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El Camino Real BRT Phasing Plan
Initial Service Concept Development
and Screening

Prepared for:
SamTrans

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Summary

The purpose of this memo is to introduce and screen a series of initial near-term service concepts for Rapid service along the El Camino Real (ECR) corridor. Rapid service would be the first phase of service improvements proposed as part of the El Camino Real BRT Phasing Plan. These near-term service concepts define a potential operating plan for a Rapid service and the inter-relationship of Rapid service with current ECR and KX services. Details such as headways, spans of service, and specific stop locations are not defined at this stage, but will be developed once service concepts are agreed upon and consensus for moving forward obtained.

An initial set of eight service concepts are presented and qualitatively assessed against one another based on a set of initial screening criteria. These initial screening criteria were derived from goals and objectives proposed in the *Evaluation Framework Memo* (dated September 23, 2013) developed for this study.[1]

In summary, five of the eight service concepts passed initial screening and are recommended for more detailed service plan development. These five service plans will be assessed against the full evaluation framework described in the *Evaluation Framework Memo* to select a preferred Rapid service alternative.

Organization

This memo is divided into five sections:

- **Initial Rapid Service Concepts** – Introduces the eight Rapid service concepts and the operating relationship with ECR and the KX.
- **Phase 1 Evaluation Framework and Initial Screening Criteria** – Describes the two-phased evaluation framework process with a focus on the initial screening criteria and the linkage to the project goals and objectives.
- **Service Concept Evaluation vs. Screening Criteria** – Presents the evaluation results of the eight service concepts against the screening criteria.
- **Recommendations** – Presents the recommended service concepts to carry forward.

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[1] The detailed evaluation framework to assess Rapid and BRT alternatives was presented in the Evaluation Framework Memo from September 23, 2013. This memo will be referred to as the *Evaluation Framework Memo*.
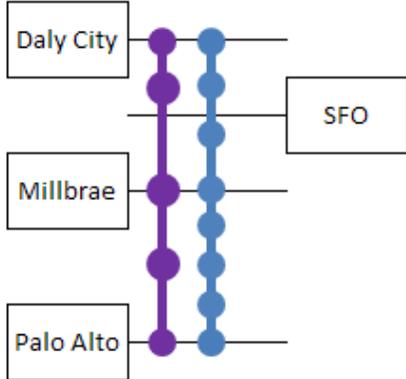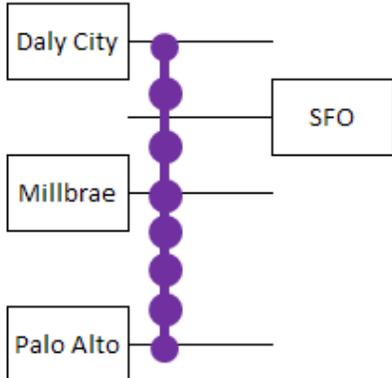
- **Next Steps** – Describes the next steps after consensus is obtained on the service concepts.
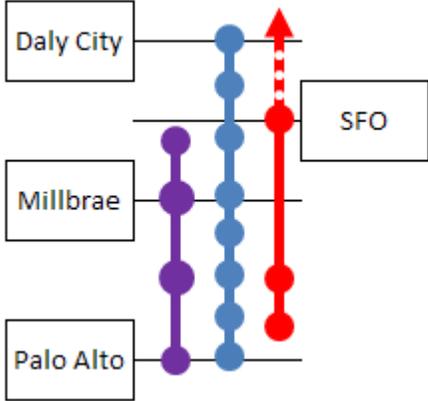
Initial Rapid Service Concepts

Based on an analysis of the existing corridor conditions including ridership, travel trends, and current ECR/KX service, eight service concepts for the ECR Corridor were developed. These are described in the following table. It is noted that further analysis of the KX travel patterns and temporal boarding profile is required:

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Table 1: Initial Near-Term Service Concepts

#	Concept	Description	Rapid Service	ECR Service	KX Service	Schematic Diagram (Concept Only) Purple = Rapid; Blue = ECR; Red = KX
1	Rapid / ECR / KX	• Rapid service is introduced into the corridor (~ 0.5-1.0 mile stop spacing) • ECR operates similar to today • KX operates per January 2014 runbook	X	X	X	Concept 1: Rapid / ECR / KX
2	Rapid / KX	• Rapid service is introduced into the corridor and absorbs ECR service • Stop spacing of Rapid (~0.3-0.5 miles) is shorter than that of a "typical" Rapid service due to Rapid's role as "local" route • KX operates per January 2014 runbook	X		X	Concept 2: Rapid/KX

| #	Concept	Description	Rapid Service	ECR Service	KX Service	Schematic Diagram (Concept Only) Purple = Rapid; Blue = ECR; Red = KX
3	Rapid / ECR	• Rapid service is introduced into the corridor (~0.5-1.0 mile stop spacing) • ECR operates similar to today • KX is discontinued • No direct service is provided to SFO (riders must transfer to BART at Millbrae/San Bruno)	X	X		 Concept 3: Rapid/ECR
4	Rapid Only	• Rapid service is introduced into corridor and absorbs ECR/KX service • Stop spacing (~0.3-0.5 mile stop spacing) is shorter than that for "typical" Rapid service due to Rapid's role as a "local" route • No direct service is provided to SFO (riders must transfer to BART at Millbrae/San Bruno)	X			 Concept 4: Rapid Only

#	Concept	Description	Rapid Service	ECR Service	KX Service	Schematic Diagram (Concept Only) Purple = Rapid; Blue = ECR; Red = KX
5	Split Rapid / ECR / KX	• Rapid service is introduced into corridor as two separate routes – possibly a northern Rapid and a southern Rapid • Split routes are feasible if travel demand analysis shows strong internal demand within the north and south parts of corridor, respectively, with low end-to-end demand • ECR operates similar to today • KX operates per January 2014 runbook	X	X	X	**Concept 5: Split Rapid** Green = Rapid North Purple = Rapid South
6	Overlap Rapid / ECR / KX	• Rapid service is introduced into corridor as two routes – possibly a northern Rapid and a southern Rapid – with overlapping service segments • Overlapping split routes are feasible if travel analysis shows split in demand between north and south parts of corridor, respectively, with strong demand along a shared segment in the middle of the corridor and low end-to-end demand • ECR operates similar to today • KX operates per January 2014 runbook	X	X	X	**Concept 6: Overlap Rapid** Green = Rapid North Purple = Rapid South

#	Concept	Description	Rapid Service	ECR Service	KX Service	Schematic Diagram (Concept Only) Purple = Rapid; Blue = ECR; Red = KX
7	Truncated Rapid / ECR / KX	• Rapid service is only introduced on a portion of the corridor (e.g., north/south half or two-thirds) • Truncated Rapid is feasible if most origin-destination activity focused on one portion of the corridor compared to the other • Truncated Rapid is also feasible if service is duplicated by BART or other regional transit service along a portion of the corridor • ECR operates similar to today • KX operates per January 2014 runbook	X	X	X	Concept 7: Truncated Rapid Daly City / SFO / Millbrae / Palo Alto
8	Hybrid Rapid / ECR / KX	• "Hybrid" Rapid service denotes *local* service (closely spaced stops) in high demand portions of the corridor and *limited-stop* service in low demand portions of the corridor. • Hybrid Rapid is feasible if demand warrants additional stops in high demand area (beyond those served by other Rapid service concepts) • Hybrid Rapid operates slower than other concepts except Concepts #2 and 4 • ECR operates similar to today • KX operates per January 2014 runbook	X	X	X	Concept 8: Hybrid Rapid Daly City / SFO / Millbrae / Palo Alto
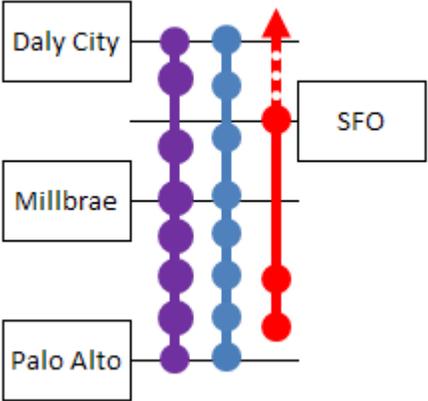
Phase 1 Evaluation Framework and Initial Screening Criteria

An initial set of goals and objectives for the ECR BRT Phasing Plan were defined in the *Evaluation Framework Memo*, which highlighted key evaluation criteria to assess the detailed service plans and arrive at a recommended service plan. The evaluation framework has been slightly refined to include a two-step process as follows:

- **Phase 1 Evaluation (Initial Screening)** – This evaluation represents a qualitative screening of service concepts to identify a shortlist of candidate concepts for more detailed development (e.g., elaboration on headways, spans of service, stop locations, travel times). A subset of representative screening criteria is used for this evaluation, based on the larger project goals and objectives identified in the *Evaluation Framework Memo*.
- **Phase 2 Evaluation (Detailed Analysis)** – This is a detailed, quantitative analysis of shortlist concepts that utilizes the VTA Model to estimate ridership, travel time, etc. This evaluation is based on the detailed evaluation framework established in the *Evaluation Framework Memo*.
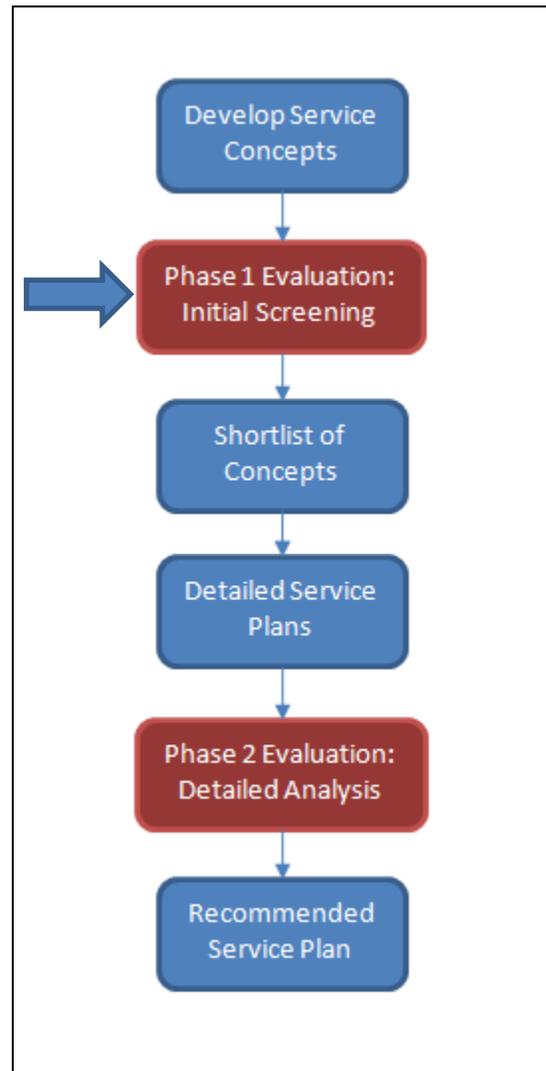
This section summarizes the initial screening criteria for the Phase 1 Evaluation. Each screening criterion is worth 1-3 points, with 3 being the top performing option, and 1 being the worst performing option. The score for each criterion is then summed up for a composite score by service concept.

The initial qualitative screening criteria are as follows:

Table 2: Phase 1 Screening Criteria for Service Concepts

ID	Screening Criteria	Qualitative Assessment	Relationship to Project Goals & Objectives
A	Faster Service	• Is service improved for existing users? • Are new users attracted to the service?	• Goal 1 - Objectives 1.1/1.2
B	Ease of Use	• Is the service easy to understand? • Is a one-seat ride provided? • Is the service confusing (i.e., which destinations are served)?	• Goal 1 – Objective 1.2
C	Access to Transit	• Is access for existing users maintained and/or improved? • Is greater access provided for potential new riders and new destinations?	• Goal 2 – Objectives 2.2/2.3
D	Need for Additional SamTrans Resources	• Are significantly more resources required than currently needed (e.g., vehicles, drivers, costs)?	• Goal 3 – Objective 3.2
E	Operating Efficiency	• Is reliability and efficiency improved (i.e., on-time performance, less variable travel times, reduced travel time, etc.)? • Does the concept allow for more flexibility in resource deployment to meet targeted demand (i.e., can resources be targeted at highest activity areas or markets with greatest potential)? • Does the service accommodate interlining efficiencies?	• Goal 1 – Objective 1.2 • Goal 3 – Objective 3.2

Service Concept Evaluation vs. Screening Criteria

Each of the eight service concepts is assessed against the five initial screening criteria. The tables below summarize the results and provide insight into the performance of a given service plan against select criteria.

Table 3: Evaluation of Service Concepts vs. Initial Screening Criteria

#	Service Concept	Faster Service	Ease of Use	Access to Transit	Need for Additional SamTrans Resources	Operating Efficiency
1	Rapid / ECR / KX	• **Good** - Rapid operates faster service than today's ECR with limited stops, while ECR handles local service.	• **Good** – Three distinct routes with direct, one-seat rides on Rapid, Local and KX.	• **Good** – Maintains ECR service for existing riders and introduces Rapid to capture new riders. KX continues to provide local connectivity in the south of the corridor, and long-distance service to SFO and San Francisco.	• **Poor** – New Rapid route is operated along the entire corridor, while ECR and KX maintained, increasing resources needed.	• **Moderate** – Rapid operates along the entire corridor, which makes it subject to higher delay and lower reliability than shorter Rapid routes.
2	Rapid / KX	• **Moderate** – Rapid serves some additional ECR stops and operates slower than Concept 1 (but still faster than today's ECR service).	• **Poor** – Customers may be confused over what stops are now served by the Rapid.	• **Poor** – Introduces new Rapid service, maintains KX, but cancels the ECR. Existing riders could be significantly impacted by eliminating stops previously served by ECR.	• **Good** – Rapid service replaces ECR, but operates faster and likely requires fewer resources.	• **Poor** – Rapid operates along the entire corridor and must also serve most ECR passengers, thus making significantly more stops than other Rapid service options (and encountering additional delay contributing to low reliability).
3	Rapid / ECR	• **Good** - Rapid operates faster service than today's ECR with limited stops, while ECR handles local service.	• **Good** – Two distinct routes with direct, one-seat rides	• **Moderate** – Maintains ECR service for existing riders and introduces Rapid to capture new riders. KX long-distance users impacted and must use alternate service to reach SFO and San Francisco.	• **Moderate**– New Rapid route is operated along the entire corridor, while ECR is maintained, increasing resources needed (despite potential KX resources being reallocated to the Rapid).	• **Moderate** – Rapid operates along the entire corridor, which makes it subject to higher delay and lower reliability than shorter Rapid routes.
4	Rapid Only	• **Moderate** – Rapid serves some additional ECR stops and operates slower than Concept 1 (but still faster than today's ECR service).	• **Poor** – While only one route operates on the corridor, customers may be confused over what stops are now served by the Rapid.	• **Poor** – Introduces new Rapid service, but cancels ECR or KX. Existing riders could be significantly impacted by eliminating stops previously served by ECR. KX long-distance users impacted and must use alternate service to reach SFO and San Francisco.	• **Good** – Rapid service replaces ECR and KX and likely requires fewer resources. Concept 4 would perform better than Concept 2.	• **Poor** – Rapid operates along the entire corridor and must also serve most ECR passengers, thus making significantly more stops than other Rapid service options (and encountering additional delay contributing to low reliability).
5	Split Rapid / ECR / KX	• **Good** - Rapid operates faster service than today's ECR with limited stops, while ECR handles local service.	• **Moderate** – Four routes operate on the corridor and the Rapid has a north and south branch which may be confusing. One seat rides possible for longer-distance riders on ECR and KX.	• **Good** – Maintains ECR/KX services for existing riders and introduces Rapid to capture new riders.	• **Moderate** – New Rapid routes operate on a portion of the corridor, while ECR and KX are maintained. Concept 5 performs better than Concept 1 since resources could be deployed to select high activity segments (and potentially reduce overall operating requirements).	• **Good** – Shorter Rapid routes are less subject to delay and variability. Also, this concept allows more service to be concentrated in core market areas.

#	Service Concept	Faster Service	Ease of Use	Access to Transit	Need for Additional SamTrans Resources	Operating Efficiency
6	Overlap Rapid / ECR / KX	• **Good** - Rapid operates faster service than today's ECR with limited stops, while ECR handles local service.	• **Moderate** – Four routes and two Rapid branches operate on the corridor, potentially confusing riders. One seat rides possible for longer-distance riders on ECR and KX.	• **Good** – Maintains ECR/KX services for existing riders and introduces Rapid to capture new riders.	• **Moderate** – New Rapid routes operate on a portion of corridor, while ECR and KX are maintained. Concept 6 performs better than Concept 1 since resources could be deployed to select high activity segments (and potentially reduce overall operating requirements).	• **Good** – Shorter Rapid routes are less subject to delay and variability. Also, this concept allows more service to be concentrated in core market areas.
7	Truncated Rapid / ECR / KX	• **Good** - Rapid operates faster service than today's ECR with limited stops, while ECR handles local service.	• **Moderate** – Three routes and the truncated Rapid operate on the corridor, potentially confusing riders. One seat rides possible for longer-distance riders on ECR and KX.	• **Good** – Maintains ECR/KX services for existing riders and introduces Rapid to capture new riders.	• **Moderate** – New Rapid route operates on a portion of corridor, while ECR and KX are maintained. Concept 7 performs better than Concept 1 since resources could be deployed to select high activity segments (and potentially reduce overall operating requirements).	• **Good** – Shorter Rapid route is less subject to delay and variability. Also, this concept allows more service to be concentrated core market areas.
8	Hybrid Rapid / ECR / KX	• **Moderate** – Rapid serves some additional ECR stops and operates slower than Concept 1 (but still faster than today's ECR service).	• **Good** – Three distinct routes with direct, one-seat rides on Rapid, Local and KX.	• **Good** – Maintains ECR service for existing riders and introduces Rapid to capture new riders. KX continues to provide local connectivity in the south of the corridor, and long-distance service to SFO and San Francisco.	• **Poor** – Hybrid Rapid route is operated along the entire corridor with longer run times than Rapid services due to additional local stops increasing required resources. Furthermore, ECR and KX are maintained.	• **Moderate** – Hybrid Rapid operates along the entire corridor. Hybrid Rapid serves local stops in high demand areas, but limited stop service in all other areas. Thus, the Hybrid Rapid makes more stops than other Rapid service options (and encountering additional delay and contributing to low reliability). Hybrid Rapid is flexible in that service is scalable to meet demand (by removing or adding stops as warranted).

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Table 4: Summary of Service Plan Performance and Composite Scores

#	Service Concept	Initial Screening Criteria					Composite Score
		Faster Service	Ease of Use	Access to Transit	Need for Additional SamTrans Resources	Operating Efficiency	
		A	B	C	D	E	
1	Rapid/ECR/KX	■	■	■	☐	◪	12
2	Rapid/KX	◪	☐	☐	■	☐	8
3	Rapid/ECR	■	■	◪	◪	◪	12
4	Rapid Only	◪	☐	☐	■	☐	8
5	Split Rapid	■	◪	■	◪	■	13
6	Overlap Rapid	■	◪	■	◪	■	13
7	Truncated Rapid	■	◪	■	◪	■	13
8	Hybrid Rapid	◪	■	■	☐	◪	11

Scoring Scale:

■	◪	☐
Highest Performing (3 Points)	Moderate Performing (2 Points)	Lowest Performing (1 Point)

Key findings are as follows:

- The Split/Overlap/Truncated Rapid service concepts scored the highest with a composite score of 13 points. These options perform similarly for all five criteria, but perform best in providing faster service, access to transit, and operating efficiency. These three concepts scored higher in operating efficiency than other service concepts in which the Rapid operates along the entire corridor, rather than along a portion of it.
- The Rapid/ECR/KX and Rapid/ECR service concepts scored 12 points each, with high performance in faster service, ease of use, and access to transit. As noted, both these options operate the Rapid along the entire length of the corridor, thereby potentially subjecting the service to more variability and travel time delay.
- The Hybrid Rapid service concept scored 11 points, largely due to poor performance in the need for additional resources and moderate scores in faster service and operating efficiency. This service would provide limited stops in low demand areas, but operate local service in high demand areas, requiring additional resources when compared to the Split/Overlap/ Truncated Rapid and Rapid/ECR/KX service concepts.
- The Rapid/KX and Rapid Only service concepts scored the lowest at 8 points each. While each of these concepts performs well in reducing the need for additional SamTrans resources,

they perform poorly in terms of maintaining access for current passengers as the ECR would be absorbed into the Rapid and some current ECR stops would be eliminated.

Recommendations

Based on the findings above, the following concepts are recommended for detailed analysis in Phase 2.

Table 5: Recommended Service Concepts for Detailed Planning/Analysis

#	Service Concept	Carry Forward for Detailed Analysis	Notes
1	**Rapid/ECR/KX**	**YES**	• **Carry forward and include Concept 3 as a variant.** • **Further analysis of KX service required.**
2	Rapid/KX	NO	• Do not carry forward as elimination of the ECR would require the Rapid to stop much more frequently, but also eliminates many local bus stops currently in use by ECR riders.
3	**Rapid/ECR**	**YES**	• **Carry forward, but as a variant of Concept 1.**
4	Rapid Only	NO	• Do not carry forward as elimination of the ECR would require the Rapid to stop much more frequently, but also eliminates many local bus stops currently in use by ECR riders.
5	**Split Rapid**	**YES**	• **Carry forward.** • **Consider combining Concepts 5 & 6 into a single concept with Split and Overlap Rapid variants.**
6	**Overlap Rapid**	**YES**	
7	**Truncated Rapid**	**YES**	• **Carry forward.**
8	**Hybrid Rapid**	**YES**	• **Carry forward.**

Note: It is noted that additional service variants may be apparent after analysis of travel markets.

Next Steps

The next steps for this analysis are:

• Further assess the KX boarding and alighting data to determine potential impacts of canceling or modifying service;
• Obtain VTA Model select link and select zone analysis to determine relative market feasibility of various service concepts (including the Split Rapid, Overlap Rapid, and Truncated Rapid concepts);

- Finalize Existing Conditions and Future Conditions studies;
- Present service concepts to SamTrans Operations on October 30, 2013; and
- Develop service plans for the four service concepts by January 28, 2014 (as noted market analysis may show the market for other service variants within the family of alternatives identified in Table 5).