LINK21

CONNECT NORTHERN CALIFORNIA

PRELIMINARY BUSINESS CASE REPORT

APPENDIX B: DRAFT ROUND 1 EVALUATION REPORT EXECUTIVE SUMMARY

December 2023

Prepared By:
Link21 Program Management Consultants (PMC)

BART

CAPITOL CORRIDOR

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Issue and Revision Record

REVISION	DATE	PREPARERS	PMC REVIEWER / BART/CCJPA REVIEWER	PMC APPROVER / BART/CCJPA APPROVER	DESCRIPTION/ NOTES
0	06/30/2023	Jonathan Tong; Shamai Cohen; Sara Steinberger; Mike Snavely; Emily Alter, Steer	Richard Batty, Steer	Peter Gertler, HNTB	Initial Working DRAFT
	07/13/2023		Andrew Tang, BART	Andrew Tang, BART	Initial Working DRAFT review
1	12/14/2023	Jonathan Tong, Steer	Elisa Tejedor, Steer	Peter Gertler, HNTB	Working DRAFT submittal
	12/16/2023		Andrew Tang, BART	Andrew Tang, BART	Working DRAFT submittal review
2	12/22/2023	Jonathan Tong, Steer	Elisa Tejedor, Steer	Elisa Tejedor, Steer	DRAFT submittal
					No review requirement

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Acronyms and Abbreviations

ACRONYM/ABBREVIATION	DEFINITION
BART	San Francisco Bay Area Rapid Transit District
CCJPA	Capitol Corridor Joint Powers Authority
JLS	Jack London Square
SFO	San Francisco International Airport
STC	Salesforce Transit Center

Link21 Program Team Names

TEAM NAME	TEAM MEMBERS
Program Management Consultants (PMC)	The HNTB Team
Program Management Team (PMT)	BART/CCJPA + PMC
Consultants	Consultants supporting program identification/project selection
Link21 Team	PMT + Consultants

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Glossary of Terms

TERM	DEFINITION
Baseline	The Baseline is a future scenario against which benefits, costs, and risks of the Crossing Project over the project life cycle are evaluated. The Baseline adopts future planning assumptions relating to demographics, transportation network and policies consistent with Plan Bay Area 2050 and other adopted regional transportation plans in the Northern California Megaregion.
BART (technology/track type)	The technology and track type that is used by BART within its own, closed system of facilities and right-of-way. From an infrastructure perspective, BART is a single-level vehicle on broad-gauge tracks that is powered by electricity using a third rail system. BART uses this technology/track type to provide Urban/Metro rail transit services.
BART Crossing Concept	A new transbay passenger rail crossing concept that uses BART technology. A BART crossing concept may have improvements to the Regional Rail network. If the crossing uses BART technology, it should connect, at a minimum, to existing BART infrastructure in the East Bay and serve downtown San Francisco.
Crossing Project	A new transbay passenger rail crossing between San Francisco and Oakland, including connections back to the existing rail network on either side of the San Francisco Bay and additional improvements away from the crossing to provide higher levels of train service in the crossing, as needed.
East Bay	The area adjacent to the eastern shores of the San Francisco Bay and San Pablo Bay from Richmond/Hercules in the north to Fremont/Berryessa/North San Jose in the south.
Exploratory Concept (Exploratory Evaluation)	Early definitions of concepts for the Exploratory Evaluation. Exploratory Concepts were refined based on the Exploratory Evaluation results before becoming Initial Concepts that were evaluated in Round 1.
Exploratory Evaluation	High-level evaluation of a series of Exploratory Concepts that uses the Initial TDLU Tool and select key metrics to understand the relative performance of concept features to generate Initial Concepts that were evaluated in Round 1.
Initial Concept (Round 1)	A developed idea consisting of a new transbay passenger rail crossing with an identified rail vehicle technology, markets accessed through existing or potential new stations, a conceptual service plan, and associated infrastructure required. Concepts were evaluated in Round 1 to inform the development of the Representative Concepts to be evaluated in Round 2 and options to be considered following Stage Gate 2.

TERM	DEFINITION
Intercity | Express Rail Service	A type of service for medium to long trips that connects regions, as well as urban and rural communities, at lower frequencies and higher average speeds compared with Urban | Metro rail services. Operators like Capitol Corridor, Amtrak, Altamont Corridor Express, and others provide this service on shared Regional Rail/standard gauge tracks sometimes owned by private rail.
North Branch (for Regional Rail)	The area north of downtown Oakland in the East Bay that is along the Capitol Corridor alignment, including the Emeryville, Berkeley, and Richmond corridor.
Northern California Megaregion	The 21-county area that comprises Alameda, Contra Costa, El Dorado, Marin, Merced, Monterey, Napa, Placer, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Yolo, and Yuba counties.
Peninsula	The areas south of San Francisco that are adjacent to the San Francisco Bay, including San Mateo County, the northwestern parts of Santa Clara County, and Silicon Valley.
Preliminary Project	The improvements to be recommended for advancement at Stage Gate 2 will consist of an identified rail technology in the crossing (BART or Regional Rail) for service delivery, potential extents (geographic limits) of the improvements, and a set of options that will frame forthcoming feasibility studies and engagement with communities, stakeholders, and the public. Once approved, it will form the basis for work to define a Project (and the identification of any Alternatives) ready for Environmental Review at Stage Gate 3. "Preliminary project" is to be used for the concept that is recommended at Stage Gate 2 and advanced to further development, but not for the sets of improvements before Stage Gate 2; those improvements are still to be referred to as "Concepts."
Priority Populations	Census tracts where people are most impacted by negative economic, mobility, community, and health and safety outcomes. Further details can be found in the document Priority Populations - An Updated Definition for Link21.
Red Line	BART Richmond – Millbrae + SFO (San Francisco International Airport) service

TERM	DEFINITION
Regional Rail (technology/track type)	A technology and track type used by multiple agencies on an interconnected rail network throughout the Megaregion. From an infrastructure perspective, Regional Rail is a single or bi-level vehicle on standard-gauge tracks that is sometimes powered by electricity using an overhead catenary system. Regional Rail infrastructure is owned in some cases by the passenger operator (e.g., Caltrain from San Francisco to San José) and in other cases a freight operator (e.g., Capitol Corridor mostly operates on Union Pacific Railroad right-of-way). On this technology and track type, operators provide two types of service: Intercity | Express and Urban | Metro. Several types of train vehicles can operate on this network, but BART cannot.
Regional Rail Crossing Concept (Rounds 1 and 2)	A new passenger rail service concept that uses Regional Rail (standard gauge) technology. A Regional Rail crossing concept may have improvements to the BART network. If the crossing uses Regional Rail technology, it should connect, at a minimum, to existing Regional Rail infrastructure in San Francisco and the East Bay.
Representative Concept (Round 2)	A high-performing concept that is a reasonable representation of the crossing technology. Representative Concepts will be subject to detailed evaluation in Round 2 to inform the identification of a crossing technology, and then further advanced to a Preliminary Project for Stage Gate 2.
Round 1	The evaluation of the Initial Concepts to develop (one or more) high-performing Representative Concept(s) for each crossing technology to be evaluated in Round 2.
Round 2	The evaluation of Representative Concepts to select a crossing technology and to identify a Preliminary Concept to advance at Stage Gate 2.
South Branch (for Regional Rail)	The area south of downtown Oakland in the East Bay that is along the Capitol Corridor alignment, including the Jack London and Coliseum corridors.
Transbay	Refers to crossing the San Francisco Bay, specifically between San Francisco and Oakland.
Urban | Metro Rail Service	A type of service that operates within metro regions at higher frequencies and medium average speeds. BART currently provides this service. Caltrain will provide this type of service with its modern, electrified trains starting in 2024.
Variant	Variants are concepts that are similar to the Exploratory Concepts, Initial Concepts or Representative Concepts, but they have minor differences to specific features, such as service, markets, and/or infrastructure.
Yellow Line	BART Antioch – SFO + Millbrae service

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Important Notice

This document is the Executive Summary of Appendix B to the *Preliminary Business Case Report*, which is expected to be complete in early 2024. This document has been made available to the public, in draft form, for informational purposes in advance of the *Preliminary Business Case Report*.

Other reports referred to in this document may still be under development. In due course, an updated version of this document with complete links to reference documents will be made available alongside the *Preliminary Business Case Report*.

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Executive Summary

Background

The objective of the Round 1 Evaluation was to identify high-performing features, such as potential markets to serve, service frequencies, and concept extents, at the strategic level. Round 1 built on the findings from the Exploratory Evaluation, and it developed a number of potential Link21 Program (Link21) San Francisco Bay Area Rapid Transit District (BART) and Regional Rail[1] crossing concepts and variants[2] for further consideration. The evaluation findings enabled the refinement of crossing technology concepts for further evaluation in the Representative Concept[3] Evaluation (Round 2).

These BART and Regional Rail crossing concepts and variants were evaluated in line with the Link21 business case principles. Benefits, costs, and risks of concepts and variants over the new transbay passenger rail crossing project (Crossing Project) life cycle were evaluated against a 2050 Baseline scenario that includes *Plan Bay Area 2050* and other metropolitan planning organization regional plan growth assumptions, policies, and transit enhancements but excludes the Crossing Project. The performance of each concept was evaluated against the Link21 goals and objectives within the Strategic Case, as well as the Financial, Economic, and Deliverability cases.

These findings are summarized in the following sections.

Overview of Initial Concepts and Variants

Several BART and Regional Rail crossing concepts were evaluated in Round 1. All initial concepts included a new transbay passenger rail crossing between San Francisco and Oakland.

In addition to these concepts, the Link21 Team also evaluated a number of concept "variants" to understand the incremental performance of minor changes. These variants are concepts that are similar to the initial concepts, but they have minor differences to specific features, such as service, markets, and/or infrastructure.

[1] Could include intercity, commuter, or high-speed rail.
[2] Variants are concepts that are similar to the Initial Concepts, but they have minor differences to specific features, such as service, markets, and/or infrastructure.
[3] A Representative Concept is a high-performing concept that is a reasonable representation of the crossing technology. Representative Concepts will be subject to detailed evaluation in Round 2 to inform the identification of a crossing technology, and then further advanced to a Preliminary Project for Stage Gate 2.

Initial BART Concepts

All BART crossing concepts included new BART infrastructure between and within the downtown San Francisco and Oakland areas, and they connected with existing BART services that also would receive frequency improvements on select routes. The BART crossing concept variants considered routing services to the Salesforce Transit Center (STC) via Mission Bay and shifting services between the Yellow and the Red[4] lines. In downtown San Francisco, it should connect with the Regional Rail network for transfers between BART and Caltrain services. A BART crossing concept may have improvements to the Regional Rail network to better integrate the BART and Regional Rail networks.

BART crossing concepts would support an Urban | Metro rail service through the crossing, including other ancillary BART and Regional Rail crossings in the Peninsula and the East Bay. This is a type of service that operates within metro regions at higher frequencies and medium average speeds. BART currently provides this type of service, and Caltrain will provide this type of service starting in 2024 with its modern, electrified trains.

There are two initial BART crossing concepts that were advanced for further study:

1. **Concept C: BART STC** (from a new station near the STC to a new Alameda station)
2. **Concept D: BART Mission Bay** (from a new 3rd and Mission station to a new Alameda station).

The following sections provide a brief overview and schematic map (**Figure 1 and Figure 2**) for each BART concept.

[4] The Yellow Line is BART Antioch – SFO (San Francisco International Airport) + Millbrae service, and the Red Line is BART Richmond – Millbrae + SFO service.

Concept C: BART STC – BART Downtown San Francisco via Alameda

Concept C would be a new BART crossing from a new station near the STC to a new Alameda station. It would extend north to the MacArthur Station via new Jack London Square and downtown Oakland stations and south to a new station at San Antonio. Transfers to Regional Rail would be available at a new station near the STC and Jack London Square.

Figure 1. Concept C: BART STC Map

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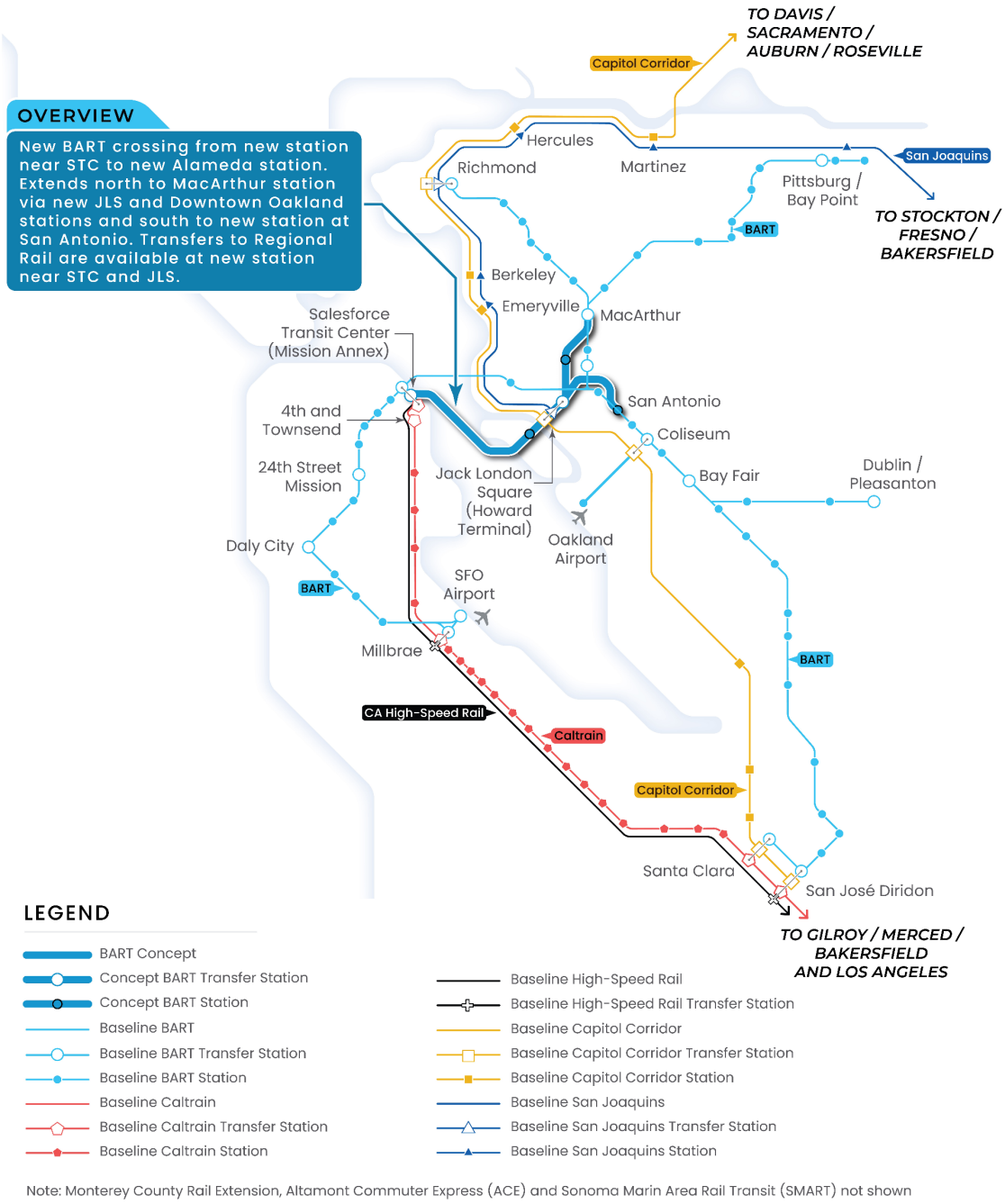


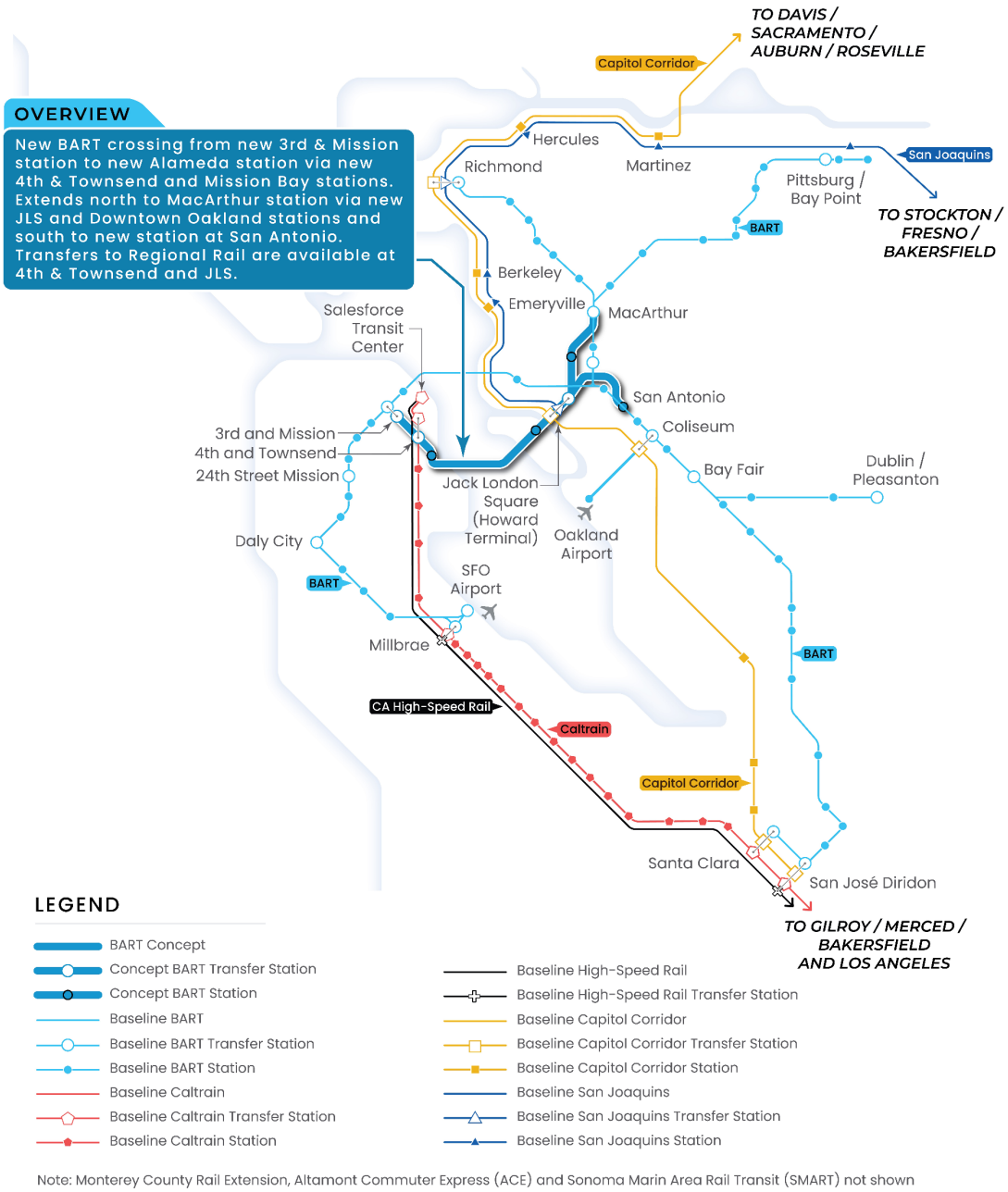
Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Concept D: BART Mission Bay – BART Downtown San Francisco via Mission Bay and Alameda

Concept D would be a new BART crossing from a new 3rd and Mission station to a new Alameda station via new 4th and Townsend and Mission Bay stations. It would extend north to the MacArthur Station via new Jack London Square and downtown Oakland stations and south to a new station at San Antonio. Transfers to Regional Rail would be available at 4th and Townsend and Jack London Square.

Figure 2. Concept D: BART Mission Bay Map

CONCEPTUAL. SUBJECT TO CHANGE. NOT TO SCALE.



Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

BART Evaluation Findings

The evaluation of BART crossing concepts resulted in the following findings:

- A BART crossing to downtown San Francisco via Mission Bay generated higher ridership than connecting directly to downtown San Francisco by providing new rail service to/from an area expected to experience high growth by 2050.
- A BART crossing direct to downtown San Francisco or via Mission Bay reduced potential future crowding in the existing crossing.
- A BART crossing generated substantial benefits for priority populations throughout the Bay Area, and priority populations generally received their proportional share of concept benefits.
- A BART to Mission Bay via downtown San Francisco route generated slightly higher ridership and benefits compared with a BART to downtown San Francisco via Mission Bay route. However, routing BART to Mission Bay via downtown San Francisco would likely make implementing a potential future extension to Western San Francisco less efficient.
- The evaluation of the BART crossing concept variants identified that shifting services from the Yellow Line to the Red Line in the East Bay generated more transbay rail ridership and benefits for priority populations.

Initial Regional Rail Concepts

All Regional Rail crossing concepts included new Regional Rail infrastructure between Hercules and the Coliseum and the Crossing Project. Regional Rail crossing concept variants included higher frequencies for rail services, different infrastructure, service extent variants on the North Branch,[5] and additional transbay rail services south of the STC. A Regional Rail concept may have improvements to the BART network to better integrate the BART and Regional Rail networks.

All Regional Rail crossing concepts will enable two types of service between Oakland and downtown San Francisco, including other ancillary improvements to BART and Regional Rail in the Peninsula and the East Bay:

- **Intercity | Express** is a type of service for medium to long trips that connects regions, as well as urban and rural communities, at lower frequencies and higher average speeds. Services that currently terminate in downtown Oakland or San Francisco in the Baseline would extend across the San Francisco Bay via a new Regional Rail crossing. Intercity | Express operators like Capitol Corridor, Amtrak,

[5] North Branch refers to the area north of downtown Oakland in the East Bay that is along the Capitol Corridor alignment, including the Emeryville, Berkeley, and Richmond corridor.

Altamont Corridor Express (ACE), and others currently provide this service on shared tracks owned by private freight rail.

- **Urban | Metro** is a type of service that operates within metro regions at higher frequencies and medium average speeds. Services would be offered between downtown San Francisco, downtown Oakland, the North Branch corridor (to Emeryville, Berkeley, and Richmond), and the South Branch[6] corridor (to Jack London Square and the Coliseum).

There are four initial Regional Rail crossing concepts that were advanced for further study:

1. **Concept A: RR JLS** (from the STC to Hercules via Alameda plus grade separation at Jack London Square and ending at Coliseum)
2. **Concept B: RR Port** (from the STC to Hercules via the Port plus grade separation at Jack London Square and ending at Coliseum)
3. **Concept E: RR MacArthur** (from the STC to Hercules via Alameda plus grade separation at Jack London Square and ending at Coliseum; includes a branch connecting to the MacArthur Station)
4. **Concept F: RR Oakland CC** (from the STC to Hercules via Alameda plus grade separation at Jack London Square and ending at the Coliseum; includes a transfer at the 12th St./Oakland City Center Station)

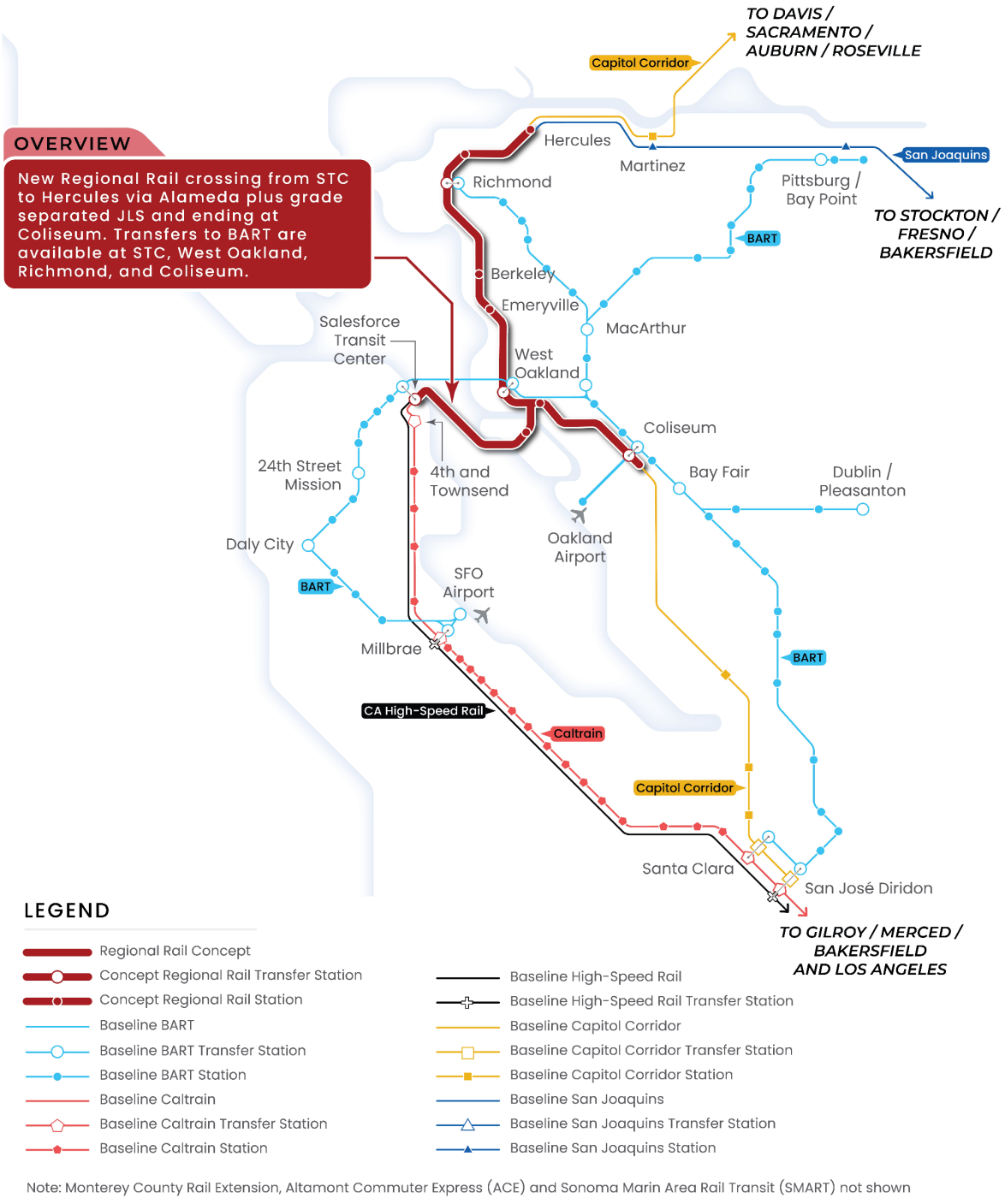
The following sections provide a brief overview and schematic map (**Figure 3 to Figure 6**) for each Regional Rail concept.

[6] South Branch refers to the area south of downtown Oakland in the East Bay that is along the Capitol Corridor alignment, including the Jack London and Coliseum corridors.

Concept A: RR JLS – Regional Rail STC to Jack London District via Alameda

Concept A would be a new Regional Rail crossing from the STC to Hercules via Alameda plus a grade separation at Jack London Square, and it would end at the Coliseum. Transfers to BART would be available at the STC, West Oakland, Richmond, and Coliseum stations.

Figure 3. Concept A: RR JLS Map



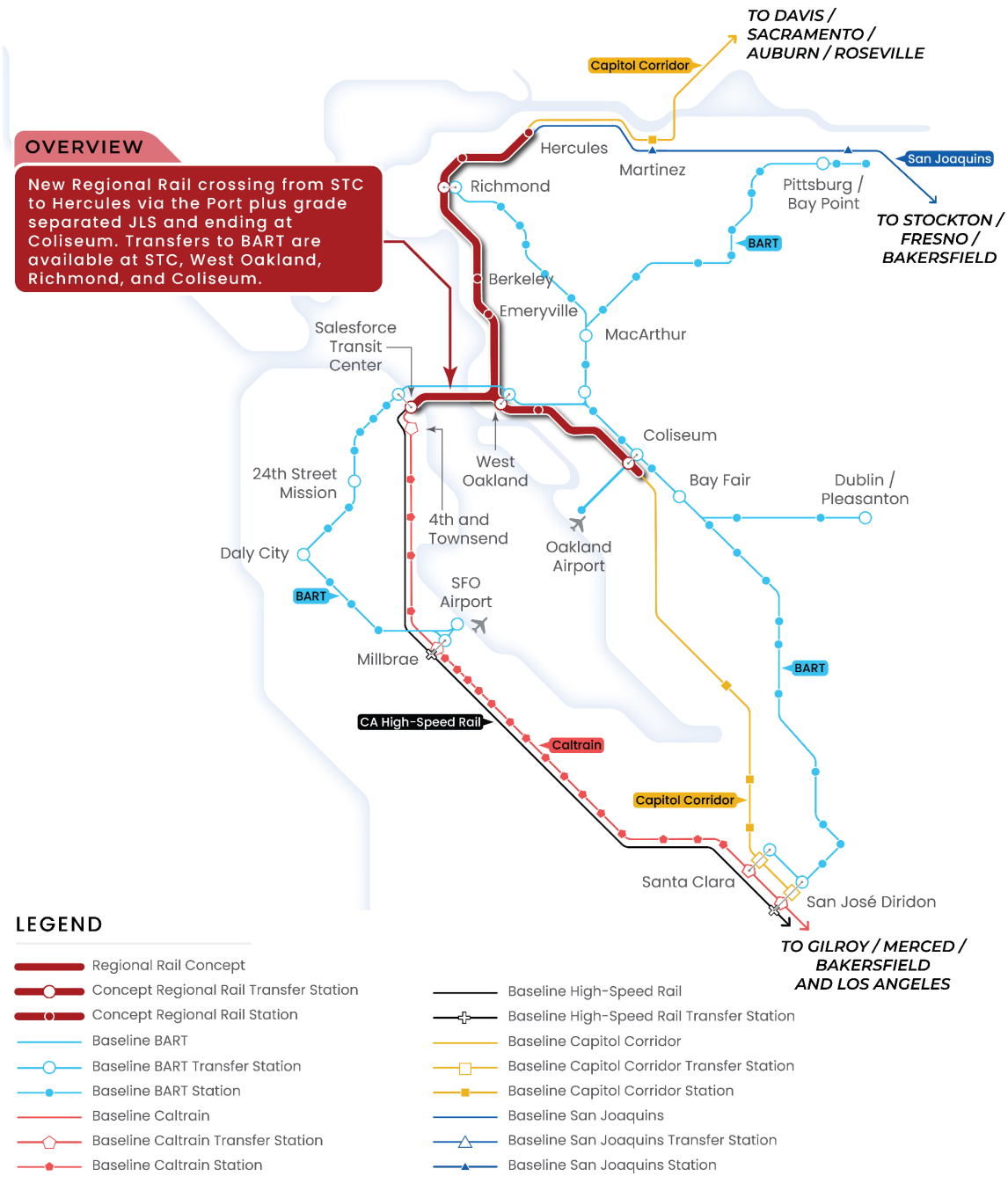
Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Concept B: RR Port – Regional Rail STC via Port of Oakland

Concept B would be a new Regional Rail crossing from the STC to Hercules via the Port plus a grade separation at Jack London Square, and it would end at the Coliseum. Transfers to BART would be available at the STC, West Oakland, Richmond, and Coliseum stations.

Figure 4. Concept B: RR Port Map

CONCEPTUAL. SUBJECT TO CHANGE. NOT TO SCALE.

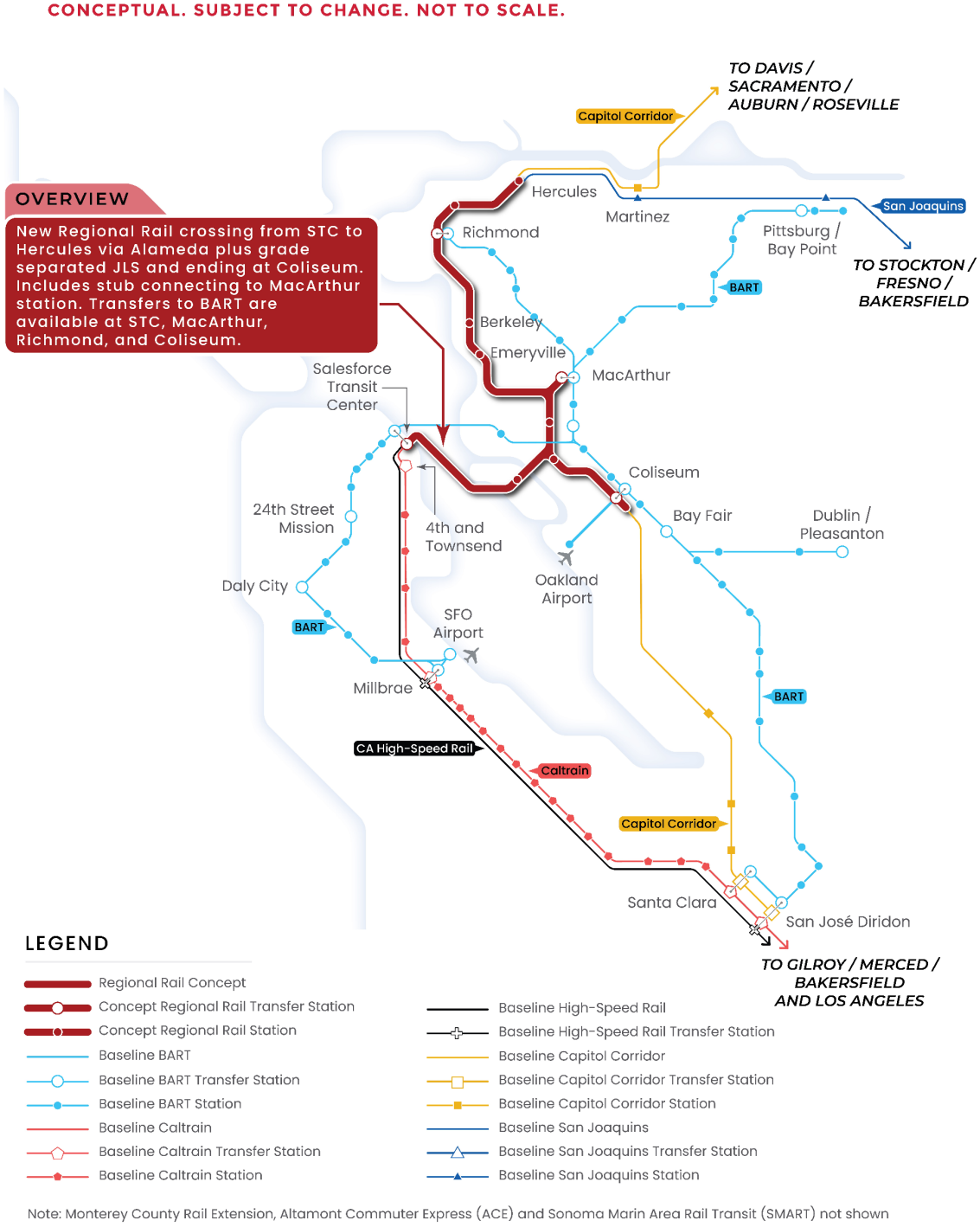


Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Concept E: RR MacArthur – Regional Rail STC to MacArthur via Alameda

Concept E would be a new Regional Rail crossing from the STC to Hercules via Alameda plus a grade separation at Jack London Square, and it would end at the Coliseum. Also, it includes a branch connecting to the MacArthur Station. Transfers to BART would be available at the STC, MacArthur, Richmond, and Coliseum stations.

Figure 5. Concept E: RR MacArthur Map



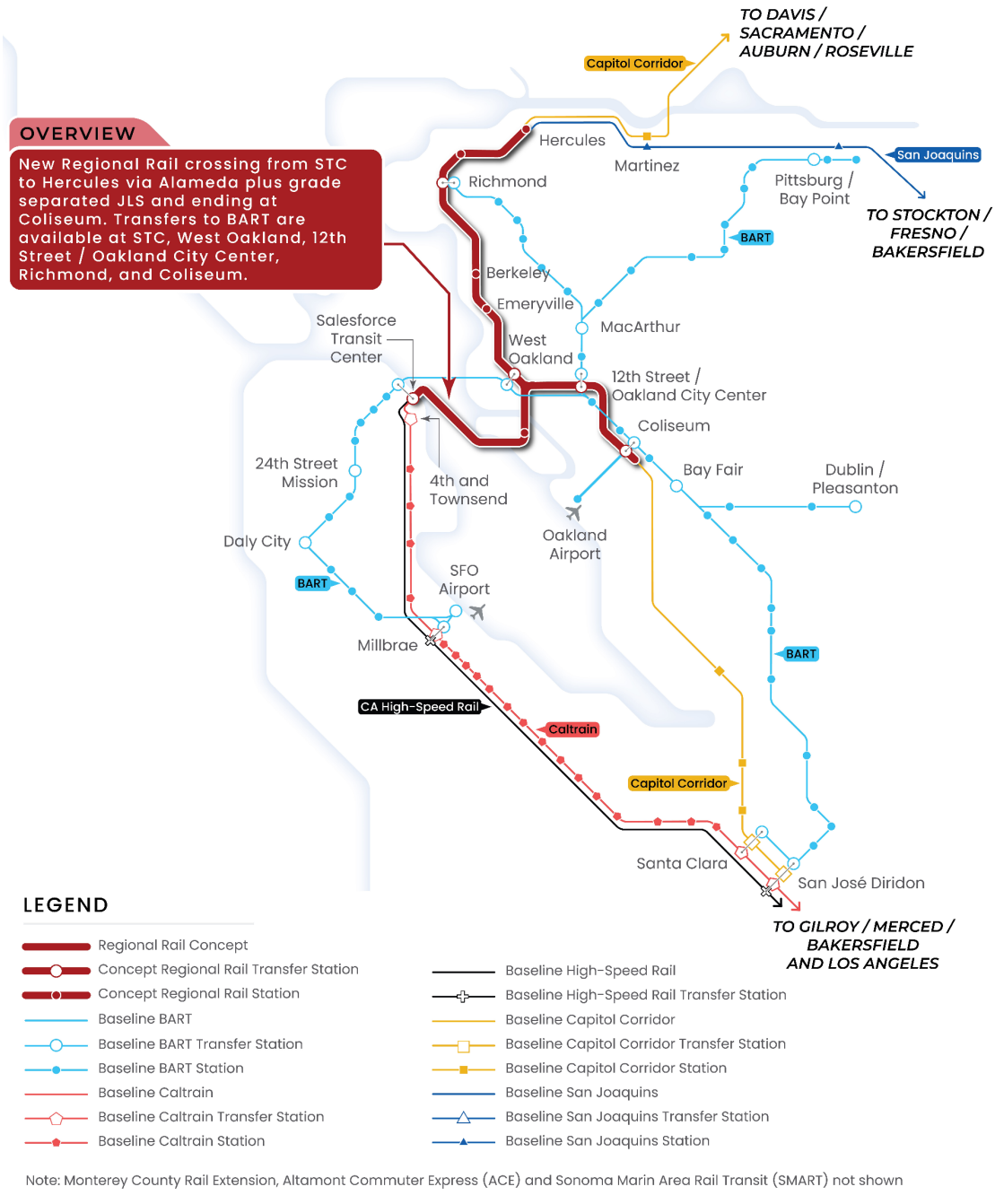
Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Concept F: RR Oakland CC – Regional Rail STC to Oakland City Center via Alameda

Concept F would be a new Regional Rail crossing from the STC to Hercules via Alameda plus a grade separation at Jack London Square, and it would end at the Coliseum. Transfers to BART would be available at the STC, West Oakland, 12th St./Oakland City Center, Richmond, and Coliseum stations.

Figure 6. Concept F: RR Oakland CC Map

CONCEPTUAL. SUBJECT TO CHANGE. NOT TO SCALE.



Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Regional Rail Evaluation Findings

The evaluation of Regional Rail crossing concepts resulted in the following findings:

- Fast and direct service between the North Branch and downtown San Francisco was a key driver of Regional Rail's high ridership and improved overall accessibility benefits, including access to jobs and important community resources.
- The Regional Rail crossing concept via the Port of Oakland delivered the greatest benefits for the lowest cost, but it provided less new rail access to residents compared to other concepts.
- Service alignment through Alameda enabled access to new markets, but it could reduce ridership potential from the North Branch by increasing travel time between these areas and downtown San Francisco.
- All Regional Rail crossing concepts directed over half the project benefits to priority populations.
- Due to the high concentration of priority populations from West Oakland to Richmond, fast and direct Regional Rail services (as in the concept via the Port of Oakland) provided the greatest level of overall benefits to these communities.
- A transfer station at the 12th St./Oakland City Center Station provided important system redundancy in the event of a Transbay Tube closure.
- Frequent service plans generated additional ridership and reduced potential future crowding, particularly around the North Branch and in the existing transbay crossing.
- Service extensions north beyond Richmond showed limited improvement to ridership and priority populations benefits, had substantial cost, and lowered cost-effectiveness.
- Regional Rail transbay service increases south of downtown San Francisco (to Millbrae via Bayview) generated substantial new ridership (over half of which was transbay), substantially reduced potential future crowding on existing Caltrain services, and delivered the greatest overall benefits to priority populations.
- Vehicle miles traveled reduction and rail mode share were not key differentiators between Regional Rail crossing concepts at this stage of the assessment.
- Deliverability case metrics were generally similar across the Regional Rail crossing concepts and were necessarily at a high level at this stage of the assessment.

Recommendations

The Round 1 evaluation identified a number of key findings that will inform development of the Representative Concepts for the Round 2 evaluation. These BART and Regional Rail findings are summarized in the BART and Regional Rail Evaluation Findings sections, respectively. The recommendations that were developed from these findings are summarized in the following sections.

BART Crossing Recommendations

The evaluation of the BART crossing concepts and variants led to the following key recommendations to inform the development of the BART Representative Concept for further assessment in Round 2:

- Advance the downtown San Francisco via Mission Bay and Alameda concepts to serve new markets, grow transbay ridership, and reduce potential future passenger crowding.
- Undertake further analysis to identify potential equity improvements to better serve priority populations.
- Perform further analysis to understand the potential impacts of shifting some existing services from the Yellow Line to the Red Line to grow transbay ridership, expand access to jobs, and improve equity performance.

Regional Rail Crossing Recommendations

The evaluation of the Regional Rail crossing concepts and variants led to the following key recommendations to inform the development of the Regional Rail Representative Concepts[7] for further assessment in Round 2:

- Develop and advance a new Regional Rail crossing concept that maintains high levels of ridership and benefits offered by a fast and frequent service between downtown San Francisco and the North Branch. This also should capture the station access benefits of a potential new station at Alameda and improve system redundancy through a transfer station with BART at the 12th St./Oakland City Center Station.
- Provide new Regional Rail infrastructure to Richmond instead of Hercules to improve capital cost-effectiveness and to avoid key environmental and land use risks. The case for improvements north of Richmond may be subject to future studies.

[7] A Representative Concept is a high-performing concept that is a reasonable representation of the crossing technology.

- Undertake further analysis to understand the impacts of increasing Regional Rail transbay services south of downtown San Francisco to expand ridership, serve unmet transbay demand, increase job accessibility, and provide additional benefits to priority populations in southeastern San Francisco.
- Perform further analysis to understand the impacts of increasing transbay frequencies to boost ridership across the system and to alleviate potential future crowding, particularly along the North Branch, which experiences high demand to/from San Francisco.
- Initiate further analysis to understand the impacts of reallocating additional services from the South Branch to the North Branch when increasing frequencies, as the North Branch generates a greater ridership response to the same frequency improvement.