To: XCAP Members and Staff
From: Cari Templeton
Date: July 17, 2020
Subject: DRAFT "New Dynamic" Matrix Format
Reviewers: Greg Brail, Tony Carrasco

Executive Summary

Consultants prepared the existing matrices titled "Summary of Evaluation with City Council-Adopted Criteria" with the goal of providing a high-level tool to supplement the City's decision-making process for following through on its commitment to provide a recommendation on the community's preferred railroad crossing improvements to eliminate at-grade crossings, improve safety, etc. XCAP and the public have provided extensive feedback on the matrix, however, we have received significant feedback from the XCAP members and members of the public about challenges using and understanding the existing matrix. The new dynamic matrix is designed to address many of these challenges and be used as a tool for XCAP to make recommendations if the group finds it useful.

Goals

The new dynamic matrix is designed to achieve the following objectives:

- Improve transparency about the detailed criteria upon which the evaluations of each alternative project are based and apply those criteria equally across all alternatives.
- Make it easier for people to understand, including but not limited to readability and accessibility.
- Aid in and inform those who are evaluating the criteria, without dictating or constraining the ultimate recommendation unnecessarily.
- Focus discussion on criteria groups and enable a sequence of roll-up decision making that will help the XCAP reach a recommendation that can be documented, annotated, and clarified at each step.
- Make it easier to summarize perspectives of constituents and other interested parties.

Non-Goals

This new dynamic matrix will NOT do any of the following:

- Eliminate the need to evaluate subjective criteria.
- Eliminate or suppress discussion.
- Achieve perfection - this is intended as a tool to arrive at recommendation - not to create a matrix that perfectly explains the multitude of trade-offs and complexities that exist in comparing the alternatives.

Comparison and Advantages

Prior matrices have been met with challenges that the new matrix attempts to improve upon:

Aspect	**Previous Matrix**	**New Dynamic Matrix**
Readability	By trying to fit all columns on one page, the font became too small and difficult to read for many people.	By dynamically collapsing unused columns, there is more room for text to fit and the text can be easier to read.
Requirements	Some requirements were ambiguous and it was unclear how the color coding “rating” had been applied.	Breaking out each identified criteria category into the more precise concerns/topics, it is easier for the reader to understand how the rating was applied.
Consistency	Some requirement criteria were inconsistently applied from one alternative project to the next.	By expanding the identified criteria into the more precise concerns/topics, we can more easily rate each alternative project along the same criteria and sub-criteria.
Usability	Static document that required Staff or consultants to update, which was cumbersome and manual.	Living electronic document that XCAP can update themselves. Includes drop-downs of predefined options for evaluating line items, as well as a notes section to annotate those choices.
Accessibility	Used colors to imply rating choices, but those colors were ambiguous, undefined, and not accessible to color-blind readers.	Uses word+color combination to indicate the rating choices, so those who are color-blind have an alternative method to show ratings that have been applied.
User Focus	Includes only two groupings of criteria: City Council driven and engineering challenges highlighted by Staff/consultants	Maintains the original groupings of City Council and engineering challenges , while also including an additional re-grouping of those same criteria based on point of

		views (“personas”) that may be relevant to the public and/or decision-makers.
Classification	Does not differentiate between criteria types.	Provides an option to choose a criterion’s type: is it a constraint, a need, or a want? Objective constraints are either met or not met. Subjective criteria have a modest spectrum of options.
Severity	Uses only color to indicate the degree of severity of an alternative meeting or not meeting a criterion.	Allows us to apply a degree of compliance with engineering criteria in terms of severity.
Preference	Does not explicitly enable the indication of preference.	Allows an option for “preferred” and “not recommended”. This will be useful as the XCAP progresses towards a recommendation to promote or eliminate an option from consideration/recommendation.
Printability	The existing matrix can be hard to read when printed on Letter sized (8.5x11”) paper, and is often printed by staff on Tabloid (11x17”) paper, which may be challenging for those printing from home.	Most of the new dynamic matrix pages can be printed on Letter sized (8.5x11”) paper, with one exception: only the Meadow-Charleston “Expanded with Notes” prints better when using Tabloid (11x17”) paper. Note: even the Meadow-Charleston “Expanded with Notes” can be reduced to print on Letter, but may be difficult to read at that size.

Sections

The new dynamic matrix incorporates several sections to view criteria, as well as a technical sheet where the dropdown options are set.

Criteria

Each crossing or crossing grouping has its own tab: “Churchill” and “Meadow/Charleston.” On each of these tabs, the rows contain the criteria set out by City Council. They retain the labels used in the previous version of the matrix (A, B, C, ...). The new dynamic matrix breaks out each individual criterion into specific detailed sub-criteria implied or explicitly stated in Staff comments from the prior matrix. These sub-criteria are labeled with their parent’s label, plus a number (A.01, A.02, B.01, etc.)

- City Council's Evaluation Criteria (A-K; color code: green)
    - Primarily the evaluation criteria identified by City Council
- Engineering Challenges (L-Q; color code: blue)
    - Primarily the engineering and technical considerations identified by Staff
- Persona Perspective (Currently Unnumbered; color code: purple)
    - An alternative grouping of the City Council and Engineering criteria, grouped by who is affected. These almost all refer directly to existing City Council or Engineering criteria, but in some cases, we may choose to add new criteria. A couple samples are included in this Draft new dynamic matrix for discussion purposes.

NOTE: When the XCAP uses the spreadsheet view (not the PDFs), the row groups and column groups are expandable and collapsible by using the +/- control on the left and top of the spreadsheet. Each crossing tab has been exported in different levels of collapsed columns and/or rows, as follows:

- **Collapsed** - All sub-criteria and notes are collapsed so that only the original criteria and ratings for each alternative are visible.
- **Expanded** - All sub-criteria are visible and notes are collapsed out of view.
- **Expanded with notes** - All sub-criteria and notes are visible for each alternative.

Dropdown Options

“Dropdown Options” tab contains the choices available in various pre populated dropdown menus in certain cells in the criteria tabs.

Collection	Description	Options	Usage
TYPE	What type of criteria or requirement is this?	Constraint Need Want	Required Highly important goal Nice to have
CHOICES	Objective evaluation	✓ ✘	Meets the constraint Does not meet the constraint
CHOICES	Subjective ranking	Preferred Good OK Poor Not Recommended N/A Unknown	Include in recommendation Meets criteria Mostly meets criteria Mostly does not meet criteria Remove from recommendation Not applicable Not yet rated
SEVERITY	Degree of impact for engineering criteria	Improves Mild Moderate Severe Unknown	Outcome will be better than now Minimal disruption or no change Notable disruption or change Extensive disruption Not yet rated

Caveats

Please keep these caveats in mind as you review this draft new dynamic matrix:

- This is a draft and a proposed alternative way to view the criteria during the XCAP evaluation. Everything here is a suggestion, and nothing is prescribed. Let’s improve it together.
- The list of detailed (sub-) criteria may be incomplete. This first draft of the new dynamic matrix makes every effort to include only concerns highlighted by Staff in the previous version.
- Remember, the goal is to use the dynamic matrix as a tool to facilitate making recommendations, not to steer the group towards debating how to perfect the matrix.

Discussion

XCAP members, Staff, and even members of the public may want to suggest changes to this format. We are open to suggestions. Though we may not be able to accommodate all suggestions, we will incorporate what we can to improve the utility of this document.

Potential discussion items:

- What are our options on the “Dropdown Options” tab? Do we want an odd or even number of options?
- What personas are included in the new dynamic matrix?
- What sub-criteria are duplicative and may be combined?
- What sub-criteria are missing and may inform our decision-making during evaluation?
- Why are some of the ratings in the new dynamic matrix inconsistent with the prior version of the matrix?
- Do we have the right rating for each criteria/alternative yet? If not, how and when do we want to evaluate those?
- Do we want to break out additional columns to clarify options?
- ...and likely a few more!

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Churchill			NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Closure	Viaduct	Partial Underpass	
City Council's Evaluation Criteria						
A	Facilitate movement across the corridor for all modes of transportation		Poor	Good	Good	
B	Reduce delay and congestion for vehicular traffic at rail crossings		OK	Good	Good	
C	Provide clear, safe routes for pedestrians and cyclists crossing the rail corridor, separate from vehicles		Good	Good	Good	
D	Support continued rail operations and Caltrain service improvements		Good	OK	Good	
E	Finance with feasible funding sources		Good	Poor	Good	
F	Minimize right-of-way acquisition		OK	Good	Poor	
G	Reduce rail noise and vibration		Good	Good	Good	
H	Maintain access to neighborhoods, parks, and schools along the corridor, while reducing regional traffic on neighborhood streets		Poor	Good	OK	
I	Minimize visual changes along the corridor		Good	Poor	OK	
J	Minimize disruption and duration of construction		Good	OK	Poor	
K	Order of Magnitude Cost		Good	Poor	OK	
Engineering Challenges						
L	Creek/Drainage Impacts		Moderate	Mild	Moderate	
M	Long-Term Maintenance		Moderate	Mild	Moderate	
N	Utility Relocations		Moderate	Mild	Severe	
O	Railroad Operations Impacts during Construction		Mild	Moderate	Moderate	
P	Local Street Circulation Impacts during Construction		Moderate	Moderate	Severe	
Q	Caltrain Design Exceptions Needed		Mild	Severe	Mild	
Persona Perspective						
	Users of various MODES of TRANSIT					
	Car Drivers					
	Bike Riders					
	Pedestrians					
	Public Transit Users					
	Location of RESIDENCES					
	Lives Near Tracks					
	All Palo Alto residents					
	Affected ORGANIZATIONS					
	Businesses					
	PAUSD					
	Caltrain					
	City Public Safety (Fire, Emergency, etc.)					

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City Council's Evaluation Criteria						
Engineering Challenges						
L	**Creek/Drainage Impacts**		Moderate	Mild	Moderate	
L.01	Requires NO diversion of creeks.	Need	Mild	Mild	Mild	
L.02	Requires NO regulatory agency approvals.	Need	Mild	Mild	Mild	
L.03	Requires NO pump stations.	Need	Moderate	Mild	Moderate	
L.04	NO increased risk of flooding.	Need	Moderate	Mild	Moderate	
M	**Long-Term Maintenance**		Moderate	Mild	Moderate	
M.01	Requires NO pump stations for creek diversions.	Need	Mild	Mild	Mild	
M.02	Requires NO pump stations for tracks/road dewatering.	Need	Moderate	Mild	Moderate	
M.03	Requires NO effort for railroad alignment	Need	Mild	Moderate	Moderate	
N	**Utility Relocations**		Moderate	Mild	Severe	
N.01	Requires NO major utility relocations.	Need	Moderate	Mild	Severe	
O	**Railroad Operations Impacts during Construction**		Mild	Moderate	Moderate	
O.01	No temporary track (i.e., shoofly) is required	Want	Mild	Moderate	Moderate	
O.02	Shoofly length (or duration??) is minimal.	Want	Unknown	Unknown	Unknown	
P	**Local Street Circulation Impacts during Construction**		Moderate	Moderate	Severe	
P.01	Requires NO lane removals.	Want	Moderate	Moderate	Severe	
P.02	Requires NO street closures.	Want	Severe	Moderate	Severe	
P.03	Traffic flows during construction.	Need	Moderate	Moderate	Severe	
Q	**Caltrain Design Exceptions Needed**		Mild	Severe	Mild	
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).	Want	Mild	Severe	Mild	
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).	Want	Mild	Mild	Mild	
Persona Perspective						
	Users of various MODES of TRANSIT					
	Car Drivers					
A.02	All existing turns will be allowed	Need	Poor	Good	Poor	[Underpass] which turns are not allowed...
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓	✓	✓	

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Ref#	**Criteria Description**	**Is this a constraint, need, or want?**	**Closure**	**Viaduct**	**Partial Underpass**	
	Bike Riders					
B.02	Pedestrian and cyclist mode separation	Want	N/A	Good	Good	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	Good	Good	Good	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good	Good	OK	
C.03	Bike lanes will be added.	Want	N/A	Unknown	Good	
	Pedestrians					
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	Good	Good	Good	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good	Good	OK	
	Able to cross Alma with less than X mile detour from today.					
	Public Transit Users					
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	✓	✓	
	Location of RESIDENCES					
	Lives Near Tracks					
F.01	No acquisitions of private property required	Need	OK	Good	Poor	
F.03	Requires no driveway modifications	Want	OK	Good	Poor	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	✓	✓	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	✓	✓	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	N/A	N/A	OK	
G.04	Minimal train wheel noise radiating out.	Want	N/A	OK	N/A	
I.02	Landscaping options are unlimited.	Want	Good	OK	Poor	
I.03	Railroad will not be visible.	Want	Good	Poor	Good	
	All Palo Alto residents					
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✘	✓	✓	
H.02	Does not permanently affect local traffic flow.	Constraint	✘	✓	✓	
H.03	Does not permanently restrict turning movements.	Need	Poor	Good	OK	

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H.04	Improves pedestrian and cyclist access.	Want	Poor	Good	OK	
I.01	Railroad will not interfere with skyline.	Want	Good	Poor	OK	
J.01	Minimal duration of construction.	Need	Good	Good	OK	
J.02	Minimal road closures during construction.	Want	Good	OK	Poor	
P.01	Requires NO lane removals.	Want	Moderate	Moderate	Severe	
P.02	Requires NO street closures.	Want	Severe	Moderate	Severe	
P.03	Traffic flows during construction.	Need	Moderate	Moderate	Severe	
	Affected ORGANIZATIONS					
	Businesses					
J.01	Minimal duration of construction.	Need	Good	Good	OK	
P.03	Traffic flows during construction.	Need	Moderate	Moderate	Severe	
	PAUSD					
	Student bike access to Paly from the north and the south and east.	Need				
	Caltrain					
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	✓	✓	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	N/A	N/A	N/A	
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	N/A	N/A	N/A	
F.02	No acquisitions of Caltrain property required	Need	OK	Good	Poor	
O.01	No temporary track (i.e., shoofly) is required	Want	Mild	Moderate	Moderate	
O.02	Shoofly length (or duration??) is minimal.	Want	Unknown	Unknown	Unknown	
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).	Want	Mild	Severe	Mild	
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).	Want	Mild	Mild	Mild	
	City Public Safety (Fire, Emergency, etc.)					
	Emergency vehicles should be able to reach Paly and Southgate with less than X second increase from current service levels.	Constraint				See EIR and see Police and Fire letters.

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City Council's Evaluation Criteria									
A	**Facilitate movement across the corridor for all modes of transportation**		Poor	Churchill Ave will be closed to vehicles at the railroad tracks. Churchill Ave will be grade separated from the railroad for all modes	Good	Churchill Ave will be grade separated from the railroad for all modes and will remain open. Viaduct provides opportunities for additional crossings for all modes.	Good	Churchill Ave will be grade separated from the railroad for all modes and will remain open. Through traffic on Churchill Ave is no longer possible, and some traffic will have to take alternate routes. Pedestrian/ bike (only) traffic will be grade separated from the railroad and vehicle traffic on Alma St via an undercrossing at Kellogg Ave.	
A.01	Grade separation for all modes	Constraint	✓	Churchill Ave will be grade separated from the railroad for all modes	✓	Churchill Ave will be grade separated from the railroad for all modes.	✓	Churchill Ave will be grade separated from the railroad for all modes.	
A.02	All existing turns will be allowed	Need	Poor	Churchill Ave will be closed to vehicles at the railroad tracks.	Good	Churchill Ave will remain open.	Poor	Churchill Ave will remain open. Through traffic on Churchill Ave is no longer possible, and some traffic will have to take alternate routes. Pedestrian/ bike (only) traffic will be grade separated from the railroad and vehicle traffic on Alma St via an undercrossing at Kellogg Ave.	[Underpass] which turns are not allowed...
A.03	Additional (new) crossings will be allowed	Want	N/A		Good	Viaduct provides opportunities for additional crossings for all modes.	N/A		
B	**Reduce delay and congestion for vehicular traffic at rail crossings**		OK	With closure of Churchill Ave, the traffic at nearby intersections will be impacted; however, this can be mitigated.	Good	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.	Good	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 gates coming down. Pedestrian undercrossing at Kellogg Ave will also help reduce intersection congestion.	
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓		✓	With construction of the grade separation, the railroad crossing gates and warning lights at Churchill Ave will be removed.	✓	With construction of the grade separation, the railroad crossing gates and warning lights at Churchill Ave will be removed.	
B.02	Pedestrian and cyclist mode separation	Want	N/A		Good		Good	Pedestrian undercrossing at Kellogg Ave will also help reduce intersection congestion.	
B.03	Changes to traffic flow at nearby intersections can be mitigated.	Need	OK	With closure of Churchill Ave, the traffic at nearby intersections will be impacted; however, this can be mitigated.	Good	The traffic will not be interrupted by railroad crossing gates.	Good	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**		Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic.	Good	Pedestrians and cyclists will be completely separated from train and vehicular traffic. Full Pedestrian and cyclist movement is maintained with the crossing relocated to Kellogg Ave.	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good		Good		OK	Full Pedestrian and cyclist movement is maintained with the crossing relocated to Kellogg Ave.	
C.03	Bike lanes will be added.	Want	N/A		Unknown		Good		
D	**Support continued rail operations and Caltrain service improvements**		Good	A temporary railroad track will not be required.	OK	A temporary railroad track will be required. Stanford game day station will be eliminated due to grade issues.	Good	A temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	A temporary railroad track will not be required.	✓	A temporary railroad track will be required.	✓	A temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	N/A		N/A		N/A		
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	N/A		N/A		N/A		
D.04	All existing train services will remain.	Want	Good		Poor	Stanford game day station will be eliminated due to grade issues.	Good		
E	**Finance with feasible funding sources**		Good	The closure would require the lowest levels of local funding, with a substantial portion of capital costs covered by Regional, State and Federal sources	Poor	The viaduct would require substantial local funding resources significantly above the closure alternative.	Good	The underpasses would require lower levels of local funding, substantial portion of the capital costs would be covered by regional, state and federal sources.	
E.01	Eligible for grade separation funding.	Constraint	✓		✓		✓		
E.02	Can be funded with minimal local funding in the form of fees, taxes or special assessments	Need	Good	The closure would require the lowest levels of local funding	Poor	The viaduct would require substantial local funding resources significantly above the closure alternative.	Good	The underpasses would require lower levels of local funding,	

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E.03	A substantial portion of capital costs covered by Regional, State and Federal sources.	Want	Good	a substantial portion of capital costs covered by Regional, State and Federal sources	Unknown		Good	substantial portion of the capital costs would be covered by regional, state and federal sources.	
F	**Minimize right-of-way acquisition**		OK	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).	Good	No acquisition of private properties will be required.	Poor	Driveway modifications are likely to be required due to the removal of planter strips along Alma St. Some (sliver) acquisition of the high school and/or residential property fronting Churchill Ave on the west side of the tracks will be required. Some of the proposed improvements require encroachment inside Caltrain's right-of-way, especially during construction.	
F.01	No acquisitions of private property required	Need	OK	No acquisition of private properties is required; however, there will be impacts to Palo Alto High School property and potentially Caltrain.	Good	No acquisition of private properties will be required.	Poor	Some (sliver) acquisition of the high school and/or residential property fronting Churchill Ave on the west side of the tracks will be required.	
F.02	No acquisitions of Caltrain property required	Need	OK	...and potentially Caltrain	Good		Poor	Some of the proposed improvements require encroachment inside Caltrain's right-of-way, especially during construction.	
F.03	Requires no driveway modifications	Want	OK	There also may be some parking loss on the east side of Churchill Ave for the pedestrian/bike undercrossing (Option 2 only).	Good		Poor	Driveway modifications are likely to be required due to the removal of planter strips along Alma St.	
G	**Reduce rail noise and vibration**		Good	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.	Good	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.	Good	Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations. The use of electric motors rather than diesel engines will also reduce noise and some road noise would be reduced. Train wheel noise at the bridge location can be mitigated.	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	Train horn noise and warning bells will be eliminated with the removal of the at-grade crossings with roadway closure.	✓	Train horn noise and warning bells will be eliminated with the removal of the at-grade crossings with roadway closure.	✓	Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations.	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	N/A		N/A		OK	Train wheel noise at the bridge location can be mitigated.	
G.04	Minimal train wheel noise radiating out.	Want	N/A		OK	With the elevated track, train wheel noise could radiate out, which can be mitigated.	N/A		
H	**Maintain access to neighborhoods, parks, and schools along the corridor, while reducing regional traffic on neighborhood streets**		Poor	Diversion of regional traffic with Churchill Ave closure will be mitigated.	Good	No diversion of regional traffic with construction of a grade separations.	OK	Regional traffic will be diverted due to the restricted turning movements. Pedestrian and cyclist access will significantly improve due to mode separation.	
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✘	Diversion of regional traffic with Churchill Ave closure will be mitigated.	✓	No diversion of regional traffic with construction of a grade separations.	✓		
H.02	Does not permanently affect local traffic flow.	Constraint	✘		✓		✓		
H.03	Does not permanently restrict turning movements.	Need	Poor		Good		OK		
H.04	Improves pedestrian and cyclist access.	Want	Poor		Good		OK		
I	**Minimize visual changes along the corridor**		Good	Railroad tracks remain at existing grade. Residual roadway areas from closure provide opportunities for landscaping.	Poor	Railroad tracks will be approximately 20 feet above grade. Landscaping with trees will be incorporated for screening where feasible.	OK	The railroad tracks and the northbound lanes of Alma St will remain at-grade, and the east side of Churchill Ave will remain unchanged. Mature trees and overhead power poles within the Alma St planting strip, from just north of Kellogg Ave to just south of Coleridge Ave, will be removed.	
I.01	Railroad will not interfere with skyline.	Want	Good	Railroad tracks remain at existing grade.	Poor	Railroad tracks will be approximately 20 feet above grade.	OK	The railroad tracks and the northbound lanes of Alma St will remain at-grade, and the east side of Churchill Ave will remain unchanged.	
I.02	Landscaping options are unlimited.	Want	Good	Residual roadway areas from closure provide opportunities for landscaping.	OK	Landscaping with trees will be incorporated for screening where feasible.	Poor	Mature trees and overhead power poles within the Alma St planting strip, from just north of Kellogg Ave to just south of Coleridge Ave, will be removed.	
I.03	Railroad will not be visible.	Want	Good		Poor		Good		

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J	**Minimize disruption and duration of construction**		Good	The closure will have minimal road closures (nights/weekends only). Construction would last for approximately 2 years.	OK	Extended lane reductions at Alma St (one lane in each direction) will be required. Construction would last for approximately 2 years.	Poor	Lane reductions on Alma St and closure of Churchill Ave between Alma St and Mariposa Ave will be required for the majority of construction. Total duration of construction will be approximately 2.5 to 3 years; however the durations are subject to change depending on the construction methodologies used.	
J.01	Minimal duration of construction.	Need	Good	Construction would last for approximately 2 years.	Good	Construction would last for approximately 2 years.	OK	Total duration of construction will be approximately 2.5 to 3 years; however the durations are subject to change depending on the construction methodologies used.	
J.02	Minimal road closures during construction.	Want	Good	The closure will have minimal road closures (nights/weekends only).	OK	Extended lane reductions at Alma St (one lane in each direction) will be required.	Poor	Lane reductions on Alma St and closure of Churchill Ave between Alma St and Mariposa Ave will be required for the majority of construction.	
K	**Order of Magnitude Cost**		Good	$50M to $65M*	Poor	$300M to $400M*	OK	$160M to $200M*	
Engineering Challenges									
L	**Creek/Drainage Impacts**		Moderate	• 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.	Mild	• No significant creek or drainage impacts.	Moderate	• Pump station required for lowered roadways. • Increased risk of flooding due to pump station.	
L.01	Requires NO diversion of creeks.	Need	Mild		Mild	No significant creek or drainage impacts.	Mild		
L.02	Requires NO regulatory agency approvals.	Need	Mild		Mild		Mild		
L.03	Requires NO pump stations.	Need	Moderate	Pump station required for lowered pedestrian/bike way. Relocation of the pump house at Embarcadero Rd required to accommodate widening of Alma St.	Mild		Moderate	Pump station required for lowered roadways.	
L.04	NO increased risk of flooding.	Need	Moderate	Increased risk of flooding with pump stations.	Mild		Moderate	Increased risk of flooding due to pump station.	
M	**Long-Term Maintenance**		Moderate	Increased maintenance costs due to: • Pump stations for undercrossing dewatering.	Mild	Increased maintenance costs due to: • Above ground railroad alignment with embankments and viaduct structures.	Moderate	Increased maintenance cost due to: • Pump stations for underpass dewatering. • Above ground structures for both road and rail.	
M.01	Requires NO pump stations for creek diversions.	Need	Mild		Mild		Mild		
M.02	Requires NO pump stations for tracks/road dewatering.	Need	Moderate	Pump stations for undercrossing dewatering.	Mild		Moderate	Pump stations for underpass dewatering	
M.03	Requires NO effort for railroad alignment	Need	Mild		Moderate	Above ground railroad alignment with embankments and viaduct structures	Moderate	Above ground structures for both road and rail.	
N	**Utility Relocations**		Moderate	• Potential utility relocations in Alma St and Churchill Ave for pedestrian/bike undercrossing. • Minor utility relocations for Embarcadero Rd/Alma St improvements.	Mild	• Minimal impacts to utilities.	Severe	• Major utility relocations for lowered roadways.	
N.01	Requires NO major utility relocations.	Need	Moderate	• Potential utility relocations in Alma St and Churchill Ave for pedestrian/bike undercrossing. • Minor utility relocations for Embarcadero Rd/Alma St improvements.	Mild	• Minimal impacts to utilities.	Severe	• Major utility relocations for lowered roadways.	
O	**Railroad Operations Impacts during Construction**		Mild	• No temporary track (i.e., shoofly) required, only single tracking during nights and weekends.	Moderate	• Temporary track (i.e., shoofly) is required.	Moderate	• Temporary track (i.e., shoofly) likely required unless alternate construction methodology and sequencing is acceptable to Caltrain.	
O.01	No temporary track (i.e., shoofly) is required	Want	Mild	No temporary track (i.e., shoofly) required, only single tracking during nights and weekends.	Moderate	Temporary track (i.e., shoofly) is required.	Moderate	Temporary track (i.e., shoofly) likely required unless alternate construction methodology and sequencing is acceptable to Caltrain.	
O.02	Shoofly length (or duration??) is minimal.	Want	Unknown		Unknown		Unknown		
P	**Local Street Circulation Impacts during Construction**		Moderate	• 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.	Moderate	• 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.	Severe	• Lane reduction on Alma St during construction of the shoofly and bridge. • Likely closure of Churchill Ave throughout the excavation and construction of the undercrossing and related features. • Likely closure of Kellogg Ave for the duration of the pedestrian underpass construction; driveway access from one direction only	

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Churchill						NOTES
Ref#	**Criteria Description**	**Is this a constraint, need, or want?**	**Closure**	**Closure Notes (Original)**	**Viaduct**	**Viaduct Notes (Original)**	**Partial Underpass**	**Partial Underpass Notes (Original)**	
P.01	Requires NO lane removals.	Want	Moderate	• Temporary night and weekend closures of lanes on Churchill Ave, Alma St and Embarcadero Rd.	Moderate	• 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.	Severe	• Lane reduction on Alma St during construction of the shoofly and bridge.	
P.02	Requires NO street closures.	Want	Severe	• Temporary night and weekend closures of lanes on Churchill Ave, Alma St and Embarcadero Rd.	Moderate		Severe	• Likely closure of Churchill Ave throughout the excavation and construction of the undercrossing and related features. • Likely closure of Kellogg Ave for the duration of the pedestrian underpass construction; driveway access from one direction only	
P.03	Traffic flows during construction.	Need	Moderate	• Path along Palo Alto High School will temporarily be impacted during construction.	Moderate	• Temporary night and weekend closures of lanes on Alma St and Churchill Ave.	Severe	• Likely closure of Churchill Ave throughout the excavation and construction of the undercrossing and related features. • Likely closure of Kellogg Ave for the duration of the pedestrian underpass construction; driveway access from one direction only	
Q	**Caltrain Design Exceptions Needed**		Mild	None required.	Severe	1.6% grade on track required. Maximum grade allowed by Caltrain is 1%	Mild	No Caltrain design exceptions needed.	
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).	Want	Mild		Severe		Mild		
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).	Want	Mild		Mild		Mild		
Persona Perspective									
	Users of various MODES of TRANSIT								
	Car Drivers								
A.02	All existing turns will be allowed	Need	Poor	Churchill Ave will be closed to vehicles at the railroad tracks.	Good	Churchill Ave will remain open.	Poor	Churchill Ave will remain open. Through traffic on Churchill Ave is no longer possible, and some traffic will have to take alternate routes. Pedestrian/ bike (only) traffic will be grade separated from the railroad and vehicle traffic on Alma St via an undercrossing at Kellogg Ave.	[Underpass] which turns are not allowed...
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓		✓	With construction of the grade separation, the railroad crossing gates and warning lights at Churchill Ave will be removed.	✓	With construction of the grade separation, the railroad crossing gates and warning lights at Churchill Ave will be removed.	
	Bike Riders								
B.02	Pedestrian and cyclist mode separation	Want	N/A		Good		Good	Pedestrian undercrossing at Kellogg Ave will also help reduce intersection congestion.	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good		Good		OK	Full Pedestrian and cyclist movement is maintained with the crossing relocated to Kellogg Ave.	
C.03	Bike lanes will be added.	Want	N/A		Unknown		Good		
	Pedestrians								
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	Good	Pedestrians/cyclists will be separated from train traffic and vehicles.	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good		Good		OK	Full Pedestrian and cyclist movement is maintained with the crossing relocated to Kellogg Ave.	
	Able to cross Alma with less than X mile detour from today.								
	Public Transit Users								
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	A temporary railroad track will not be required.	✓	A temporary railroad track will be required.	✓	A temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
	Location of RESIDENCES								
	Lives Near Tracks								
F.01	No acquisitions of private property required	Need	OK	No acquisition of private properties is required; however, there will be impacts to Palo Alto High School property and potentially Caltrain.	Good	No acquisition of private properties will be required.	Poor	Some (sliver) acquisition of the high school and/or residential property fronting Churchill Ave on the west side of the tracks will be required.	

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Churchill						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Closure	Closure Notes (Original)	Viaduct	Viaduct Notes (Original)	Partial Underpass	Partial Underpass Notes (Original)	
F.03	Requires no driveway modifications	Want	OK	There also may be some parking loss on the east side of Churchill Ave for the pedestrian/bike undercrossing (Option 2 only).	Good		Poor	Driveway modifications are likely to be required due to the removal of planter strips along Alma St.	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	Train horn noise and warning bells will be eliminated with the removal of the at-grade crossings with roadway closure.	✓	Train horn noise and warning bells will be eliminated with the removal of the at-grade crossings with roadway closure.	✓	Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations.	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	N/A		N/A		OK	Train wheel noise at the bridge location can be mitigated.	
G.04	Minimal train wheel noise radiating out.	Want	N/A		OK	With the elevated track, train wheel noise could radiate out, which can be mitigated.	N/A		
I.02	Landscaping options are unlimited.	Want	Good	Residual roadway areas from closure provide opportunities for landscaping.	OK	Landscaping with trees will be incorporated for screening where feasible.	Poor	Mature trees and overhead power poles within the Alma St planting strip, from just north of Kellogg Ave to just south of Coleridge Ave, will be removed.	
I.03	Railroad will not be visible.	Want	Good		Poor		Good		
	All Palo Alto residents								
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✘	Diversion of regional traffic with Churchill Ave closure will be mitigated.	✓	No diversion of regional traffic with construction of a grade separations.	✓		
H.02	Does not permanently affect local traffic flow.	Constraint	✘		✓		✓		
H.03	Does not permanently restrict turning movements.	Need	Poor		Good		OK		
H.04	Improves pedestrian and cyclist access.	Want	Poor		Good		OK		
I.01	Railroad will not interfere with skyline.	Want	Good	Railroad tracks remain at existing grade.	Poor	Railroad tracks will be approximately 20 feet above grade.	OK	The railroad tracks and the northbound lanes of Alma St will remain at-grade, and the east side of Churchill Ave will remain unchanged.	
J.01	Minimal duration of construction.	Need	Good	Construction would last for approximately 2 years.	Good	Construction would last for approximately 2 years.	OK	Total duration of construction will be approximately 2.5 to 3 years; however the durations are subject to change depending on the construction methodologies used.	
J.02	Minimal road closures during construction.	Want	Good	The closure will have minimal road closures (nights/weekends only).	OK	Extended lane reductions at Alma St (one lane in each direction) will be required.	Poor	Lane reductions on Alma St and closure of Churchill Ave between Alma St and Mariposa Ave will be required for the majority of construction.	
P.01	Requires NO lane removals.	Want	Moderate	• Temporary night and weekend closures of lanes on Churchill Ave, Alma St and Embarcadero Rd.	Moderate	• 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.	Severe	• Lane reduction on Alma St during construction of the shoofly and bridge.	
P.02	Requires NO street closures.	Want	Severe	• Temporary night and weekend closures of lanes on Churchill Ave, Alma St and Embarcadero Rd.	Moderate		Severe	• Likely closure of Churchill Ave throughout the excavation and construction of the undercrossing and related features. • Likely closure of Kellogg Ave for the duration of the pedestrian underpass construction; driveway access from one direction only	
P.03	Traffic flows during construction.	Need	Moderate	• Path along Palo Alto High School will temporarily be impacted during construction.	Moderate	• Temporary night and weekend closures of lanes on Alma St and Churchill Ave.	Severe	• Likely closure of Churchill Ave throughout the excavation and construction of the undercrossing and related features. • Likely closure of Kellogg Ave for the duration of the pedestrian underpass construction; driveway access from one direction only	
	Affected ORGANIZATIONS								
	Businesses								
J.01	Minimal duration of construction.	Need	Good	Construction would last for approximately 2 years.	Good	Construction would last for approximately 2 years.	OK	Total duration of construction will be approximately 2.5 to 3 years; however the durations are subject to change depending on the construction methodologies used.	
P.03	Traffic flows during construction.	Need	Moderate	• Path along Palo Alto High School will temporarily be impacted during construction.	Moderate	• Temporary night and weekend closures of lanes on Alma St and Churchill Ave.	Severe	• Likely closure of Churchill Ave throughout the excavation and construction of the undercrossing and related features. • Likely closure of Kellogg Ave for the duration of the pedestrian underpass construction; driveway access from one direction only	
	PAUSD								

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Churchill						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Closure	Closure Notes (Original)	Viaduct	Viaduct Notes (Original)	Partial Underpass	Partial Underpass Notes (Original)	
	Student bike access to Paly from the north and the south and east.	Need							
	Caltrain								
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	A temporary railroad track will not be required.	✓	A temporary railroad track will be required.	✓	A temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	N/A		N/A		N/A		
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	N/A		N/A		N/A		
F.02	No acquisitions of Caltrain property required	Need	OK	...and potentially Caltrain	Good		Poor	Some of the proposed improvements require encroachment inside Caltrain's right-of-way, especially during construction.	
O.01	No temporary track (i.e., shoofly) is required	Want	Mild	No temporary track (i.e., shoofly) required, only single tracking during nights and weekends.	Moderate	Temporary track (i.e., shoofly) is required.	Moderate	Temporary track (i.e., shoofly) likely required unless alternate construction methodology and sequencing is acceptable to Caltrain.	
O.02	Shoofly length (or duration??) is minimal.	Want	Unknown		Unknown		Unknown		
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).	Want	Mild		Severe		Mild		
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).	Want	Mild		Mild		Mild		
	City Public Safety (Fire, Emergency, etc.)								
	Emergency vehicles should be able to reach Paly and Southgate with less than X second increase from current service levels.	Constraint							See EIR and see Police and Fire letters.

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Underpass	
City Council's Evaluation Criteria						Not Recommended	Not Recommended		
A	Facilitate movement across the corridor for all modes of transportation		Good	Good	Good	Good	Poor	OK	
B	Reduce delay and congestion for vehicular traffic at rail crossings		Good	Good	Good	Good	Poor	Good	
C	Provide clear, safe routes for pedestrians and cyclists crossing the rail corridor, separate from vehicles		Good	Good	Good	OK	Poor	OK	
D	Support continued rail operations and Caltrain service improvements		Good	Good	Good	Poor	Poor	Good	
E	Finance with feasible funding sources		Poor	Good	OK	Poor	Poor	OK	
F	Minimize right-of-way acquisition		Poor	OK	Good	Poor	Poor	Poor	
G	Reduce rail noise and vibration		Good	Good	Good	Good	Good	Good	
H	Maintain access to neighborhoods, parks, and schools along the corridor, while reducing regional traffic on neighborhood streets		Good	Good	Good	Good	Poor	OK	
I	Minimize visual changes along the corridor		OK	Poor	Poor	Good	Good	OK	
J	Minimize disruption and duration of construction		Poor	OK	Good	Poor	Poor	OK	
K	Order of Magnitude Cost		OK	Good	OK	Poor	Poor	OK	
Engineering Challenges						Not Recommended	Not Recommended		
L	Creek/Drainage Impacts		Severe	Moderate	Mild	Severe	Severe	Moderate	
M	Long-Term Maintenance		Severe	Moderate	Moderate	Severe	Severe	Moderate	
N	Utility Relocations		Severe	Severe	Mild	Severe	Severe	Severe	
O	Railroad Operations Impacts during Construction		Severe	Moderate	Mild	Severe	Severe	Moderate	
P	Local Street Circulation Impacts during Construction		Moderate	Moderate	Mild	Moderate	Mild	Moderate	
Q	Caltrain Design Exceptions Needed		Severe	Severe	Moderate	Severe	Severe	Mild	
Persona Perspective									
	Users of various MODES of TRANSIT								
	Car Drivers								
	Bike Riders								
	Pedestrians								
	Public Transit Users								
	Location of RESIDENCES								
	Lives Near Tracks								
	All Palo Alto residents								
	Affected ORGANIZATIONS								
	Businesses								
	PAUSD								
	Caltrain								
	City Public Safety (Fire, Emergency, etc.)								

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Underpass	
City Council's Evaluation Criteria						Not Recommended	Not Recommended		
A	**Facilitate movement across the corridor for all modes of transportation**		Good	Good	Good	Good	Poor	OK	
A.01	Grade separation for all modes	Constraint	✓	✓	✓	✓	✘	✓	
A.02	All existing turns will be allowed	Need	Good	Good	Good	Good	Good	OK	[Underpass] which turns are not allowed...
A.03	Additional (new) crossings will be allowed	Want	Good	N/A	Good	Good	N/A	N/A	
B	**Reduce delay and congestion for vehicular traffic at rail crossings**		Good	Good	Good	Good	Poor	Good	
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓	✓	✓	✓	✘	✓	
B.02	Pedestrian and cyclist mode separation	Want	N/A	N/A	N/A	N/A	N/A	Good	
B.03	Changes to traffic flow at nearby intersections can be mitigated.	Need	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	
C	**Provide clear, safe routes for pedestrians and cyclists crossing the rail corridor, separate from vehicles**		Good	Good	Good	OK	Poor	OK	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	✓	✓	✓	✓	✘	✓	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good	Good	Good	Good	Good	OK	[Underpass] Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.
C.03	Bike lanes will be added.	Want	Good	Good	Good	N/A	N/A	Good	
D	**Support continued rail operations and Caltrain service improvements**		Good	Good	Good	Poor	Poor	Good	
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	✓	N/A	✓	✓	✓	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	✓	✓	✓	✓	✓	N/A	
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	✓	N/A	N/A	✘	✘	N/A	
D.04	All existing train services will remain.	Want	Good	Good	Good	Good	Good	Good	(This requirement added to match Churchill requirements, but loss of station is not under discussion for Meadow/Churchill.)
E	**Finance with feasible funding sources**		Poor	Good	OK	Poor	Poor	OK	
E.01	Eligible for grade separation funding.	Constraint	✓	✓	✓	✓	✘	✓	
E.02	Can be funded with minimal local funding in the form of fees, taxes or special assessments	Need	Poor	Good	OK	Poor	Poor	OK	
E.03	A substantial portion of capital costs covered by Regional, State and Federal sources.	Want	N/A	Good	N/A	N/A	N/A	N/A	
F	**Minimize right-of-way acquisition**		Poor	OK	Good	Poor	Poor	Poor	
F.01	No acquisitions of private property required	Need	Poor	Good	Good	Poor	Poor	Poor	
F.02	No acquisitions of Caltrain property required	Need	Good	Good	Good	Good	Good	Poor	
F.03	Requires no driveway modifications	Want	N/A	Poor	Good	N/A	N/A	Poor	
G	**Reduce rail noise and vibration**		Good	Good	Good	Good	Good	Good	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	✓	✓	✓	✓	✓	

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Underpass	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	✓	✓	✓	✓	✓	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	OK	N/A	N/A	OK	OK	N/A	
G.04	Minimal train wheel noise radiating out.	Want	N/A	OK	OK	N/A	N/A	OK	
H	**Maintain access to neighborhoods, parks, and schools along the corridor, while reducing regional traffic on neighborhood streets**		Good	Good	Good	Good	Poor	OK	
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✓	✓	✓	✓	✘	✓	
H.02	Does not permanently affect local traffic flow.	Constraint	✓	✓	✓	✓	✘	✓	
H.03	Does not permanently restrict turning movements.	Need	Good	Good	Good	Good	Good	OK	
H.04	Improves pedestrian and cyclist access.	Want	N/A	N/A	N/A	N/A	N/A	Good	
I	**Minimize visual changes along the corridor**		OK	Poor	Poor	Good	Good	OK	
I.01	Railroad will not interfere with skyline.	Want	Good	OK	Poor	Good	Good	Good	
I.02	Landscaping options are unlimited.	Want	Poor	Good	Good	Poor	Poor	OK	
I.03	Railroad will not be visible.	Want	OK	Poor	Poor	Good	Good	OK	
J	**Minimize disruption and duration of construction**		Poor	OK	Good	Poor	Poor	OK	
J.01	Minimal duration of construction.	Need	Poor	OK	Good	Poor	Poor	Poor	
J.02	Minimal road closures during construction.	Want	Poor	OK	Good	Poor	Poor	OK	
K	**Order of Magnitude Cost**		OK	Good	OK	Poor	Poor	OK	
Engineering Challenges						Not Recommended	Not Recommended		
L	**Creek/Drainage Impacts**		Severe	Moderate	Mild	Severe	Severe	Moderate	
L.01	Requires NO diversion of creeks.	Need	Severe	Mild	Mild	Severe	Severe	Mild	
L.02	Requires NO regulatory agency approvals.	Need	Severe	Mild	Mild	Severe	Severe	Mild	
L.03	Requires NO pump stations.	Need	Severe	Severe	Mild	Severe	Severe	Severe	
L.04	NO increased risk of flooding.	Need	Severe	Severe	Mild	Severe	Severe	Severe	
M	**Long-Term Maintenance**		Severe	Moderate	Moderate	Severe	Severe	Moderate	
M.01	Requires NO pump stations for creek diversions.	Need	Severe	Mild	Mild	Severe	Severe	Mild	
M.02	Requires NO pump stations for tracks/road dewatering.	Need	Severe	Severe	Mild	Severe	Severe	Severe	
M.03	Requires NO effort for railroad alignment	Need	Severe	Severe	Severe	Severe	Severe	Severe	
N	**Utility Relocations**		Severe	Severe	Mild	Severe	Severe	Severe	
N.01	Requires NO major utility relocations.		Severe	Severe	Mild	Severe	Severe	Severe	
O	**Railroad Operations Impacts during Construction**		Severe	Moderate	Mild	Severe	Severe	Moderate	
O.01	No temporary track (i.e., shoofly) is required	Want	Severe	Moderate	Mild	Severe	Severe	Moderate	
O.02	Shoofly length (or duration??) is minimal.	Want	Severe	Moderate	Mild	Severe	Severe	Moderate	
P	**Local Street Circulation Impacts during Construction**		Moderate	Moderate	Mild	Moderate	Mild	Moderate	
P.01	Requires NO lane removals.	Want	Moderate	Moderate	Mild	Moderate	Moderate	Moderate	
P.02	Requires NO street closures.	Want	Moderate	Mild	Mild	Mild	Mild	Mild	
P.03	Traffic flows during construction.	Need	Moderate	Moderate	Mild	Moderate	Mild	Severe	
Q	**Caltrain Design Exceptions Needed**		Severe	Severe	Moderate	Severe	Severe	Mild	
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).		Severe	Mild	Moderate	Severe	Severe	Mild	

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Underpass	
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).		Mild	Severe	Mild	Mild	Mild	Mild	
Persona Perspective									
	Users of various MODES of TRANSIT								
	Car Drivers								
A.02	All existing turns will be allowed	Need	Good	Good	Good	Good	Good	OK	[Underpass] which turns are not allowed...
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓	✓	✓	✓	✘	✓	
	Bike Riders								
B.02	Pedestrian and cyclist mode separation	Want	N/A	N/A	N/A	N/A	N/A	Good	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	✓	✓	✓	✓	✘	✓	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good	Good	Good	Good	Good	OK	[Underpass] Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.
C.03	Bike lanes will be added.	Want	Good	Good	Good	N/A	N/A	Good	
	Pedestrians								
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	✓	✓	✓	✓	✘	✓	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good	Good	Good	Good	Good	OK	[Underpass] Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.
	Able to cross Alma with less than X mile detour from today.								
	Public Transit Users								
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	✓	N/A	✓	✓	✓	So Caltrain service cannot be interrupted.
	Location of RESIDENCES								
	Lives Near Tracks								
F.01	No acquisitions of private property required	Need	Poor	Good	Good	Poor	Poor	Poor	
F.03	Requires no driveway modifications	Want	N/A	Poor	Good	N/A	N/A	Poor	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	✓	✓	✓	✓	✓	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	✓	✓	✓	✓	✓	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	OK	N/A	N/A	OK	OK	N/A	
G.04	Minimal train wheel noise radiating out.	Want	N/A	OK	OK	N/A	N/A	OK	
I.02	Landscaping options are unlimited.	Want	Poor	Good	Good	Poor	Poor	OK	
I.03	Railroad will not be visible.	Want	OK	Poor	Poor	Good	Good	OK	
	All Palo Alto residents								

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd						NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Hybrid	Viaduct	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel with At-Grade Freight	Underpass	
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✓	✓	✓	✓	✘	✓	
H.02	Does not permanently affect local traffic flow.	Constraint	✓	✓	✓	✓	✘	✓	
H.03	Does not permanently restrict turning movements.	Need	Good	Good	Good	Good	Good	OK	
H.04	Improves pedestrian and cyclist access.	Want	N/A	N/A	N/A	N/A	N/A	Good	
I.01	Railroad will not interfere with skyline.	Want	Good	OK	Poor	Good	Good	Good	
J.01	Minimal duration of construction.	Need	Poor	OK	Good	Poor	Poor	Poor	
J.02	Minimal road closures during construction.	Want	Poor	OK	Good	Poor	Poor	OK	
P.01	Requires NO lane removals.	Want	Moderate	Moderate	Mild	Moderate	Moderate	Moderate	
P.02	Requires NO street closures.	Want	Moderate	Mild	Mild	Mild	Mild	Mild	
P.03	Traffic flows during construction.	Need	Moderate	Moderate	Mild	Moderate	Mild	Severe	
	Affected ORGANIZATIONS								
	Businesses								
J.01	Minimal duration of construction.	Need	Poor	OK	Good	Poor	Poor	Poor	
P.03	Traffic flows during construction.	Need	Moderate	Moderate	Mild	Moderate	Mild	Severe	
	PAUSD								
	Student bike access to Paly from the north and the south and east.	Need	Unknown	Unknown	Unknown	N/A	N/A	Unknown	
	Caltrain								
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	✓	N/A	✓	✓	✓	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	✓	✓	✓	✓	✓	N/A	
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	✓	N/A	N/A	✘	✘	N/A	
F.02	No acquisitions of Caltrain property required	Need	Good	Good	Good	Good	Good	Poor	
O.01	No temporary track (i.e., shoofly) is required	Want	Severe	Moderate	Mild	Severe	Severe	Moderate	
O.02	Shoofly length (or duration??) is minimal.	Want	Severe	Moderate	Mild	Severe	Severe	Moderate	
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).		Severe	Mild	Moderate	Severe	Severe	Mild	
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).		Mild	Severe	Mild	Mild	Mild	Mild	
	City Public Safety (Fire, Emergency, etc.)								
	Emergency vehicles should be able to reach Paly and Southgate with less than X second increase from current service levels.	Constraint	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	See EIR and see Police and Fire letters.

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd												NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Trench Notes (original)	Hybrid	Hybrid Notes (original)	Viaduct	Viaduct Notes (original)	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel Passenger and Freight Notes (original)	South Palo Alto Tunnel with At-Grade Freight	South Palo Alto Tunnel with At-Grade Freight Notes (original)	Underpass	Underpass Notes (original)	
City Council's Evaluation Criteria									Not Recommended		Not Recommended				
A	**Facilitate movement across the corridor for all modes of transportation**		Good	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open.	Good	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open.	Good	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.	Good	Meadow Dr and Charleston Rd will be grade separated from the railroad for all modes and will remain open.	Poor	Meadow Dr and Charleston Rd will be grade separated from the passenger train traffic only for all modes and will remain open. Meadow Dr and Charleston Rd will not be grade separated from the freight train traffic.	OK	East/West (through) traffic on Meadow Dr and Charleston Rd will be grade separated from the railroad and Alma St for all modes. Some turning movements on Meadow Dr to/from Alma St will be prohibited. All turning movements on Charleston Dr to/from Alma St will be permitted; however, some movements will be facilitated via a roundabout approximately 600 feet west of Alma St, resulting in longer routes for all modes.	
A.01	Grade separation for all modes	Constraint	✓	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.	✓	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 not be grade separated from the freight train traffic.	✓	East/West (through) traffic on Meadow Dr and Charleston Rd will be grade separated from the railroad and Alma St for all modes.	
A.02	All existing turns will be allowed	Need	Good		Good		Good		Good		Good		OK	Some turning movements on Meadow Dr to/from Alma St will be prohibited. All turning movements on Charleston Dr to/from Alma St will be permitted; however, some movements will be facilitated via a roundabout approximately 600 feet west of Alma St, resulting in longer routes for all modes.	[Underpass] which turns are not allowed...
A.03	Additional (new) crossings will be allowed	Want	Good		N/A		Good	Viaduct provides opportunities for additional crossings for all modes.	Good		N/A		N/A		
B	**Reduce delay and congestion for vehicular traffic at rail crossings**		Good	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.	Good	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.	Good	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.	Good	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.	Poor	With construction of the grade separation, the railroad crossing gates and warning lights at Meadow Dr and Charleston Rd will remain for the freight at-grade crossing. Freight train service is limited to just a few trains at night.	Good	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. Pedestrian and cyclist mode separation will also help reduce intersection congestion.	
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓	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 Dr and Charleston Rd will be removed. Thus, the traffic will not be interrupted by gates coming down.	✘	Freight train service is limited to just a few trains at night.	✓	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.	
B.02	Pedestrian and cyclist mode separation	Want	N/A		N/A		N/A		N/A		N/A		Good	Pedestrian and cyclist mode separation will also help reduce intersection congestion.	
B.03	Changes to traffic flow at nearby intersections can be mitigated.	Need	Unknown		Unknown		Unknown		Unknown		Unknown		Unknown		
C	**Provide clear, safe routes for pedestrians and cyclists crossing the rail corridor, separate from vehicles**		Good	Pedestrians/cyclists will be separated from train traffic and bike lanes will be added to Charleston Rd.	Good	Pedestrians/cyclists will be separated from train traffic and bike lanes will be added to Charleston Rd.	Good	Pedestrians/cyclists will be separated from train traffic and bike lanes will be added to Charleston Rd.	OK	Pedestrians/cyclists will be separated from train traffic.	Poor	Pedestrians/cyclists will be separated from passenger train traffic only.	OK	Pedestrians and cyclists traveling east/west will be completely separated from train and vehicular traffic on Alma St. Full pedestrian and cyclist movement is maintained. Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic.	✘	Pedestrians/cyclists will be separated from passenger train traffic only.	✓	Pedestrians and cyclists traveling east/west will be completely separated from train and vehicular traffic on Alma St. Full pedestrian and cyclist movement is maintained.	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good		Good		Good		Good		Good		OK	Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.	[Underpass] Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.
C.03	Bike lanes will be added.	Want	Good	Bike lanes will be added to Charleston Rd.	Good	Bike lanes will be added to Charleston Rd.	Good	Bike lanes will be added to Charleston Rd.	N/A		N/A		Good		
D	**Support continued rail operations and Caltrain service improvements**		Good	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.	Good	A temporary railroad track will be required, and a crossover track located north of the San Antonio Caltrain Station will be relocated.	Good	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.	Poor	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 Ave Caltrain Station. Due to the pump stations, there will be potential risks to train operations due to flooding.	Poor	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 Ave Caltrain Station. Due to the pump stations, there will be potential risks to train operations due to flooding.	Good	During construction, a temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	A temporary railroad track will be required,	✓	A temporary railroad track will be required,	N/A	New railroad tracks can be built without a temporary track,	✓	A temporary railroad track will be required at the boring pit areas to the north and south.	✓	A temporary railroad track will be required at the boring pit areas to the north and south.	✓	During construction, a temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	✓	and a crossover track located north of the San Antonio Caltrain Station will be relocated.	✓	and a crossover track located north of the San Antonio Caltrain Station will be relocated.	✓	and a crossover track located north of the San Antonio Caltrain Station will be relocated.	✓	A siding track will be relocated north of the California Ave Caltrain Station.	✓	A siding track will be relocated north of the California Ave Caltrain Station.	N/A		
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	✓	With the pump stations, there will be potential risks to train operations from flooding.	N/A		N/A		✘	Due to the pump stations, there will be potential risks to train operations due to flooding.	✘	Due to the pump stations, there will be potential risks to train operations due to flooding.	N/A		
D.04	All existing train services will remain.	Want	Good		Good		Good		Good		Good		Good		(This requirement added to match Churchill requirements, but loss of station is not under discussion for Meadow/Churchill.)

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd												NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Trench Notes (original)	Hybrid	Hybrid Notes (original)	Viaduct	Viaduct Notes (original)	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel Passenger and Freight Notes (original)	South Palo Alto Tunnel with At-Grade Freight	South Palo Alto Tunnel with At-Grade Freight Notes (original)	Underpass	Underpass Notes (original)	
E	**Finance with feasible funding sources**		Poor	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.	Good	The hybrid would require lower levels of local funding, with a substantial portion of capital costs covered by Regional, State and Federal sources.	OK	The viaduct would require substantial local funding resources more than the hybrid alternative, but less than the trench and tunnel alternatives.	Poor	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.	Poor	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.	OK	The underpass will require substantial local funding resources more than the hybrid alternative, but less than the trench and tunnel alternatives.	
E.01	Eligible for grade separation funding.	Constraint	✓		✓		✓		✓		✘	However, this alternative would not be eligible for grade separation funding as the at-grade crossing for freight would remain.	✓		
E.02	Can be funded with minimal local funding in the form of fees, taxes or special assessments	Need	Poor	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.	Good	The hybrid would require lower levels of local funding, with a substantial portion of capital costs covered by Regional, State and Federal sources.	OK	The viaduct would require substantial local funding resources more than the hybrid alternative, but less than the trench and tunnel alternatives.	Poor	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.	Poor	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.	OK	The underpass will require substantial local funding resources more than the hybrid alternative, but less than the trench and tunnel alternatives.	
E.03	A substantial portion of capital costs covered by Regional, State and Federal sources.	Want	N/A		Good		N/A		N/A		N/A		N/A		
F	**Minimize right-of-way acquisition**		Poor	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.	OK	No acquisition of private properties is required; however, driveway modifications will be required.	Good	No acquisition of private properties is required.	Poor	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.	Poor	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.	Poor	Multiple private property acquisitions are required, and driveway modifications are also likely to be required. There is also encroachment into Caltrain's right of way, permanently as well as during construction.	
F.01	No acquisitions of private property required	Need	Poor	* Subsurface acquisitions will be required for the ground anchors for the trench retaining walls * right-of-way acquisitions will be required to construct pump stations.	Good	No acquisition of private properties is required	Good	No acquisition of private properties is required.	Poor	* Subsurface acquisitions will be required for the ground anchors for the trench retaining walls * right of way acquisitions will be required to construct pump stations.	Poor	* Subsurface acquisitions will be required for the ground anchors for the trench retaining walls * right of way acquisitions will be required to construct pump stations.	Poor	Multiple private property acquisitions are required	
F.02	No acquisitions of Caltrain property required	Need	Good		Good		Good		Good		Good		Poor	There is also encroachment into Caltrain's right of way, permanently as well as during construction	
F.03	Requires no driveway modifications	Want	N/A		Poor	driveway modifications will be required.	Good		N/A		N/A		Poor	driveway modifications are also likely to be required	
G	**Reduce rail noise and vibration**		Good	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.	Good	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.	Good	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.	Good	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.	Good	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.	Good	Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations. The use of electric motors rather than diesel engines will also reduce noise. Train wheel noise may increase at the bridge location, depending on structure type; however, this noise can be mitigated.	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will remain for the at-grade crossings to accommodate the freight trains.	✓	Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations.	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	The use of electric motors rather than diesel engines will also reduce noise.	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	OK	With the lowered track, train noise could reflect off walls and impact properties farther away, which can be mitigated.	N/A		N/A		OK	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.	OK	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.	N/A		
G.04	Minimal train wheel noise radiating out.	Want	N/A		OK	With the elevated track, train wheel noise could radiate out, which can be mitigated with a sound barrier.	OK	With the elevated track, train wheel noise could radiate out, which can be mitigated with a sound barrier.	N/A		N/A		OK	Train wheel noise may increase at the bridge location, depending on structure type; however, this noise can be mitigated.	
H	**Maintain access to neighborhoods, parks, and schools along the corridor, while reducing regional traffic on neighborhood streets**		Good	No diversion of regional traffic with construction of grade separations.	Good	No diversion of regional traffic with construction of grade separations.	Good	No diversion of regional traffic with construction of grade separations.	Good	No diversion of regional traffic with construction of grade separations.	Poor	Diversion of regional traffic with the permanent lane reduction on Alma St will impact residential streets. Turning movements at Ely Pl will be limited to right turns on northbound Alma St only.	OK	Regional traffic will be diverted due to the restricted turning movements; however, travel in all directions will be possible, but may require a longer route and take more time. Pedestrian and cyclist access will significantly improve due to mode separation.	
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✓	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 St will impact residential streets.	✓		
H.02	Does not permanently affect local traffic flow.	Constraint	✓		✓		✓		✓		✘	Turning movements at Ely Pl will be limited to right turns on northbound Alma St only.	✓		
H.03	Does not permanently restrict turning movements.	Need	Good		Good		Good		Good		Good		OK	Regional traffic will be diverted due to the restricted turning movements; however, travel in all directions will be possible, but may require a longer route and take more time.	
H.04	Improves pedestrian and cyclist access.	Want	N/A		N/A		N/A		N/A		N/A		Good	Pedestrian and cyclist access will significantly improve due to mode separation.	
I	**Minimize visual changes along the corridor**		OK	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.	Poor	Railroad tracks will be approximately 15 feet above grade. Landscaping with trees will be incorporated for screening where feasible.	Poor	Railroad tracks will be approximately 20 feet above grade. Landscaping with trees will be incorporated for screening where feasible.	Good	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.	Good	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.	OK	Railroad tracks will remain at-grade. On Charleston Rd, removal of the planting strip on both sides of the road will be required along with the planting strip on the east side of Alma St between Charleston Rd and Ely Pl.	
I.01	Railroad will not interfere with skyline.	Want	Good	Railroad tracks will be below grade with high fencing at grade.	OK	Top of Rail (TOR) Railroad tracks will be approximately 15 feet above grade.	Poor	Railroad tracks will be approximately 20 feet above grade.	Good		Good		Good	Railroad tracks will remain at-grade.	
I.02	Landscaping options are unlimited.	Want	Poor	Landscaping options will be limited to plants with shallow roots in areas where tiebacks are required for the trench retaining walls.	Good	Landscaping with trees will be incorporated for screening where feasible.	Good	Landscaping with trees will be incorporated for screening where feasible.	Poor	Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench section.	Poor	Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench section.	OK	On Charleston Rd, removal of the planting strip on both sides of the road will be required along with the planting strip on the east side of Alma St between Charleston Rd and Ely Pl.	
I.03	Railroad will not be visible.	Want	OK	Railroad tracks will be below grade with high fencing at grade.	Poor		Poor		Good	Railroad tracks will be below grade with high fencing at grade in the trench section.	Good	Passenger tracks will be below grade and freight tracks will be at-grade with high fencing.	OK	Railroad tracks will remain at-grade.	

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd												NOTES
Ref#	**Criteria Description**	**Is this a constraint, need, or want?**	**Trench**	**Trench Notes (original)**	**Hybrid**	**Hybrid Notes (original)**	**Viaduct**	**Viaduct Notes (original)**	**South Palo Alto Tunnel Passenger and Freight**	**South Palo Alto Tunnel Passenger and Freight Notes (original)**	**South Palo Alto Tunnel with At-Grade Freight**	**South Palo Alto Tunnel with At-Grade Freight Notes (original)**	**Underpass**	**Underpass Notes (original)**	
J	**Minimize disruption and duration of construction**		Poor	Extended road closures at Meadow Dr and Charleston Rd are required. Construction would last for approximately 6 years.	OK	Extended lane reductions at Alma St, Meadow Dr, and Charleston Rd will be required. Construction would last for approximately 4 years.	Good	The viaduct will have minimal road closures (nights/weekends only). Construction would last for approximately 2 years.	Poor	Extended lane reductions on Alma St are required. Construction would last for approximately 6 years.	Poor	Extended Lane reductions on Alma St are required. Construction would last for approximately 6 years.	OK	Lane reductions and temporary closures (nights/weekends only) on Alma St, a closure of Meadow Dr between Emerson St and Park Blvd, and a closure of Charleston Rd between Alma St and Park Blvd will be required for the majority of construction. The total duration of construction will be approximately 3.5 to 4 years; however the durations are subject to change depending on the construction methodologies used.	
J.01	Minimal duration of construction.	Need	Poor	Construction would last for approximately 6 years.	OK	Construction would last for approximately 4 years.	Good	Construction would last for approximately 2 years.	Poor	Construction would last for approximately 6 years.	Poor	Construction would last for approximately 6 years.	Poor	The total duration of construction will be approximately 3.5 to 4 years; however the durations are subject to change depending on the construction methodologies used.	
J.02	Minimal road closures during construction.	Want	Poor	Extended road closures at Meadow Dr and Charleston Rd are required.	OK	Extended lane reductions at Alma St, Meadow Dr, and Charleston Rd will be required.	Good	The viaduct will have minimal road closures (nights/weekends only).	Poor	Extended lane reductions on Alma St are required.	Poor	Extended lane reductions on Alma St are required.	OK	Lane reductions and temporary closures (nights/weekends only) on Alma St, a closure of Meadow Dr between Emerson St and Park Blvd, and a closure of Charleston Rd between Alma St and Park Blvd will be required for the majority of construction.	
K	**Order of Magnitude Cost**		OK	$800M to 950M*	Good	$200M to $250M*	OK	$400M to 500M*	Poor	$1,218M to $1,827M*	Poor	$1,173M to $1,759M*	OK	$350M to $450M*	
Engineering Challenges									Not Recommended		Not Recommended				
L	**Creek/Drainage Impacts**		Severe	• 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.	Moderate	• Pump stations required for lowered roadways. • Increased risk of flooding due to pump stations.	Mild	• No significant creek or drainage impacts.	Severe	• 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.	Severe	• 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.	Moderate	• Pump station required for lowered roadways. • Increased risk of flooding due to pump station.	
L.01	Requires NO diversion of creeks.	Need	Severe	Adobe and Barron creeks	Mild		Mild	No significant creek or drainage impacts.	Severe	Requires diversion of Adobe and Matadero creeks	Severe	Requires diversion of Adobe and Matadero creeks	Mild		
L.02	Requires NO regulatory agency approvals.	Need	Severe	would be required for creek diversion	Mild		Mild		Severe	regulatory agency approvals required for creek diversion	Severe	regulatory agency approvals required for creek diversion	Mild		
L.03	Requires NO pump stations.	Need	Severe	Needed for creek diversion and to dewater the tracks.	Severe	required for lowered roadways	Mild		Severe	required to dewater the trench and tunnel	Severe	required to dewater the trench and tunnel	Severe	Pump station required for lowered roadways	
L.04	NO increased risk of flooding.	Need	Severe	increased risk due to pump stations	Severe	Increased risk of flooding due to pump stations.	Mild		Severe	due to pump stations	Severe	due to pump stations	Severe	Increased risk of flooding due to pump station	
M	**Long-Term Maintenance**		Severe	Increased maintenance costs due to: • Pump stations for creek diversions. • Pump stations for trench dewatering. • Below ground railroad alignment.	Moderate	Increased maintenance costs due to: • Pump stations for trench dewatering. • Above ground railroad alignment with embankments and undercrossing structures.	Moderate	Increased maintenance costs due to: • Above ground railroad alignment with embankments and viaduct structures.	Severe	Increased maintenance costs due to: • Pump stations for creek diversions. • Pump stations for trench dewatering. • Below ground railroad alignment.	Severe	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.	Moderate	Increased maintenance cost due to: • Pump stations for underpass dewatering. • Above ground structures for both road and rail.	
M.01	Requires NO pump stations for creek diversions.	Need	Severe	Pump stations for creek diversions.	Mild		Mild		Severe		Severe	Pump stations for creek diversions	Mild		
M.02	Requires NO pump stations for tracks/road dewatering.	Need	Severe	Pump stations for trench dewatering.	Severe	Pump stations for trench dewatering.	Mild		Severe		Severe	Pump stations for trench dewatering.	Severe	Pump stations for underpass dewatering	
M.03	Requires NO effort for railroad alignment	Need	Severe	Below ground railroad alignment	Severe	Above ground railroad alignment with embankments and undercrossing structures	Severe	Above ground railroad alignment with embankments and viaduct structures	Severe		Severe	Below ground railroad alignment as well as at-grade railroad alignment	Severe	Above ground structures for both road and rail	
N	**Utility Relocations**		Severe	• Major utility relocations for lowered railroad.	Severe	• Major utility relocations for lowered roadways.	Mild	• No major utility relocations.	Severe	• Major utility relocations for lowered railroad.	Severe	• Major utility relocations for lowered railroad.	Severe	• Major utility relocations for lowered roadways.	
N.01	Requires NO major utility relocations.		Severe	Major utility relocations for lowered railroad	Severe	Major utility relocations for lowered roadways	Mild	No major utility relocations.	Severe	Major utility relocations for lowered railroad.	Severe	Major utility relocations for lowered railroad.	Severe	Major utility relocations for lowered roadways.	
O	**Railroad Operations Impacts during Construction**		Severe	• Temporary track (i.e., shoofly) is required.	Moderate	• Temporary track (i.e., shoofly) is required, but a bit shorter than the trench shoofly.	Mild	• No temporary track (i.e., shoofly) required.	Severe	• Temporary track (shoofly) is required.	Severe	• Temporary track (shoofly) is required.	Moderate	• Temporary track (i.e., shoofly) likely required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
O.01	No temporary track (i.e., shoofly) is required	Want	Severe	Temporary track (i.e., shoofly) is required	Moderate		Mild	No temporary track (i.e., shoofly) required.	Severe		Severe		Moderate		
O.02	Shoofly length (or duration??) is minimal.	Want	Severe	Shoofly is a bit longer than the hybrid shoofly.	Moderate	Shoofly is a bit shorter than the trench shoofly.	Mild		Severe		Severe		Moderate		
P	**Local Street Circulation Impacts during Construction**		Moderate	• 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.	Moderate	• 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.	Mild	• 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.	Moderate	• Alma St will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Ave. • From Charleston Rd to Ferne Ave, there will be only one southbound lane on Alma St.	Mild	• Alma St will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Ave.	Moderate	• Lane reduction on Alma St during construction of the shoofly and bridge. • Closure of Meadow Dr and Charleston Rd throughout excavation and construction of the undercrossing and related features.	
P.01	Requires NO lane removals.	Want	Moderate	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.	Moderate	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.	Mild	Reduced lane widths on Alma St, north of Meadow Dr and south of Charleston Rd.	Moderate	Alma St will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Ave.	Moderate	Alma St will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Ave.	Moderate	Lane reduction on Alma St during construction of the shoofly and bridge.	
P.02	Requires NO street closures.	Want	Moderate	Closes Meadow Dr while Charleston Rd roadway bridges are constructed and visa versa.	Mild		Mild		Mild		Mild		Mild		
P.03	Traffic flows during construction.	Need	Moderate		Moderate	Alma St, Charleston Rd, and Meadow Dr reduced to 2 lanes.	Mild	Possible night time closures of Meadow Dr and Charleston Rd.	Moderate	From Charleston Rd to Ferne Ave, there will be only one southbound lane on Alma St.	Mild		Severe	Closure of Meadow Dr and Charleston Rd throughout excavation and construction of the undercrossing and related features.	
Q	**Caltrain Design Exceptions Needed**		Severe	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	Severe	Temporary vertical clearance of 12 feet at undercrossing structures during construction. Minimum vertical clearance allowed by Caltrain is 15.5 feet.	Moderate	1.4% grade on track required. Maximum grade allowed by Caltrain is 1%.	Severe	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	Severe	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	Mild	No Caltrain design exceptions required.	
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).		Severe	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	Mild		Moderate	1.4% grade on track required.	Severe	2% grade on track required.	Severe	2% grade on track required.	Mild		
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).		Mild		Severe	Temporary vertical clearance of 12 feet at undercrossing structures during construction. Minimum vertical clearance allowed by Caltrain is 15.5 feet.	Mild		Mild		Mild		Mild		
Persona Perspective															
	Users of various MODES of TRANSIT														
	Car Drivers														

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd												NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Trench Notes (original)	Hybrid	Hybrid Notes (original)	Viaduct	Viaduct Notes (original)	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel Passenger and Freight Notes (original)	South Palo Alto Tunnel with At-Grade Freight	South Palo Alto Tunnel with At-Grade Freight Notes (original)	Underpass	Underpass Notes (original)	
A.02	All existing turns will be allowed	Need	Good		Good		Good		Good		Good		OK	Some turning movements on Meadow Dr to/from Alma St will be prohibited. All turning movements on Charleston Dr to/from Alma St will be permitted; however, some movements will be facilitated via a roundabout approximately 600 feet west of Alma St, resulting in longer routes for all modes.	[Underpass] which turns are not allowed...
B.01	Traffic flow will no longer be interrupted by trains (e.g., crossing gates and warning lights)	Constraint	✓	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 Dr and Charleston Rd will be removed. Thus, the traffic will not be interrupted by gates coming down.	✘	Freight train service is limited to just a few trains at night.	✓	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.	
	Bike Riders														
B.02	Pedestrian and cyclist mode separation	Want	N/A		N/A		N/A		N/A		N/A		Good	Pedestrian and cyclist mode separation will also help reduce intersection congestion.	
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic.	✘	Pedestrians/cyclists will be separated from passenger train traffic only.	✓	Pedestrians and cyclists traveling east/west will be completely separated from train and vehicular traffic on Alma St. Full pedestrian and cyclist movement is maintained.	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good		Good		Good		Good		Good		OK	Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.	[Underpass] Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.
C.03	Bike lanes will be added.	Want	Good	Bike lanes will be added to Charleston Rd.	Good	Bike lanes will be added to Charleston Rd.	Good	Bike lanes will be added to Charleston Rd.	N/A		N/A		Good		
	Pedestrians														
C.01	Pedestrians/cyclists will be separated from train traffic	Constraint	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic	✓	Pedestrians/cyclists will be separated from train traffic.	✘	Pedestrians/cyclists will be separated from passenger train traffic only.	✓	Pedestrians and cyclists traveling east/west will be completely separated from train and vehicular traffic on Alma St. Full pedestrian and cyclist movement is maintained.	
C.02	Full pedestrian and cyclist movement is maintained	Need	Good		Good		Good		Good		Good		OK	Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.	[Underpass] Pedestrians and cyclists will have more circuitous routes traveling east/west across the corridor because the ped/bike path is located on one side of the street only: On the south side of Meadow Dr and on the north side of Charleston Rd. For example, cyclists traveling eastbound on Charleston Rd near Ruthelma St will have to cross Charleston Rd to get onto the north side of the road, then cross Charleston Rd again at the roundabout near Mumford Pl to get back onto the right/south side of the road.
	Able to cross Alma with less than X mile detour from today.														
	Public Transit Users														
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	A temporary railroad track will be required,	✓	A temporary railroad track will be required,	N/A	New railroad tracks can be built without a temporary track,	✓	A temporary railroad track will be required at the boring pit areas to the north and south.	✓	A temporary railroad track will be required at the boring pit areas to the north and south.	✓	During construction, a temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	So Caltrain service cannot be interrupted.
	Location of RESIDENCES														
	Lives Near Tracks														
F.01	No acquisitions of private property required	Need	Poor	* Subsurface acquisitions will be required for the ground anchors for the trench retaining walls * right-of-way acquisitions will be required to construct pump stations.	Good	No acquisition of private properties is required	Good	No acquisition of private properties is required.	Poor	* Subsurface acquisitions will be required for the ground anchors for the trench retaining walls * right of way acquisitions will be required to construct pump stations.	Poor	* Subsurface acquisitions will be required for the ground anchors for the trench retaining walls * right of way acquisitions will be required to construct pump stations.	Poor	Multiple private property acquisitions are required	
F.03	Requires no driveway modifications	Want	N/A		Poor	driveway modifications will be required.	Good		N/A		N/A		Poor	driveway modifications are also likely to be required	
G.01	Train horn noise and warning bells will be eliminated.	Constraint	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will be eliminated with the replacement of the at-grade crossings with grade separations.	✓	Train horn noise and warning bells will remain for the at-grade crossings to accommodate the freight trains.	✓	Train horn noise and warning bells will be eliminated by the replacement of the at-grade crossings with grade separations.	
G.02	Utilizing electric engines instead of diesel engines will also reduce noise.	Constraint	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	Utilizing electric engines instead of diesel engines will also reduce noise.	✓	The use of electric motors rather than diesel engines will also reduce noise.	
G.03	Minimal train noise reflecting off walls or from underground vibrations.	Want	OK	With the lowered track, train noise could reflect off walls and impact properties farther away, which can be mitigated.	N/A		N/A		OK	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.	OK	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.	N/A		
G.04	Minimal train wheel noise radiating out.	Want	N/A		OK	With the elevated track, train wheel noise could radiate out, which can be mitigated with a sound barrier.	OK	With the elevated track, train wheel noise could radiate out, which can be mitigated with a sound barrier.	N/A		N/A		OK	Train wheel noise may increase at the bridge location, depending on structure type; however, this noise can be mitigated.	
I.02	Landscaping options are unlimited.	Want	Poor	Landscaping options will be limited to plants with shallow roots in areas where tiebacks are required for the trench retaining walls.	Good	Landscaping with trees will be incorporated for screening where feasible.	Good	Landscaping with trees will be incorporated for screening where feasible.	Poor	Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench section.	Poor	Landscaping options will be limited to plants with shallow roots in areas where ground anchors are required for the trench section.	OK	On Charleston Rd, removal of the planting strip on both sides of the road will be required along with the planting strip on the east side of Alma St between Charleston Rd and Ely Pl.	
I.03	Railroad will not be visible.	Want	OK	Railroad tracks will be below grade with high fencing at grade.	Poor		Poor		Good	Railroad tracks will be below grade with high fencing at grade in the trench section.	Good	Passenger tracks will be below grade and freight tracks will be at-grade with high fencing.	OK	Railroad tracks will remain at-grade.	
	All Palo Alto residents														
H.01	No diversion of regional traffic with construction of grade separations.	Constraint	✓	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 St will impact residential streets.	✓		
H.02	Does not permanently affect local traffic flow.	Constraint	✓		✓		✓		✓		✘	Turning movements at Ely Pl will be limited to right turns on northbound Alma St only.	✓		

[DRAFT] XCAP "New Dynamic" Matrix: Summary of Evaluation with City Council-Adopted Criteria

		TYPE	Meadow Dr and Charleston Rd												NOTES
Ref#	Criteria Description	Is this a constraint, need, or want?	Trench	Trench Notes (original)	Hybrid	Hybrid Notes (original)	Viaduct	Viaduct Notes (original)	South Palo Alto Tunnel Passenger and Freight	South Palo Alto Tunnel Passenger and Freight Notes (original)	South Palo Alto Tunnel with At-Grade Freight	South Palo Alto Tunnel with At-Grade Freight Notes (original)	Underpass	Underpass Notes (original)	
H.03	Does not permanently restrict turning movements.	Need	Good		Good		Good		Good		Good		OK	Regional traffic will be diverted due to the restricted turning movements; however, travel in all directions will be possible, but may require a longer route and take more time.	
H.04	Improves pedestrian and cyclist access.	Want	N/A		N/A		N/A		N/A		N/A		Good	Pedestrian and cyclist access will significantly improve due to mode separation.	
I.01	Railroad will not interfere with skyline.	Want	Good	Railroad tracks will be below grade with high fencing at grade.	OK	Top of Rail (TOR) Railroad tracks will be approximately 15 feet above grade.	Poor	Railroad tracks will be approximately 20 feet above grade.	Good		Good		Good	Railroad tracks will remain at-grade.	
J.01	Minimal duration of construction.	Need	Poor	Construction would last for approximately 6 years.	OK	Construction would last for approximately 4 years.	Good	Construction would last for approximately 2 years.	Poor	Construction would last for approximately 6 years.	Poor	Construction would last for approximately 6 years.	Poor	The total duration of construction will be approximately 3.5 to 4 years; however the durations are subject to change depending on the construction methodologies used.	
J.02	Minimal road closures during construction.	Want	Poor	Extended road closures at Meadow Dr and Charleston Rd are required.	OK	Extended lane reductions at Alma St, Meadow Dr, and Charleston Rd will be required.	Good	The viaduct will have minimal road closures (nights/weekends only).	Poor	Extended lane reductions on Alma St are required.	Poor	Extended lane reductions on Alma St are required.	OK	Lane reductions and temporary closures (nights/weekends only) on Alma St, a closure of Meadow Dr between Emerson St and Park Blvd, and a closure of Charleston Rd between Alma St and Park Blvd will be required for the majority of construction.	
P.01	Requires NO lane removals.	Want	Moderate	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.	Moderate	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.	Mild	Reduced lane widths on Alma St, north of Meadow Dr and south of Charleston Rd.	Moderate	Alma St will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Ave.	Moderate	Alma St will be reduced to one lane in each direction from south of Oregon Expressway to Ventura Ave.	Moderate	Lane reduction on Alma St during construction of the shoofly and bridge.	
P.02	Requires NO street closures.	Want	Moderate	Closes Meadow Dr while Charleston Rd roadway bridges are constructed and visa versa.	Mild		Mild		Mild		Mild		Mild		
P.03	Traffic flows during construction.	Need	Moderate		Moderate	Alma St, Charleston Rd, and Meadow Dr reduced to 2 lanes.	Mild	Possible night time closures of Meadow Dr and Charleston Rd.	Moderate	From Charleston Rd to Ferne Ave, there will be only one southbound lane on Alma St.	Mild		Severe	Closure of Meadow Dr and Charleston Rd throughout excavation and construction of the undercrossing and related features.	
	Affected ORGANIZATIONS														
	Businesses														
J.01	Minimal duration of construction.	Need	Poor	Construction would last for approximately 6 years.	OK	Construction would last for approximately 4 years.	Good	Construction would last for approximately 2 years.	Poor	Construction would last for approximately 6 years.	Poor	Construction would last for approximately 6 years.	Poor	The total duration of construction will be approximately 3.5 to 4 years; however the durations are subject to change depending on the construction methodologies used.	
P.03	Traffic flows during construction.	Need	Moderate		Moderate	Alma St, Charleston Rd, and Meadow Dr reduced to 2 lanes.	Mild	Possible night time closures of Meadow Dr and Charleston Rd.	Moderate	From Charleston Rd to Ferne Ave, there will be only one southbound lane on Alma St.	Mild		Severe	Closure of Meadow Dr and Charleston Rd throughout excavation and construction of the undercrossing and related features.	
	PAUSD														
	Student bike access to Paly from the north and the south and east.	Need	Unknown		Unknown		Unknown		N/A		N/A		Unknown		
	Caltrain														
D.01	Temporary railroad track can be accommodated, if required.	Constraint	✓	A temporary railroad track will be required,	✓	A temporary railroad track will be required,	N/A	New railroad tracks can be built without a temporary track,	✓	A temporary railroad track will be required at the boring pit areas to the north and south.	✓	A temporary railroad track will be required at the boring pit areas to the north and south.	✓	During construction, a temporary railroad track is likely to be required unless an alternate construction methodology and sequencing is acceptable to Caltrain.	
D.02	Crossover track located north of the San Antonio Caltrain Station can be relocated, if required.	Constraint	✓	and a crossover track located north of the San Antonio Caltrain Station will be relocated.	✓	and a crossover track located north of the San Antonio Caltrain Station will be relocated.	✓	and a crossover track located north of the San Antonio Caltrain Station will be relocated.	✓	A siding track will be relocated north of the California Ave Caltrain Station.	✓	A siding track will be relocated north of the California Ave Caltrain Station.	N/A		
D.03	Risk of pump stations flooding can be accomodated, if required.	Constraint	✓	With the pump stations, there will be potential risks to train operations from flooding.	N/A		N/A		✘	Due to the pump stations, there will be potential risks to train operations due to flooding.	✘	Due to the pump stations, there will be potential risks to train operations due to flooding.	N/A		
F.02	No acquisitions of Caltrain property required	Need	Good		Good		Good		Good		Good		Poor	There is also encroachment into Caltrain's right of way, permanently as well as during construction	
O.01	No temporary track (i.e., shoofly) is required	Want	Severe	Temporary track (i.e., shoofly) is required	Moderate		Mild	No temporary track (i.e., shoofly) required.	Severe		Severe		Moderate		
O.02	Shoofly length (or duration??) is minimal.	Want	Severe	Shoofly is a bit longer than the hybrid shoofly.	Moderate	Shoofly is a bit shorter than the trench shoofly.	Mild		Severe		Severe		Moderate		
Q.01	Does not exceed maximum grade allowed by Caltrain (1%).		Severe	2% grade on track required. Maximum grade allowed by Caltrain is 1%.	Mild		Moderate	1.4% grade on track required.	Severe	2% grade on track required.	Severe	2% grade on track required.	Mild		
Q.02	Complies with minimum vertical clearance allowed by Caltrain (15.5 feet).		Mild		Severe	Temporary vertical clearance of 12 feet at undercrossing structures during construction. Minimum vertical clearance allowed by Caltrain is 15.5 feet.	Mild		Mild		Mild		Mild			
	City Public Safety (Fire, Emergency, etc.)														
	Emergency vehicles should be able to reach Paly and Southgate with less than X second increase from current service levels.	Constraint	Unknown		Unknown		Unknown		Unknown		Unknown		Unknown		See EIR and see Police and Fire letters.

TYPE	CHOICES	SEVERITY
Constraint	✓	Improves
Need	✘	Mild
Want	Preferred	Moderate
	Good	Severe
	OK	Unknown
	Poor	
	Not Recommended	
	N/A	
	Unknown	