations

2) Approved a general Workplan for XCAP in concept
   a) Created Working Groups (2-3 people) to synthesize questions by domain (leveraging internal/external domain expertise and institutional memory)
   b) Questions will be turned over to Staff or relevant experts to be answered in written format.
   c) Domain Reports will be included in Final Recommendations report and will contain assumptions used by XCAP to form the basis of recommendations
   d) Working Group Domains:
      i) Safety - Fire/Police, means restrictions
      ii) Technical Working Group – Engineering and Water (Creeks, Ground Water/Pumping)
      iii) Traffic/PAUSD - multimodal, El Camino, Safe Routes
      iv) Caltrain – Technical, Electrification, and Business Plan
      v) Property Impacts - process, land acquisition
      vi) Existing Policies – Comp Plan, Rail Corridor Report

3) Volunteer retired Civil Engineers (Edgar Ugarte, Sreedhar Rao, Ron Owes and Joe Teresi) have come forward to assist the Technical Working Group to review work done to date and to "pre-screen" any new iterations/ideas that come forward for any fatal flaws.

4) Invited new iterations/ideas from the public and approved a process for "pre-screening" new ideas judiciously since significant costs may be associated with additional work

- Six new iterations/ideas presented:
  - Iteration on South Palo Alto Tunnel (Roland Lebrun)
  - Iteration on Churchill underpass (Larry Klein)
  - Iteration on Churchill underpass with only left/right turns onto Alma (Mike Price)
  - 2 Roundabout concepts for Embarcadero/Alma (Tony Carrasco)
  - Underpass Iteration for South Palo Alto (Elizabeth Alexis)
- XCAP voted on whether they merit "pre-screening" by volunteer civil engineers and Technical Group – 5 of 6 iterations/ideas passed "pre-screening"

- Technical Group and Civil Engineers met with AECOM to review new remaining 5 iterations/ideas.
- The plan is to have a second meeting to review the work completed to date on existing alternatives.
- At the XCAP meeting on December 18, 2019, the Technical Working group will formally announce the summary of the discussions with AECOM and then vote whether to recommend to the City Council that any new ideas/iterations should be studied further.
- If XCAP recommends ideas for further study, these recommendations will be made to the City Council in January so the Council could deliberate and take action accordingly.

5) Received Report from Police and Fire about the impacts of closure of Churchill on Emergency Response time
6) Future Presenters known at this time:
   a) Sebastian Petty of Caltrain (January)
   b) Norm Matteoni (attorney) to discuss Property Impacts (January/February)
   c) Safety presentation from either Ken Dueker (PAPD) or Robert Scarpino (Caltrain Operations)

Upcoming for Next XCAP Meeting, December 18, 2019:

1) Report back from Technical Working Group / Civil Engineers regarding AECOM meeting and review of new iterations/ideas

AECOM Imagine it. Delivered.

AECOM
100 West San Fernando
San Jose, CA 95113
aecom.com

Project name:
Palo Alto Rail Program Management

Project ref:
60577356

To:
Ed Shikada, City Manager
City of Palo Alto
250 Hamilton Avenue
Palo Alto, CA 94301

From:
Millette Litzinger

Date:
December 17, 2019 (Update from 12/5 version)
Updated to Include only Excerpts Related to XCAP Recommendation of Three Ideas

CC:
Etty Mercurio, AECOM
John Maher,AECOM
Peter DeStefano, AECOM
Gary Black (Hexagon)

DRAFT

Memo

Subject: "New Ideas" from XCAP Technical Working Group

- The Expanded Community Advisory Panel (XCAP) received and screened new ideas from the community at their November 13, 2019 Special XCAP meeting. In this meeting, they received New Ideas from five (5) community members. The XCAP voted to push forward ideas from four (4) of the presenters to their Technical Working Group for further review. The New Ideas that were pushed forward are listed below. Full descriptions of the New Ideas can be found under the “November 13, 2019 XCAP Special Meeting” at https://connectingpaloalto.com/presentations-and-reports/.
- Embarcadero/Alma Roundabout and Viaduct (Tony Carrasco)
- Churchill Crossing Concept (Michael Price)
- Charleston/Meadow Underpass Concept (Elizabeth Alexis)

Below is a description of the distinguishing characteristics that AECOM used to review each New Idea and notable impacts related to the following categories:

- Geometrics/Structures
- Right of Way Requirements
- Groundwater/Stormwater Impacts
- Traffic/Access Circulation
- Safe Routes for Ped/Bikes
- Cost Effectiveness

Attachments:

- Churchill Crossing Concept, Typical Section
- Churchill Crossing Concept, Layout
- Charleston/Meadow Underpass Concept, Typical Section
- Charleston/Meadow Underpass Concept, Layout

Embarcadero/Alma Roundabout and Viaduct (Tony Carrasco)

This concept includes a roundabout at the Embarcadero/Alma, allowing all turning movements to/from Embarcadero and Alma.

Geometrics/Structures

- The rail has to be raised 20+ feet over its current elevation over Embarcadero, creating a 3-level “interchange”. As a result, the rail impacts extend about 1,000 feet further north than the Churchill viaduct.
- The existing rail and road bridges over Embarcadero would have to be demolished and reconstructed to accommodate a wider structure needed for a roundabout.
- The aforementioned wider structure would likely require lowering of Embarcadero itself (doable, but added cost).

Right of Way Requirements

- Right-of-way impacts on the west side are likely (at Palo Alto High School and the Town and Country shopping center).

Groundwater/Stormwater Impacts

- New pump station required at Embarcadero.

Traffic/Access Circulation

- Queues from the left turns onto Kingsley (from SB Alma) could back up into the circulatory roadway of the roundabout, impacting the roundabout itself, in addition to this being a safety issue too (sudden, unexpected stopping of vehicles).
- A private driveway would have to be accessed from the circulatory roadway of the roundabout (done in some cases, but certainly not desirable).
- Merging from the roundabout onto WB Embarcadero is problematic (sight distance is limited, plus there’s not much distance to weave into the adjacent lane to make a left turn into the high school).

Safe Routes for Ped/Bikes

- Big roundabouts are typically difficult for ped/bikes to navigate.

Cost Effectiveness

- We have another alternative (the intersection at Kingsley/High) to address traffic circulation at Embarcadero/Alma that functions better and costs much less.

Churchill Crossing Concept (Michael Price)

This concept partially closes Churchill Avenue, but preserves access to Alma. A typical section and a schematic layout of this concept are attached.

Geometrics/Structures

- The “split” of the roadway on NB Alma and EB Churchill introduces a fixed object in the road (end of the retaining wall), but we should be able to design this so that it’s not a safety hazard.

- The retaining walls on Alma will be tall (~20 feet Max) and will have a tunnel-effect. Providing left and right shoulders would be ideal, especially 8 to 10-foot right shoulders for disabled vehicles. To provide an 8-foot right shoulder on NB Alma St (connecting to Churchill Ave in the underpass), the landscaping strip on the east side of Alma St will have to be removed. This will reduce the setback distance from the curb line for many homes fronting Alma by approximately 9.5 feet.

- Need to evaluate a profile on Churchill to see if there’s an impact to the Churchill/Paly/Castilleja intersection. At first glance, it appears we can avoid lowering this intersection.

- Since there are no ped/bikes on Alma and Churchill (under the tracks), we can be more aggressive with the road profile and use 10-12% Max. This will help reduce the construction limits and cost.

- The bridge geometry and lane configurations need to be hashed out. We’ll need two through lanes on NB Alma.

- The sight distance at the T-intersection of Churchill and Alma will be less-than-standard for vehicles making rights/lefts onto Alma from EB Churchill. This is mainly due to very little space available for a right shoulder on SB Alma.

Right of Way Requirements

- Temporary Construction Easements (TCEs) will be required.
- Full acquisitions likely not required, but partial/sliver residential takes potentially needed along Alma St and potentially a home on the east side of Mariposa Ave.
- Curb setback distances must be reduced for homes along Alma St, as noted above.
- Potential minor relocation of the ped/bike trail on the north side of Churchill (between Castilleja Ave and the railroad).
- The far-right lane on SB Alma St will encroach inside Caltrain’s R/W. This will have to be reviewed/approved by Caltrain.

Groundwater/Stormwater Impacts

- Pump Station will be needed to drain the lowered Churchill/Alma intersection.

Traffic/Access Circulation

- This concept will create circuitous routes for some and introduce more traffic on residential streets.

- Several traffic movements are eliminated... likely to cause driver confusion for those not familiar with the configuration:

  a. Traffic from WB Churchill must turn right onto NB Alma
  b. No thru-movement allowed on Churchill
  c. Traffic from SB Alma cannot make a left onto EB Churchill
  d. Traffic from NB Mariposa cannot access Churchill (vehicles would have to turn around). Residents on Mariposa (south of Churchill and north of Miramonte) would be forced to travel south, generating more traffic on other Southgate neighborhood streets (Castilleja Ave and Miramonte Ave).

e. One private driveway on Churchill (between Castilleja and Mariposa) will front a one-way “frontage” road (traveling north), which will force them to travel north and make a right onto Mariposa to exit the Southgate neighborhood.
f. Left turns not allowed from WB Churchill onto Mariposa (same condition as today).
g. The left turn movements to/from Kellogg Ave and Coleridge Ave will have to be prohibited because drivers trying to make a left turn onto Alma will not have adequate sight distance to approaching vehicles traveling on NB and SB Alma St, respectively. A concrete barrier will likely be placed at these locations to prohibit the left-turn movements at each intersection.

Safe Routes for Ped/Bikes

- Grade separation for motor vehicles is not ped/bike friendly, so need a separate undercrossing for ped/bikes (similar to the current Option 1 for the Churchill closure).

Stage Construction

- This alternative would likely reduce Alma St to two lanes (one lane in each direction) with no access to the west side of the tracks for a lengthy duration during construction while the underpass and a lowered Alma/Churchill are built. Unless Caltrain accepts top-down construction or some other non-traditional construction method, shoofly tracks will also be required.

Cost Effectiveness

- This idea is more costly than a closure of Churchill, but potentially less costly than the Churchill viaduct.

Charleston/Meadow Underpass Concept (Elizabeth Alexis)

This concept provides a grade separation at Charleston and Meadow without raising the tracks. A typical section and a schematic layout of this concept are attached.

Geometrics/Structures

- The east/west through movements would pass under two structures (one for the railroad, one for Alma St), similar to Embarcadero today.

Right of Way Requirements

- The presentation infers no property impacts, but the width needed to accommodate the turning movements (the u-turn bay, for example) for truck/buses will likely require sliver takes (at the very least) or complete property acquisitions. A 2-lane roundabout (~172-foot outside diameter, including sidewalks) would be required to accommodate the additional traffic and turning movements. The roundabout's footprint would require full property acquisitions.

- Slide 8 does not show standard merge distances, so the footprint (along M/C) would likely be much larger than presented on this slide.

- The existing width of Charleston on the east side of the tracks (from back of sidewalk to back of sidewalk) is approximately 85 feet. To obtain an adequate cross section of the frontage roads and underpass, we need approximately 95 feet of width, which will require a sliver acquisitions on each side of the road (see x-section). The curb setback distance for the homes on the south side Charleston would be reduced by ~ 16 feet.

- The width of Charleston on the west side of the tracks is even more narrow, thus, having greater impact on private properties.

- The width of Meadow on the east side of the tracks is only ~ 62 feet (back of sidewalk to back of sidewalk), making the same configuration on Meadow less feasible.

Groundwater/Stormwater Impacts

- Same as other underpass options... a pump station will be needed to drain the lowered roads.

Traffic/Access Circulation

- A circuitous route is proposed for EB vehicles on Charleston and Meadow.

- Traffic on NB and SB Alma St destined for El Camino Real and other locations on the west side of the tracks would also have to traverse a circuitous route. In the NB direction, drivers will likely opt for Ely Pl to access Charleston via Mumford Pl to avoid any backups on Alma St, thus generating more traffic on residential streets.

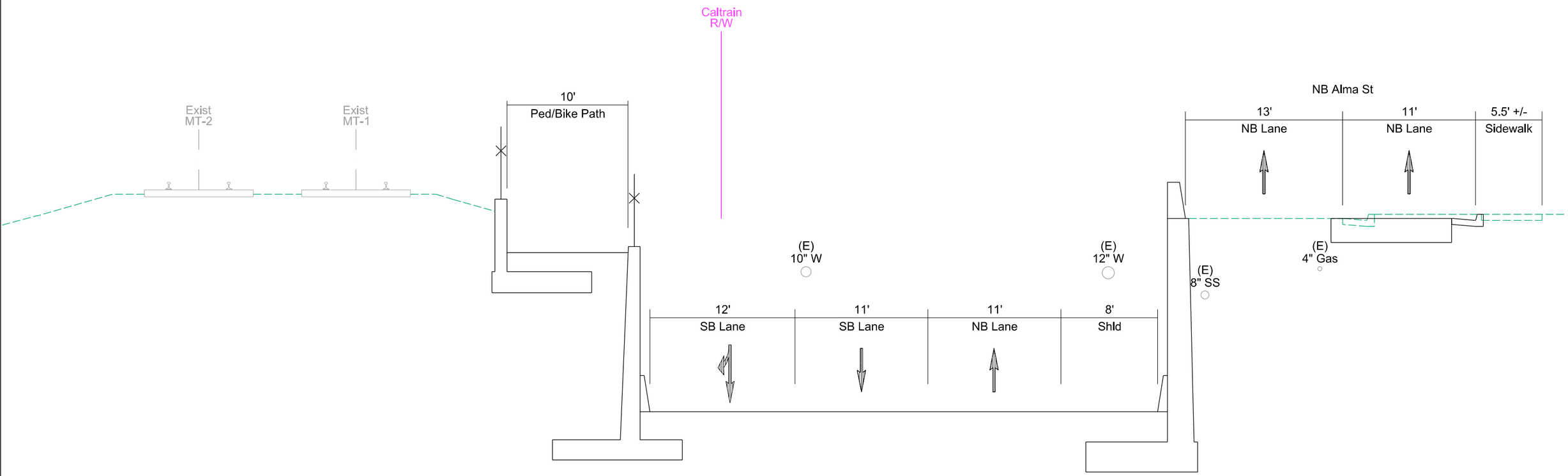
- Road geometry would have to be hashed out to ensure queuing of vehicles (for the u-turn movement, for example) does not impact through movements.

Safe Routes for Ped/Bikes

- The "split" of Meadow and Charleston will create a conflict between peds/bikes and motor vehicles, i.e., peds would be on the outside of the road approaching the railroad, but then cross one lane of (moderately high speed) traffic to get to the inside lane (to enter the underpass section of M/C).

Cost Effectiveness

- The property impacts will likely make this concept more costly than the Hybrid alternative, and thus, potentially cost prohibitive.



Typical Section
Alma St (North of Churchill Ave)

Price - Churchill Underpass Layout

Kellogg Ave

Churchill Ave

Coleridge Ave

Ped/Bike Bridge

Alma St

Caltrain R/W

Mariposa Ave

Paly Rd

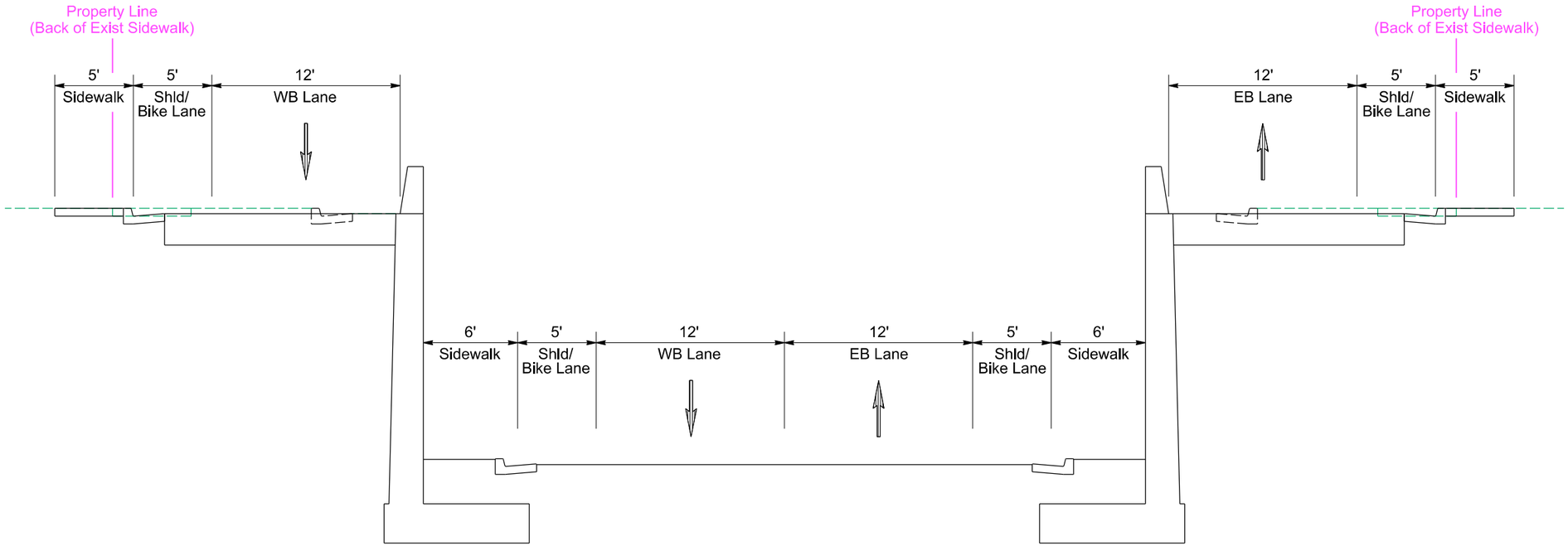
Castilleja Ave

Legend

Encroachment inside Caltrain R/W

Sliver Takes and/or TCEs

Structure over Alma/Churchill



Typical Section
Charleston Rd (East of Alma St)

Alexis - Charleston Underpass and Roundabout Layout

Charleston Rd

Wright Pl

Alma St

Ely Pl

Mumford Pl

160' Diameter

Legend

- Full Take (Property Acquisition)
- Potential Full Take
- Sliver Takes and/or TCEs
- Structure over Charleston

CONNECTING PALO ALTO

Rail Crossing Community Conversations

Type of Rail Crossing Options

JOIN THE RAIL CONVERSATION TOWN HALLS THURSDAYS @ 6:00-8:00PM

Community conversations with structured presentations, question and answer sessions and more

FEBRUARY 20

General presentation and topics, including update from the November 2019 community discussion.

Mitchell Park Community Center
3700 Middlefield Rd, Palo Alto

FEBRUARY 27

General presentation plus focus on Meadow/ Charleston Rail Grade Separation Alternatives.

Palo Alto Elks Lodge
4249 El Camino Real, Palo Alto

MARCH 12

General presentation plus focus on Churchill Rail Grade Separation Alternatives.

Palo Alto High School
50 Embarcadero Rd, Palo Alto

Transportation Community Conversations

WORD ON THE STREET COMMUNITY CONVERSATIONS THURSDAYS

Informal conversations, open-house style with City staff on transportation priorities like rail, parking, traffic calming, oversized overnight vehicle parking, etc.

JANUARY 30

Ohlone Elementary (6-8 p.m.)
950 Amarillo Ave, Palo Alto

MARCH 19

JLS Middle School (6-8 p.m.)
480 E Meadow Dr, Palo Alto

APRIL 16

Gunn High School (3-5 p.m.)
780 Arastradero Rd, Palo Alto

Read a new blog series on medium at
medium.com/paloaltoconnect

Email the City at
transportation@cityofpaloalto.org

Learn more at **www.connectingpaloalto.com**

CITY OF PALO ALTO