LINK21

CONNECT NORTHERN CALIFORNIA

PRELIMINARY BUSINESS CASE REPORT

APPENDIX C: DRAFT CONCEPT DEVELOPMENT PROCESS REPORT

May 2024

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DRAFT

BART

CAPITOL CORRIDOR

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Acronyms and Abbreviations

ACRONYM/ABBREVIATION	DEFINITION
BART	San Francisco Bay Area Rapid Transit District
CCJPA	Capitol Corridor Joint Powers Authority
DTSF	downtown San Francisco
EAC	Equity Advisory Council
JLS	Jack London Square
MTC	Metropolitan Transportation Commission
PBC	Preliminary Business Case
PEL	Planning and Environmental Linkages
SFCTA	San Francisco County Transportation Authority
SFMTA	San Francisco Municipal Transportation Agency
SFO	San Francisco International Airport
STC	Salesforce Transit Center
tph	trains per hour

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 networks, and policies that are consistent with the adopted regional transportation plans of the six metropolitan planning organizations (MPO) within the Northern California Megaregion (such as Plan Bay Area 2050).
BART (technology/track type)[1]	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.
Blue Line	BART Dublin/Pleasanton – Daly City service
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 Round)	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 Travel Demand and Land Use (TDLU) Tool and select key metrics to understand the relative performance of concept features and to generate Initial Concepts that were evaluated in Round 1.

[1] Specific BART lines are referred to directly (e.g., Yellow Line), with a geographic description if there is any ambiguity (e.g., “in the East Bay”)

TERM	DEFINITION
Gauge	The distance between the two rails of a train track. Broad gauge (where the tracks are 5 feet, 6 inches apart) is used on the BART network, and standard gauge (where the tracks are 4 feet, 8.5 inches apart) is used on the Regional Rail network.
Green Line	BART Berryessa/North San José – Daly City service
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, 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 considered following Stage Gate 2.
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, San Joaquins, 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.
Options	Includes Initial Concepts that have not been formally screened out and could be subject to further development and detailed evaluation. Options advanced at Stage Gate 2 include those associated with the Representative Concepts of the identified technology in the crossing, and any supplemental improvements to the other system.
Orange Line	BART Berryessa/North San Jose – Richmond service
Peninsula	The areas south of San Francisco that are adjacent to the San Francisco Bay, including San Mateo County and the northwestern parts of Santa Clara County.

TERM	DEFINITION
Preliminary Project	The improvements to be recommended for advancement at Stage Gate 2, that consist of an identified rail technology in the crossing (BART or Regional Rail) for service delivery, and a set of options that will frame forthcoming feasibility studies and engagement with communities, stakeholders, and the public. Once identified, it will form the basis for work to define a Proposed Project (and the identification of any Alternatives) that is 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 evaluated 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
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 transbay passenger rail crossing concept that uses Regional Rail (standard gauge) technology. A Regional Rail 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.

TERM	DEFINITION
Round 2	The evaluation of Representative Concepts to inform the recommendation to identify a Preliminary Project (and potential alternatives) 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.
Stage Gate 2	At Stage Gate 2, Link21 will present to the BART and CCJPA Boards to: “Advance the identified Preliminary Project to be refined, with continued community, stakeholder, and public engagement, into a Proposed Project ready for environmental review.
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

1. Introduction

The *Concept Development Process Report* describes how the Link21 Team[2] identified, developed, considered, and evaluated potential concepts to determine which Representative Concepts[3] were assessed and documented in the Link21 Program's (Link21) *Preliminary Business Case (PBC) Report.*

1.1. Overview of Input to Concept Development

Link21 embarked on studies to define a range of potential concepts to support the evaluation of a new transbay passenger rail crossing between San Francisco, Oakland, and beyond.

The Link21 Crossing Project is defined as 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.

The development of the Representative Concepts followed an integrated approach to planning. The overall concept development process involved a wide range of inputs and considerations from:

- Engaging with stakeholders and communities.
- Reviewing previous studies, the Link21 Market Analysis, and brainstorming workshops.
- Examining the Link21 Problem and Vision Statement and the ability for concepts to achieve the vision, goals, and objectives.[4]
- Establishing planning requirements as minimum criteria for developing and assessing the crossing concepts.
- Considering leveraging other rail investments in the Northern California Megaregion (Megaregion).[5]

[2] San Francisco Bay Area Rapid Transit District (BART), Capitol Corridor Joint Powers Authority (CCJPA), Program Management Consultants (PMC), and Consultants supporting program identification/project selection (Consultants)
[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.
[4] The Preliminary Purpose and Need will be fully consistent with the Link21 goals and objectives.
[5] 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.

- Evaluating engineering and operations considerations, which included physical infrastructure requirements and associated costs.
- Planning service, which included frequency, redundancy, and geographical coverage of service.
- Determining equity implications, which included the physical, social, and economic implications for surrounding communities.
- Examining potential environmental considerations, including:
  - Potential environmental constraints and opportunities associated with concepts, documented in the Environmental Constraints and Opportunities Report (2022).
  - Potential environmental risks, as documented in the Environmental Input to Link21 Concepts Report (2023).
  - Cross-discipline interactive workshops within the Link21 Team to ensure that the concepts being developed take into consideration the environmental, opportunities and constraints.
- Reviewing the evaluation findings from qualitative and quantitative analyses, including the use of a transportation demand modeling tool, and recommendations through the business case evaluation.

These inputs to the process, along with a series of workshops, make sure environmental considerations are integrated into the overall Link21 planning process leading to stage gate decisions and, ultimately, to the National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) process. This allows Link21 to meet the goals and purpose of an integrated planning and environmental process, Planning and Environment Linkages (PEL), which is a collaborative and integrated approach to transportation decision-making.

1.2. Concept Planning Requirements

The Link21 Team established planning requirements to guide the concept development process of the Crossing Project and to screen potential ideas. Planning requirements include the need for any potential Crossing Project to:

- **Provide a second rail crossing between Oakland and San Francisco with BART and/or Regional Rail[6] technology**. At the heart of Link21 is a new transbay passenger rail crossing, as recommended from past studies. Ideas that did not provide a new BART or Regional Rail connection between Oakland and San Francisco were not advanced.

[6] Could include intercity, commuter, or high-speed rail.

- **Provide wider improvements to the BART and Regional Rail networks that enhance the performance of the crossing**. Wider improvements should advance one or more of the following:
  - Provide convenient connections or transfers from the new crossing to existing networks.
  - Support frequent and reliable service through a new crossing.
  - Reduce potential crowding in the transbay corridor.
  - Improve the relative cost-effectiveness of the new crossing.
- **Demonstrate independent utility**. This means the concept should fulfill the project purpose without additional segments or programs. In addition to this, the Link21 Team agreed that the concept should:
  - Advance most or all of the project's objectives[7] while not substantially detracting from or challenge other objectives.
  - Provide economic benefits to the Megaregion and have realistic prospects of being a financially viable project, noting that subsequent development on the project's definition should maintain or improve the Crossing Project's overall cost-effectiveness and financial viability.
  - Have realistic prospects of being delivered and free from fatal flaws in terms of its feasibility. If there are environmental, engineering, or operational challenges that would substantially increase deliverability risk, the concept should not be advanced.
- **Build upon existing adopted plans** and support other relevant projects that are in line with the *Megaregion Program Report*. Concepts that are advanced should not directly impede or preclude other relevant plans or projects, including a potential future western San Francisco rail line.

1.3. Environmental Considerations

The PEL process was utilized throughout the concept development process, and it drew on environmental constraints and opportunities data and workshops. Potential environmental concerns, such as generally avoiding or minimizing temporary and permanent disruptions to sensitive habitats, historic resources, public parks, schools, hospitals, and other community resources, especially within priority populations/communities with environmental justice concerns, were considered in the concept development process. For example, a potential new 12th Street Station in downtown Oakland could avoid disruption to the historic district if it is located west of

[7] The full set of Link21 goals and objectives can be found in the PBC Report.

Broadway. Further information on environmental considerations can be found in the *Environmental Input to Link21 Concepts Report.*

1.4. Equity Considerations

1.4.1. Siting of Physical Infrastructure

The concept development process considered infrastructure locations and construction methods that would minimize temporary or permanent disruptions due to construction. This goal was prioritized in communities with priority populations, and, in particular, residential areas. For example, physical components that could result in potential local impacts (e.g., tunnel boring machine launch points and track turn-out boxes) could be located outside of residential areas of West Oakland.

1.4.2. Service Planning

Service planning efforts were based on the model results and sought to improve passenger rail service between residential areas with priority populations and job centers within reasonable commuting range. For example, based on findings from the Exploratory Evaluation, the Regional Rail concepts evolved to include a new Urban | Metro route providing relatively fast and frequent rail service linking priority populations areas in Richmond, West Berkeley, Emeryville, downtown Oakland, and the Oakland Coliseum/Oakland Airport area.

1.5. Stakeholder Considerations

1.5.1. Stakeholder Engagement

Link21 solicited input on concept development from the general public and stakeholder agencies, such as local cities and existing rail operators. The general public provided views on which passenger rail service improvements were most important: faster service, greater reliability, greater availability of direct service, more frequent service, and quicker access to stations. Link21 either incorporated each type of improvement into at least one of the concepts developed or documented the need for the improvement to be included in future development phases (e.g., for quicker access to stations).

Some of the cities, while expressing general support for the program, signaled interest in influencing the placement of potential new infrastructure, such as new dedicated rail alignments and new or improved stations, because of their potential effects on the existing land uses and communities in those areas. The Link21 Team incorporated input into some of the concepts about locations to avoid, such as in the West Oakland neighborhood. Also, the Peninsula Corridor Joint Powers Board (Caltrain) expressed an interest that any proposed Crossing Project modifications to the Caltrain line between

the Salesforce Transit Center (STC) and Millbrae be consistent with its adopted *Caltrain Vision Plan* and *Business Plan*. The Link21 Team incorporated that input, aiming to be consistent with Caltrain's visions in the Regional Rail concepts. Overall, the Link21 Team will seek further discussions about more detailed designs during the subsequent phase, when the program will be ready to develop the project design at that more detailed level.

1.6. Concept Evaluation Process

The Project Identification phase of Link21 contains the following five stages for the concept identification, development, evaluation, and refinement process:

1. **Pre-evaluation Screening**, where the scope and strategic boundaries of Link21 were defined based on Link21 goals and objectives, planning requirements, and the need to focus technical analyses on an initial viable passenger rail crossing project.
2. **Exploratory Evaluation**, which involved evaluating several Exploratory Concepts[8] and variants. These Exploratory Concepts were early definitions of concepts for the purpose of testing to understand the relative performance of improving rail services. Findings and recommendations from the Exploratory Evaluation are documented in *Appendix A: Exploratory Evaluation Report* and informed the generation of Initial Concepts that were evaluated in Round 1.
3. **Initial Concept Evaluation (Round 1)**, which involved evaluating several Initial Concepts and variants. These Initial Concepts were developed ideas, 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 required associated infrastructure. Findings and recommendations from Round 1, documented in *Appendix B: Round 1 Evaluation Report*, informed the development of the Representative Concepts that were evaluated in Round 2 and the options that will be considered following Stage Gate 2.
4. **Representative Concept Evaluation (Round 2),** which involved evaluating one BART and one Regional Rail Representative Concept. These Representative Concepts were high-performing concepts that were intended to serve as a reasonable representation of the crossing technology. Representative Concepts were subject to detailed evaluation in Round 2, as documented in this PBC Report, and to support the recommendation to identify a crossing technology for advancement to a Preliminary Project at Stage Gate 2.
5. **Identify a Preliminary Project**, which is the improvement to be recommended for advancement at Stage Gate 2 that consists of an identified rail technology in the crossing (BART or Regional Rail) for service delivery and a set of options that will

[8] 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.

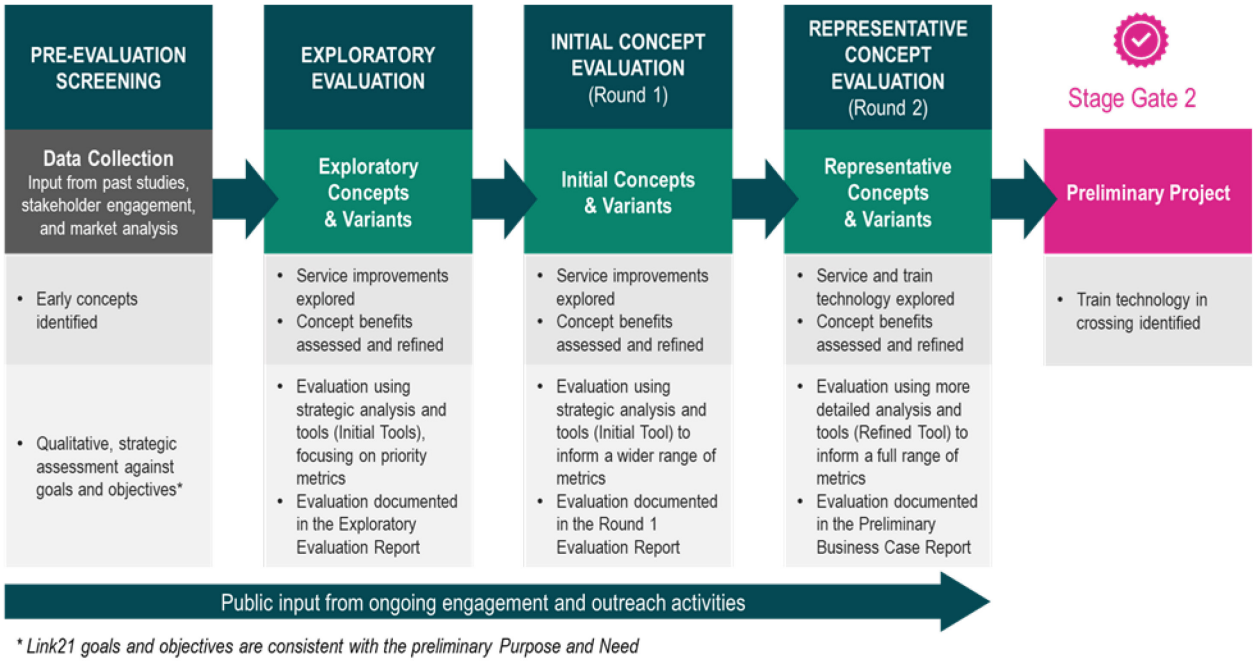
frame forthcoming feasibility studies and engagement with communities, stakeholders, and the public. Once approved, it will form the basis for work to define a Proposed Project (and the identification of any Alternatives) ready for environmental review at Stage Gate 3.

Exploratory, Round 1, and Round 2 evaluations were designed to support decision-making at Stage Gate 2, when Link21 will be seeking to advance the identified Preliminary Project. The Preliminary Project includes core components for the crossing (of service and infrastructure) together with options related to markets served, service, and infrastructure.

Figure 1-1 summarizes the concept development process leading up to Stage Gate 2.

It should be noted that determining the Preliminary Project is a strategic decision and a first step towards defining the Proposed Project for entry into environmental review at Stage Gate 3. The markets served, services, and infrastructure presented in this document will be subject to change as the definition of the Crossing Project is refined. Further work will be required to achieve an integrated mobility solution and details on how Link21 services will be integrated with other modes of transportation and the communities it serves will be considered in the next phase.

Figure 1-1. Concept Development and Evaluation Process



1.7. Engagement and Outreach

Since Link21's inception, outreach to and engagement with stakeholders and the general public has shaped its planning work and business case framework. The efforts and outcomes to date include:

- Reviewing state, regional, and local plans and policies (as introduced in Section 2 of the *PBC Report*) to ensure alignment with their goals.
- Conducting a public survey about Link21's goals and objectives, which received more than 2,000 responses that informed the refinement of the goals and objectives.
- Performing two rounds of community co-creation with low-income and historically disadvantaged and underserved communities to understand their desired vision for Link21, confirm the goals and objectives align with their desired vision, inform Link21's definition of priority populations, and identify a set of metrics to be used in the equity evaluation.
- Engaging with megaregional agencies and operators to present progress and receive input on key issues, such as the definition of program goals and objectives, through:
  - A Program Development Team (PDT), which consists of senior staff and executives from agencies and operators across the Megaregion; and
  - A Jurisdictional Working Group (JWG), which consists of city and jurisdictional partners who provide a local perspective.
- Conducting several rounds and forms of informational outreach with the general public, including in-person and virtual events and tailored, grassroots outreach, to share progress and findings, such as concept development and a high-level summary of potential benefits to the Megaregion, and to solicit input from the public on these topics.
- Convening bimonthly meetings with the Link21 Equity Advisory Council (EAC), whose membership reflects the diversity of the Megaregion, including low-income communities and communities of color that have been most impacted by transportation inequities, youth, and other communities that have historically been marginalized. EAC members have provided input on the business case foundational elements, evaluation approach,[9] and findings to date.
- Conducting a public survey in December 2023, which was completed by over 1,250 respondents, to understand their relative preferences for features associated with possible BART and Regional Rail crossing projects, to inform Round 2.

[9] Examples where the EAC informed methodology and metrics refinement include introducing a new metric on opportunity jobs and identifying the need to consider the absolute benefit to priority populations not just the proportion of benefits to priority populations.

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2. Pre-evaluation Screening

2.1. Data Collection

At the beginning of the Project Identification phase, the Link21 Team conducted data collection that included a review of existing studies, Link21 Market Analysis, and information gathered from stakeholder engagement and outreach. Key environmental constraints and opportunities were also identified and documented in the Link21 Environmental Constraints and Opportunities Report.

2.1.1. Existing Studies

Link21 is an extension of previous Regional Rail planning efforts. Multiple prior planning studies informed high-level direction for the development of Link21 concepts, including:

- Metropolitan Transportation Commission (MTC) Horizon Crossings: Transformative Investments for an Uncertain Future (2019)
- California State Rail Plan (2018)
- MTC Bay Area Core Capacity Transit Study (2017)
- MTC Plan Bay Area 2040 (2017)
- MTC Plan Bay Area 2050 (2021)
- BART Metro: Sustainable Communities Operational Analysis (2012)
- MTC San Francisco Bay Crossings Studies (and multiple updates, 1991–2013)
- MTC Bay Area Regional Rail Plan (2007)

Together, these prior studies identified the need for additional connectivity and capacity across the bay between San Francisco and Oakland, pointing toward potential BART and Regional Rail solutions. In particular, both *Plan Bay Area 2050* and the *California State Rail Plan* described a new rail crossing of the bay, which could potentially be enabled by Link21.

In addition, the plans made statements that guide further development of the existing rail system in the Megaregion. For example, against the backdrop of the BART system as it stood in 2007, the *MTC Regional Rail Plan* considered the BART system's extension to San Jose/Santa Clara as its last outward expansion and the focus going forward would be on expanding core capacity to provide higher-frequency, highly productive metro-type service, leaving higher-speed express trains to serve outlying suburban markets. The plan articulated the need for a larger regional express rail network that uses standard gauge technology and that serves longer distance trips to complement BART. The *MTC Regional Rail Plan* defined a Metro Core and Metro Commute strategy for BART that focused on high-service levels in the urban core and

lower service levels toward the system's edges that was commensurate with ridership demand and competitiveness to autos.

The visions and strategies articulated by these studies influenced the development of Link21 concepts, targeting the highest service levels in the denser urban areas of the Megaregion with higher travel demand and lower service levels in less dense areas using Regional Rail technology, generally on existing tracks.

2.1.2. Market Analysis

The Link21 Market Analysis identified markets where people are traveling today and could travel in the future with extra emphasis on considering communities, including priority populations, that have been underserved by rail. Equity was incorporated in this analysis through an equity-weighted unmet potential for train travel based on an initial definition of priority populations.

The *Market Analysis Report* identified places with relatively high unmet potential for train travel as follows:

- Unmet transbay potential for train travel is highest closest to the Transbay Corridor in San Francisco and Oakland and to/from inner East Bay cities between Richmond and Oakland, which are home to high concentrations of priority populations.
- High levels of unmet transbay potential for train travel were also identified throughout San Francisco, including western San Francisco.
- Medium to high unmet transbay potential for train travel was also identified in several medium-length markets, including San Pablo, Hercules, Martinez, Vallejo, Napa, Fairfield, San Ramon, and parts of San Mateo County.
- Non-transbay trips and riders represent unmet new ridership potential throughout Northern California. Crossing Project improvements could unlock benefits for non-transbay rail riders and enable new non-transbay rail trips.

A full description of the market analysis findings can be found in the Market Analysis Report.

2.2. Screening

The concept planning requirements established by the Link21 Team, as described in Section 1.2, underpinned the overarching concept development and screening process. Ideas that did not satisfy the planning requirements were not advanced by the Link21 Team, although their exclusion was not necessarily an indication of their merits and may be pursued by others as a separate project.

The market analysis identified places with relatively high unmet potential for train travel, but it did not determine whether rail was the optimal solution for meeting the potential demand nor did it establish if potential rail connections advanced Link21's goals and

objectives. Therefore, additional assessment was needed to establish a rationale for whether or not to include it as an Initial Concept.

The Link21 Team considered and assessed ideas with different tools and varying degrees of detail. Some ideas were evaluated using a travel demand model, while others were assessed based on qualitative measures. To guide this assessment, a subset of key business case evaluation framework metrics was used in screening and prioritizing potential ideas. These criteria included:

- Advancement of Link21 goals, including benefits to transbay and megaregional trips, and promoting equity.
- Relative cost-effectiveness of transportation performance improvements.
- Fundability considerations, such as impacts on overall project costs.
- Technical risk, including construction, operations, land use, environmental risks.

There were also other reasons for not pursuing potential corridors, including:

- Proximity to an existing BART or other rail transit line — for some locations, demand could be met by increasing existing service in locations that already have rail access.
- Another agency is planning a transit project to meet demand in that corridor — Link21 will coordinate efforts with partner agencies to make sure one does not preclude the other and to provide high-quality connections so Link21 and those projects provide synergistic benefits to travelers and the community.

2.2.1. Dual-gauge Crossing

The Link21 Team explored the dual-gauge crossing concept as a potential means to accommodate both BART and Regional Rail in a single two-track crossing, which might be less expensive than building separate, dedicated tracks for the two technologies. The primary factor affecting the feasibility of the dual-gauge concept is the crashworthiness risk of BART vehicles sharing track with heavier Regional Rail vehicles, which affects both infrastructure and equipment requirements and the operation of such a crossing.

The weight and configuration of the Regional Rail vehicles is largely fixed by their required ability to be crashworthy and compatible with heavy freight trains on shared track elsewhere in the network. The cost to reconfigure BART vehicles and the structural retrofit and replacement costs would likely be greater than the potential cost of constructing an additional dedicated two-track crossing.

Also, sharing track in a dual-gauge crossing would add operational requirements related to the signaling systems that would significantly reduce the capacity of the shared crossing. Given these findings, the dual-gauge concept was eliminated from further consideration.

2.2.2. Western San Francisco

The Link21 market analysis identified places in western San Francisco with relatively high unmet potential for transbay train travel. The San Francisco Municipal Transportation Agency (SFMTA) and San Francisco County Transportation Authority (SFCTA) are actively studying a Geary/19th Avenue subway project.

It is important that a Crossing Project actively consider and provide connection to a future rail corridor in western San Francisco. The Crossing Project and western San Francisco projects will enhance and bolster each other to provide mutually beneficial project benefits by being able to connect to more places and effectively utilize the additional capacity of a new transbay crossing.

The concepts considered at this stage have provisions for a future connection and include infrastructure to enable an operationally compatible connection to a potential western San Francisco rail line in the future.

The Link21 Team will continue to coordinate closely with SFMTA and SFCTA. The extent to which a potential western San Francisco project is combined with the Crossing Project will be carefully considered as the projects progress.

2.2.3. Carquinez Strait Crossing

The Link21 market analysis identified the potential for medium to high unmet transbay rail demand to Vallejo, Napa, and Fairfield, which would require trains to cross the Carquinez Strait. However, rail service across the strait is hindered by the existing Benicia-Martinez lift bridge, which constrains frequency and is a significant source of delays, as it frequently opens for marine traffic. Therefore, Link21 did not include rail improvements to the Carquinez Strait as part of the initial Crossing Project or extending rail to the cities of Vallejo or Napa.

However, CCJPA is separately advancing the replacement of the Carquinez Strait rail crossing and conducted a *New Carquinez Crossing Study* in 2022. This examined options for a new rail crossing of the Carquinez Strait that would facilitate future service expansion between Sacramento and the Bay Area. In November 2022, the CCJPA Board authorized staff to continue engineering feasibility analysis for two options: a new rail bridge crossing adjacent to the I-80 bridge crossing or a new rail bridge crossing to replace the existing Benicia-Martinez lift bridge. A new rail bridge adjacent to I-80 would bring train service to Vallejo. Work on these Carquinez Strait rail bridge options is ongoing with an update to the Board expected in February or April 2024.

The Link21 Team will stay engaged with CCJPA staff about this work so that any important findings can be incorporated into Link21 analysis. The Crossing Project will be designed with passive provision to accommodate service benefits made possible by the reconstruction of the bridge, given the potential benefit it would enable for additional and more reliable train service.

2.2.4. San Ramon

The Link21 market analysis identified San Ramon as a location of high unmet potential for train travel. However, the San Ramon hub is not in proximity to the transbay rail crossing. The Contra Costa County Transportation Authority (CCTA) has identified express bus transit improvements to serve unmet demand in the I-680 corridor. Therefore, Link21 did not include rail improvements in the San Ramon area.

2.2.5. Southeast Berkeley

The Link21 market analysis identified unmet transbay potential for train travel at multiple hubs in southeast Berkeley and Oakland, including near the University of California, Berkeley campus and the Rockridge neighborhood. While there may be potential demand for transbay trips, extensions to these areas would not address key aspects of the Link21 Problem Statement and were not included within the Link21 concepts. This is because these extensions are not along a potential transbay crossing alignment and would not add to connections to existing passenger rail networks. Also, they would not provide a transfer opportunity between BART and Regional Rail or enable more frequent and reliable service through the crossing.

2.2.6. I-580/MacArthur Boulevard Corridor

The Link21 market analysis identified moderate to high unmet transbay potential for train travel from the Grand Lake, Allendale/Dimond, and Eastmont hubs along the I-580/MacArthur Boulevard corridor in southeast Oakland, which include significant priority populations. Serving these hubs is not necessary to deliver Link21's goals and objectives with a new transbay passenger rail crossing. Since this corridor has not been studied previously for high-capacity transit, Link21 would support efforts by others to advance planning in analyzing if new rail is the preferred way to meet the demand. To this end, Link21 will not preclude providing connection to such a potential future rail project.

2.2.7. BART Crossing Concept Connecting to the Existing San Francisco/Peninsula BART Line

The Link21 Team considered the feasibility of connecting a new BART bay crossing to the existing BART line under Market Street in San Francisco. The complexity of the underground conditions at this location suggests that the construction period would require up to two years. During construction, BART operations would be limited to single tracking between the Embarcadero and 24th Street stations, reducing train capacity by 75-85%, and it is unlikely that alternatives like increased transbay bus service would be able to offset this loss. Also, the permanent post-construction service, capacity, and operational considerations of the new connection would add significant complexity to operating the overall system. As a result, Link21 will not advance this idea in the

crossing concepts. However, improved pedestrian connections between any new crossing and the existing San Francisco/Peninsula BART line stations would be included where practically possible.

3. Exploratory Evaluation

3.1. Development of Exploratory Concepts

The Link21 Team identified and conducted preliminary studies and brainstorming workshop sessions to inform the preliminary development of 16 exploratory concepts. This effort included a review of prior studies of a transbay crossing as described in Section 2.1. Following the data collection and pre-evaluation screening process, the Link21 Team initially focused on identifying a range of markets to be served, which would be connected by potential alignments and stations.

Based on the learnings from the data collection and planning requirements for the Crossing Project, potential extents for concepts were drawn:

- If the crossing uses BART technology, at a minimum this crossing should connect to existing BART infrastructure in the East Bay and serve downtown San Francisco (DTSF). In DTSF, it enables transfers between BART and Caltrain services. In Oakland, it should enable transfers between BART and Capitol Corridor services.
- If the crossing uses Regional Rail technology, at a minimum this Regional Rail crossing should connect to existing Regional Rail infrastructure in both the East Bay and San Francisco and the Peninsula. From an operational perspective, the minimum connection in the East Bay to the north is to Emeryville and to the south is to the San Antonio area.

3.2. Evaluation of Exploratory Concepts

The Exploratory Evaluation involved high-level analysis of several Exploratory Concepts to support the generation of Initial Concepts to be evaluated in Round 1. Exploratory concepts are early definitions of concepts that were identified following an initial review of past studies, market analysis, stakeholder and public input, and other factors, such as engineering and operations.

The Exploratory Evaluation considered four minimum Crossing Concepts — two for BART and two for Regional Rail. It also considered several variants that closely relate to the Crossing Concepts. The evaluation of these variants helped determine the value of additional components (“incremental components”) on an incremental basis.

3.2.1. BART Crossing Concepts

The BART Exploratory Concepts included two minimum crossing concepts and three incremental components:

- **BART Crossing Concepts**
  - BART DTSF – Alameda

  - BART Mission Bay – Alameda
- **BART Incremental Components** – connections in the East Bay
  - Only connecting the Red and Yellow[10] lines
  - Only connecting the Green and Blue[11] lines
  - Connecting the Red and Yellow and the Green and Blue lines

The evaluation of the BART Exploratory Concepts led to the following recommendations to inform the development of the Initial List of Concepts to be refined and evaluated in further detail in Round 1:

- Develop crossing concepts that connect the new crossing to both the Red/Yellow lines and Green/Blue lines in the East Bay to expand ridership, reduce future crowding, increase cost effectiveness, and improve operations and incident management potential.
- Further evaluate the DTSF and Mission Bay crossing alignments to understand the trade-offs between travel times and new markets served.
- Explore concepts that increase intra-East Bay service and further increase service to the Red line in the East Bay to expand ridership and help improve the proportion of benefits to priority populations.

3.2.2. Regional Rail Crossing Concepts

The Regional Rail Exploratory Concepts included two minimum crossing concepts and two incremental components:

- **Regional Rail Crossing Concepts**
  - RR STC – Port of Oakland (Port)
  - RR STC – Alameda
- **Regional Rail incremental components**
  - Extension north (Emeryville/Richmond/Hercules)
  - Extension south (San Antonio/Coliseum)

[10] The Red line is BART Richmond – Millbrae + SFO (San Francisco International Airport) service, and the Yellow line is BART Antioch – SFO + Millbrae service.
[11] The Green line is BART Berryessa/North San José – Daly City service, and the Blue line is BART Dublin/Pleasanton – Daly City service.

The evaluation of the Regional Rail Exploratory Concepts led to the following recommendations for the development of the Initial List of Concepts that will be refined and evaluated in further detail in Round 1:

- Extend infrastructure improvements at least to Richmond in the Emeryville/Berkeley/Richmond corridor, evaluate whether extensions to San Pablo or Hercules increase ridership, increase cost-effectiveness, and increase the proportion of benefits to priority populations.
- Extend infrastructure improvements at least to the Coliseum Station in the south to increase ridership, increase cost-effectiveness, and increase the proportion of benefits to priority populations.
- Explore different transfer locations in the East Bay to enhance connectivity between different rail services and increase resiliency.
- Explore infrastructure improvements beyond the STC on the Peninsula to alleviate operational constraints at the STC and enable increased transbay frequency on Regional Rail.
- Explore Regional Rail service to a potential new Bayview station to increase ridership and increase the proportion of benefits to priority populations.
- Explore service improvements to the Richmond corridor and intra-East Bay service to increase ridership and increase the proportion of benefits to priority populations.

3.2.3. Combined BART And Regional Rail

The Combined BART and Regional Rail Exploratory Concepts included two crossing concepts (no incremental components):

- **Combined BART and Regional Rail Crossing Concepts**
  - RR STC – Port + BART Mission Bay – Alameda
  - RR STC – Alameda + BART DTSF to Alameda N+S[12]

The recommendation from the Exploratory Evaluation is that a combined BART and Regional Rail Crossing Concept should not be advanced due to low additional ridership potential and high capital costs compared to single-technology crossing Exploratory Concepts. However, this decision would not preclude a third rail crossing should the transportation needs of the Megaregion evolve in the future.

Further information on the Exploratory Concepts can be found in the *Concept Planning and Engineering Report*. Further information about the concepts evaluated and the evaluation findings can be found in *Appendix A: Exploratory Evaluation Report.*

[12] N+S = North and South

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4. Round 1 Evaluation

4.1. Development of Initial Concepts

Building on Exploratory Concepts and recommendations from the Exploratory Evaluation, several Initial Concepts were developed for evaluation in Round 1. An Initial Concept is 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, conceptual service plan, and associated infrastructure required. The evaluation of these Initial Concepts informed the development of Representative Concepts for evaluation in Round 2 and the options to be considered following Stage Gate 2.

Further information on the Initial Concepts can be found in the *Concept Planning and Engineering Report*.

Six Initial Concepts were developed and studied based on a review of the findings from the Exploratory Evaluation. The geographic areas for potential stations and terminals were informed by the Exploratory Evaluation for further studies and testing in this round. The Link21 Team reviewed the metrics selected during Exploratory Concept development and developed a refined set of metrics for the evaluation of the Initial Concepts.

4.2. Evaluation of Initial Concepts

In Round 1, the six Initial Concepts were evaluated. These concepts considered different markets and connections within the DTSF and Oakland areas, and they helped identify impacts of service to Alameda and Mission Bay.

4.2.1. BART Concepts

Overview of BART Concepts

Two BART Initial Concepts were evaluated in Round 1:

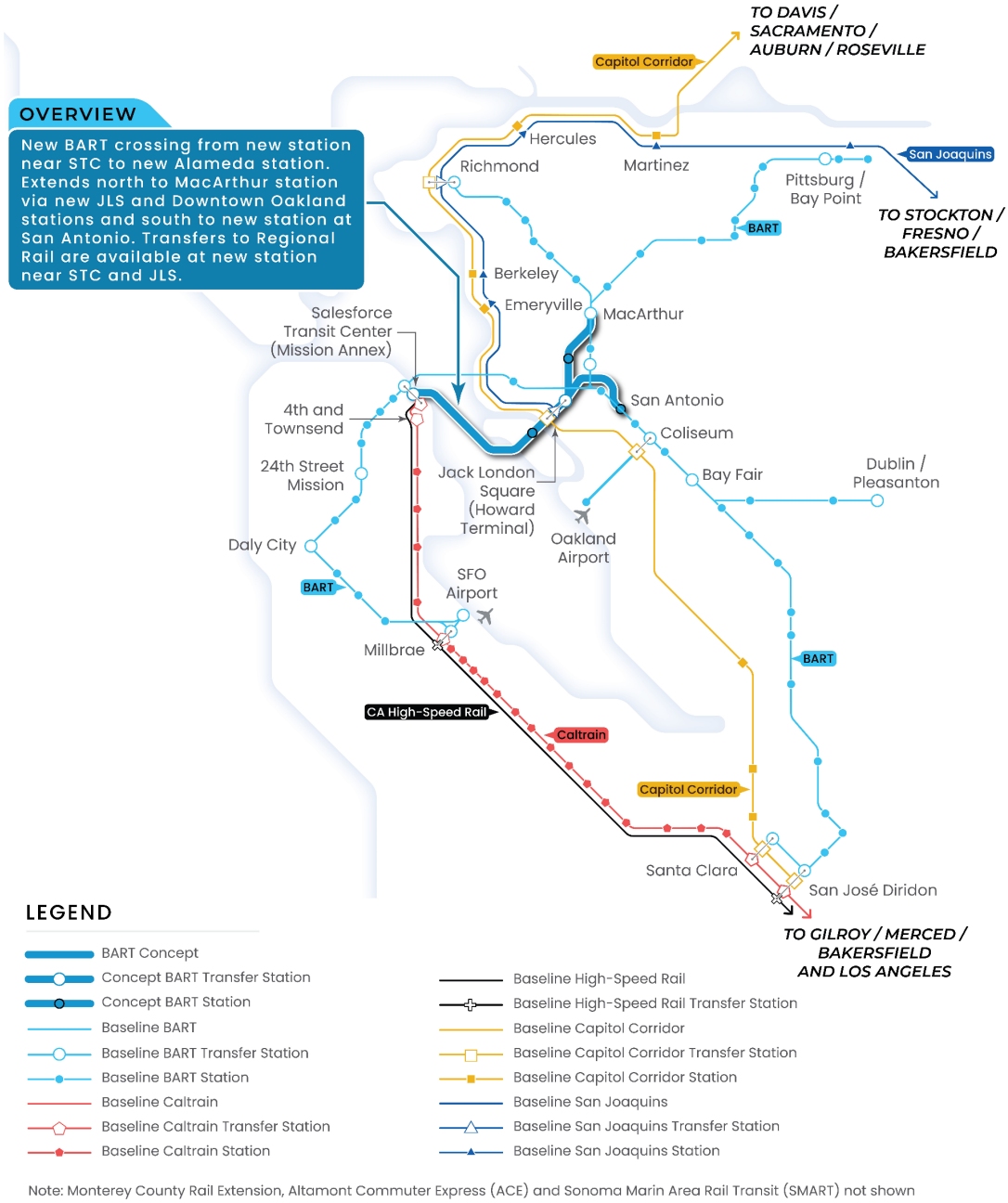
- **Concept C:** BART Downtown San Francisco via Alameda (**Figure 4-1**)
- **Concept D:** BART Downtown San Francisco via Mission Bay and Alameda (**Figure 4-2**)

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 (JLS) and downtown Oakland stations and south to a new station at San Antonio. Transfers to Regional Rail would be available at new stations near STC and JLS. During peak periods, 24 trains per hour (tph) would operate each way through the new crossing.

Figure 4-1. Concept C: BART STC Map

CONCEPTUAL. SUBJECT TO CHANGE. NOT TO SCALE.

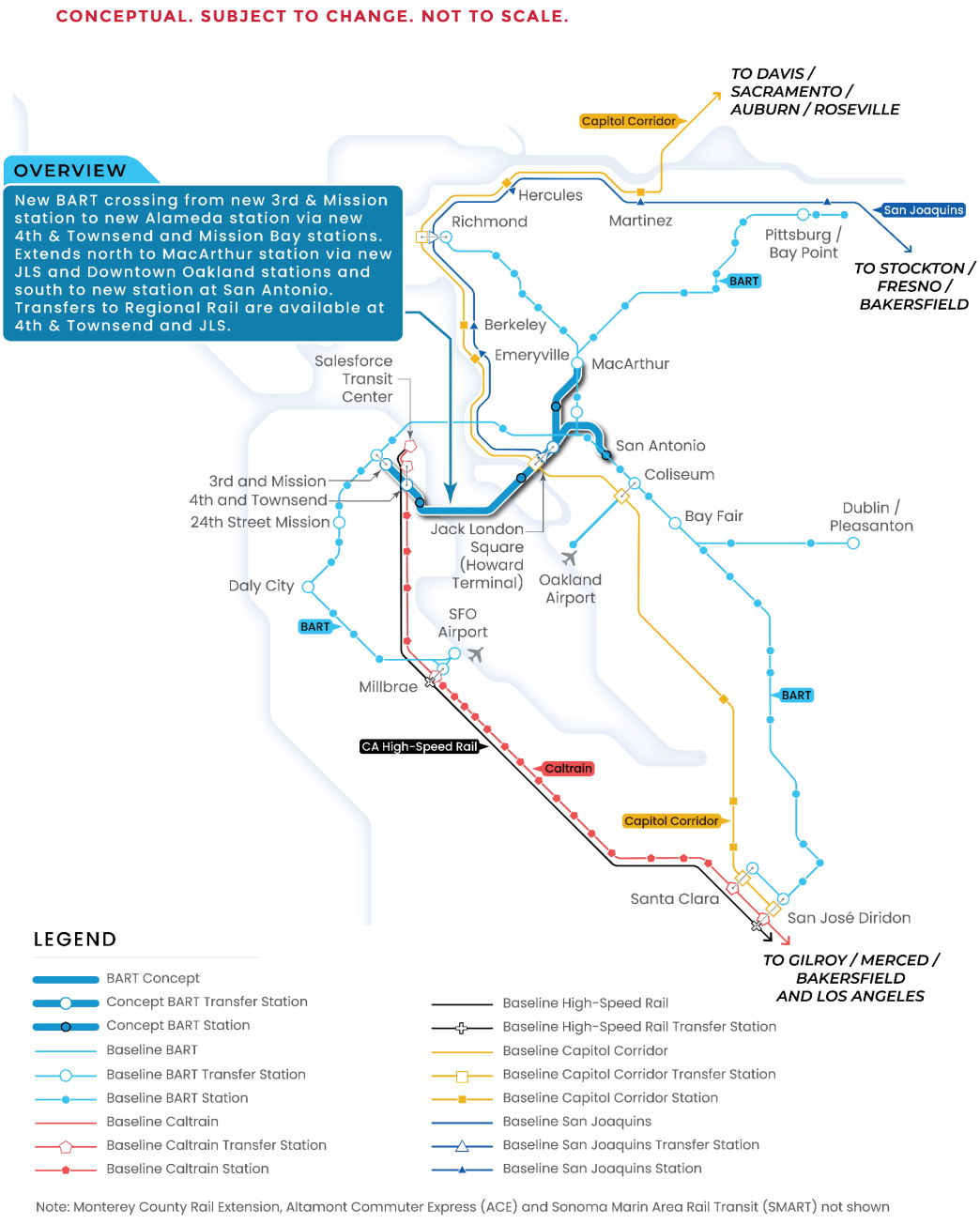


Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Concept 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 JLS 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 JLS. During peak periods, 24 tph would operate through the new crossing.

Figure 4-2. Concept D: BART Mission Bay Map



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

BART Concept Variants

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. Variants were evaluated to help determine the potential impacts of:

- Adopting an alternative alignment in DTSF to serve Mission Bay via the STC.
- Reallocating BART services through the new crossing from the Yellow Line to the Red Line.

Recommendations for BART Concepts

The evaluation of the BART Initial Concepts and variants led to the following key recommendations to inform the development of the BART Representative Concept for further analysis in Round 2:

- Advance Concept D: Downtown San Francisco via Mission Bay and Alameda 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.

4.2.2. Regional Rail Concepts

Overview of Regional Rail Concepts

Four Regional Rail Initial Concepts were evaluated in Round 1:

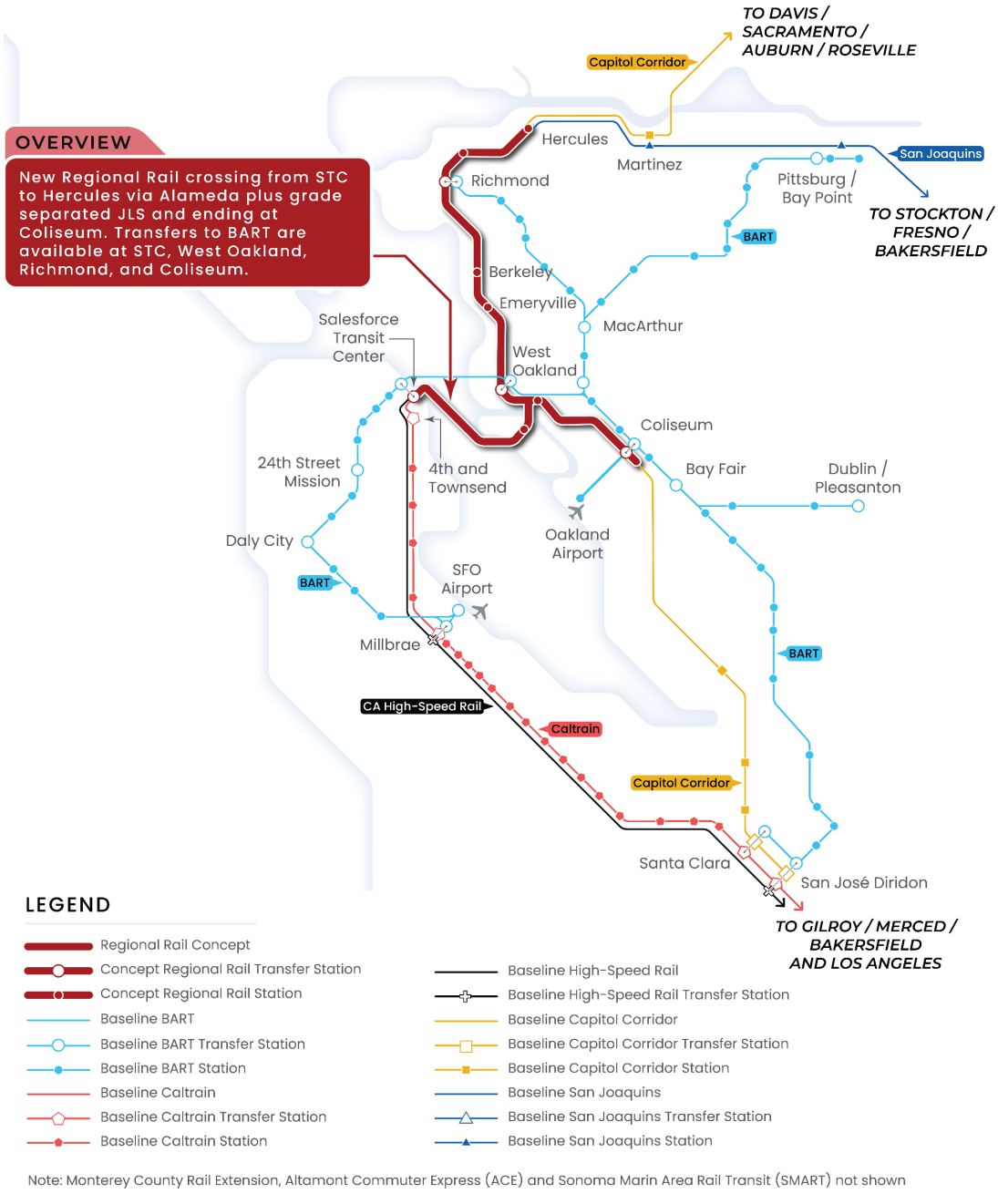
- **Concept A:** Regional Rail STC to Jack London District via Alameda (**Figure 4-3**)
- **Concept B:** Regional Rail STC via Port of Oakland (**Figure 4-4**)
- **Concept E:** Regional Rail STC to MacArthur via Alameda (**Figure 4-5**)
- **Concept F:** Regional Rail STC to Oakland City Center via Alameda (**Figure 4-6**)

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 JLS, and it would end at the Coliseum Station. Transfers to BART would be available at the STC, West Oakland, Richmond, and Coliseum stations. During peak periods, an average of 10.5 tph would operate through the new crossing.

Figure 4-3. Concept A: RR JLS Map

CONCEPTUAL. SUBJECT TO CHANGE. NOT TO SCALE.

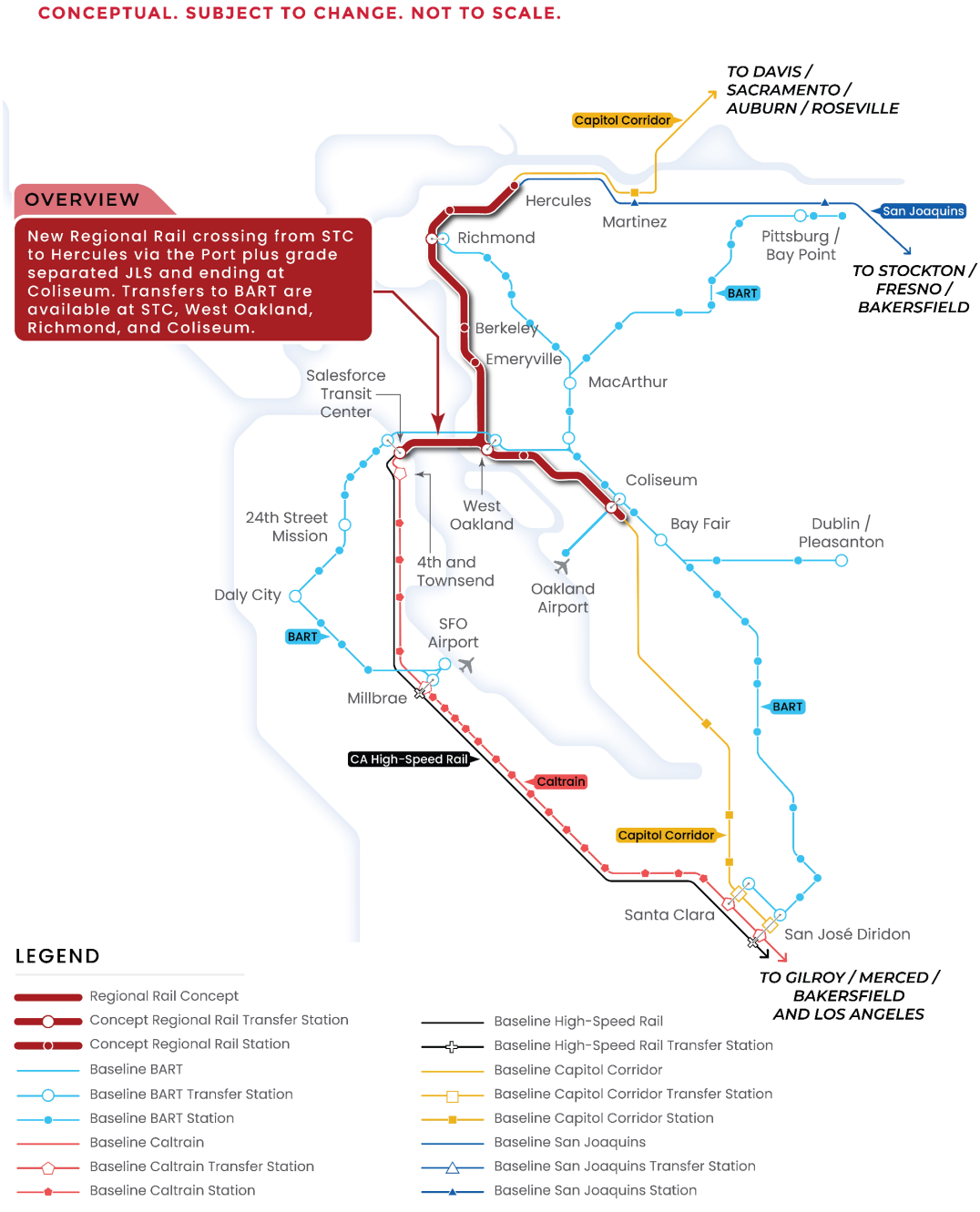


Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

Concept 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 JLS, and it would end at the Coliseum Station. Transfers to BART would be available at the STC, West Oakland, Richmond, and Coliseum stations. During peak periods, an average of 10.5 tph would operate through the new crossing.

Figure 4-4. Concept B: RR Port Map

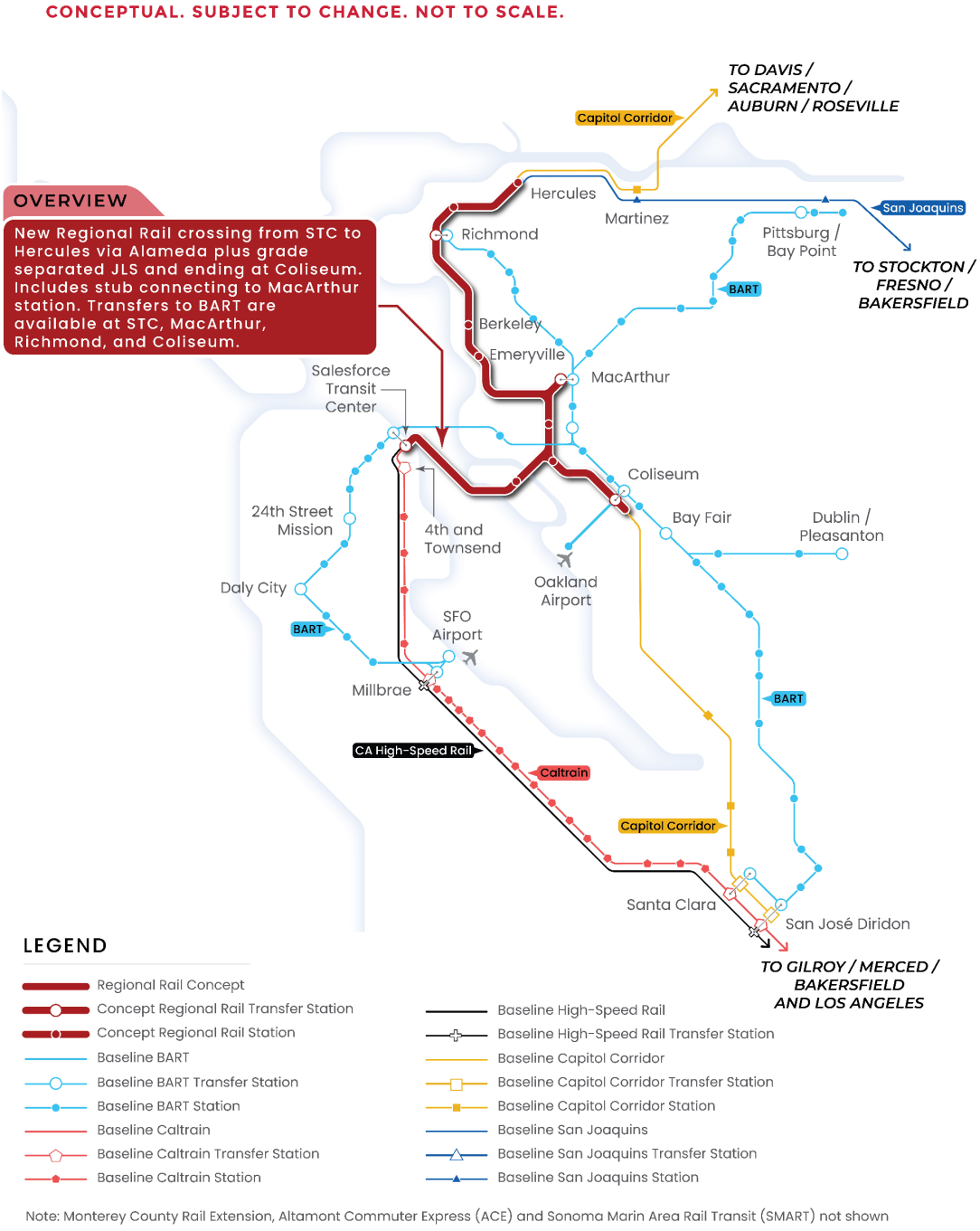


Note: Monterey County Rail Extension, Altamont Commuter Express (ACE) and Sonoma Marin Area Rail Transit (SMART) not shown

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 JLS, and it would end at the Coliseum Station. Also, it includes a branch connecting to the MacArthur Station. Transfers to BART would be available at the STC, MacArthur, Richmond, and Coliseum stations. During peak periods, an average of 10.5 tph would operate through the new crossing.

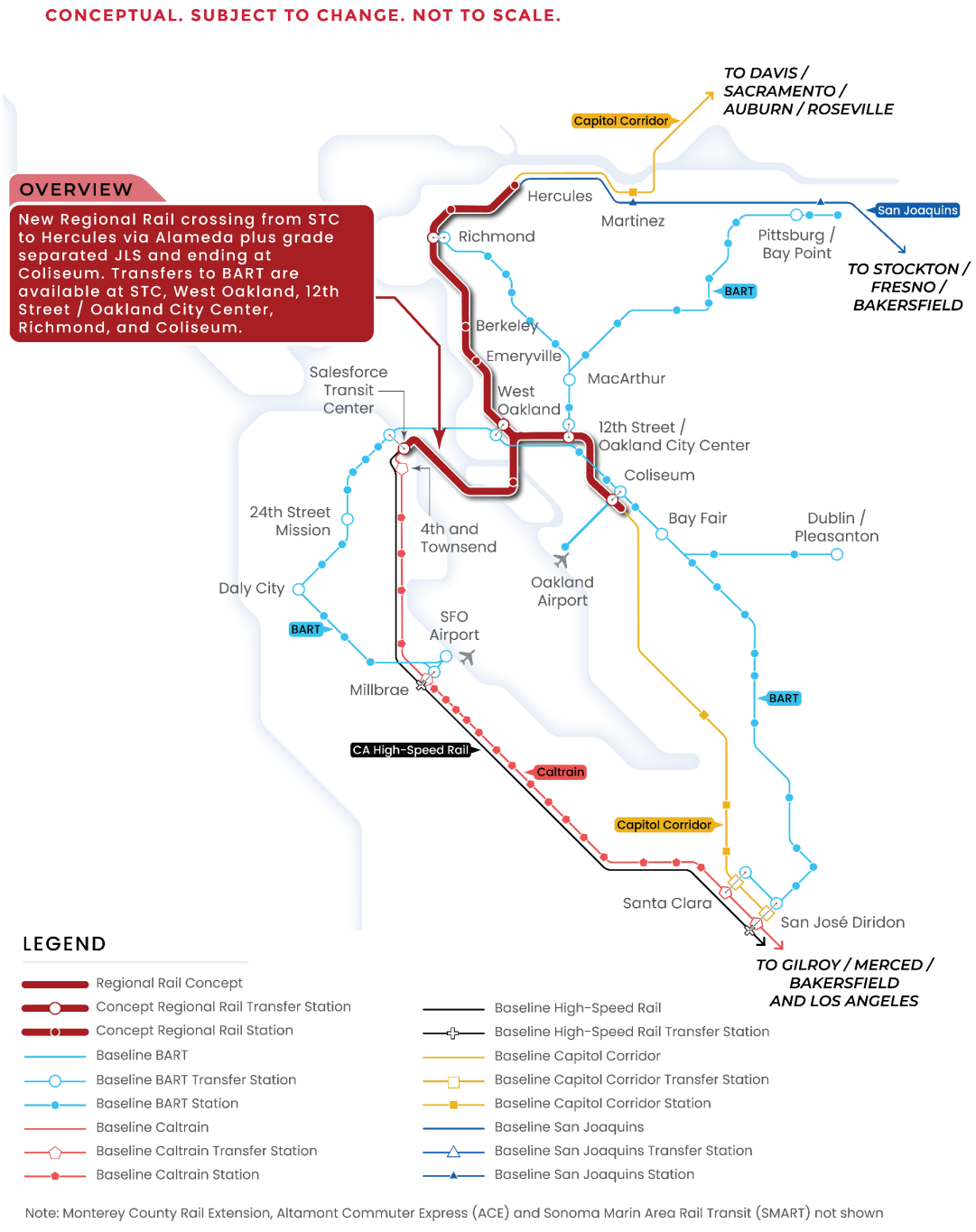
Figure 4-5. Concept E: RR MacArthur Map



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 JLS, and it would end at the Coliseum Station. Transfers to BART would be available at the STC, West Oakland, 12th St./Oakland City Center, Richmond, and Coliseum stations. During peak periods, an average of 10.5 tph would operate through the new crossing.

Figure 4-6. Concept F: RR Oakland CC Map



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

Regional Rail Concept Variants

Additional Regional Rail crossing concept variants were evaluated to help determine the potential impacts of:

- Increasing Regional Rail service frequencies through the new crossing by an additional 10 tph.
- Offering different Regional Rail infrastructure and service extent variants on the North Branch,[13] (i.e., Richmond, San Pablo, or Hercules).
- Increasing the number of Regional Rail transbay services south of DTSF from the STC to Millbrae via Bayview.

Recommendations for Regional Rail Concepts

The evaluation of the Regional Rail Initial Concepts and variants led to the following key recommendations to inform the development of the Regional Rail Representative Concepts[14] analyzed 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 DTSF 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.
- Perform further analysis to understand the operational constraints and impacts of increasing the frequency of service through the crossing to further utilize the potential of the crossing. This could be achieved by adding Regional Rail transbay services south of DTSF to expand ridership, serve unmet transbay demand, increase job accessibility, and provide additional benefits to priority populations in southeastern San Francisco.
- Initiate 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.

[13] The 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 corridors.
[14] 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 reallocating additional services from the South Branch[15] to the North Branch when increasing frequencies, as the North Branch generates a greater ridership response to the same frequency improvement.

Further information about the concepts evaluated and the evaluation findings can be found in *Appendix B: Round 1 Evaluation Report.*

[15] The 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 stations.

5. Round 2 Evaluation

Round 2 involved the evaluation of a BART and a Regional Rail Representative Concept. Each was a high-performing concept that was a reasonable representation of the crossing technology. The Representative Concepts included assumptions on potential infrastructure, markets, and service that enabled the Link21 Team to evaluate a BART concept against a Regional Rail concept. The definition of a Representative Concept, in terms of potential infrastructure, markets, and service, is subject to change. There are other potential variants associated with each Representative Concept and these will be considered as potential options after Stage Gate 2.

Representative Concepts were 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.

5.1. Development of Representative Concepts

5.1.1. Key Considerations of Representative Concept Development

In addition to the Planning Requirements, the following general assumptions and key considerations were identified to guide the concept development process in Round 2:

- Development of the concepts should facilitate a fair comparison between the BART and Regional Rail technologies. For example, where potential stations are identified in the same geographic area for both technologies, such as at Alameda, the same station location is assumed in all concepts.
- Minimal provisions to accommodate and not preclude a future western San Francisco extension are included in both Representative Concepts to reduce potential disruptions, enhance flexibility, and create even comparison between BART and Regional Rail technologies.
- All concepts are consistent with Caltrain's Enhanced Growth Scenario and should not preclude California High-Speed Rail or The Portal[16] project that would connect the Caltrain terminus in DTSF to the STC.
- Transfers between Regional Rail and BART, and between BART and BART, in DTSF should be facilitated with a pedestrian tunnel to improve the passenger experience and network connectivity.

[16] The Portal was formally known as the Downtown Rail Extension (DTX).

- BART-to-BART transfers should be enhanced where possible to improve passenger experience and provide redundancy and alternative routes in case of delays.
- The BART Representative Concept should have the same pedestrian improvements as the Regional Rail Representative Concept at the Coliseum Station for a fair comparison of the two technologies.
- Alignment considerations through the Richmond, Emeryville, and Berkeley stations should include Union Pacific Railroad constraints, right-of-way impacts, and Amtrak long-distance train operations.

5.1.2. Potential Stations at Bayview and San Antonio

During the Exploratory Evaluation and Round 1, the Link21 Team considered concepts that included potential new stations at Bayview and San Antonio. Following Round 1, the Link21 Team made a strategic decision not to include these two stations in the Representative Concepts. Although Link21 identified that introducing these stations have the potential to materially enhance the benefits of the Crossing Project, they are being advanced by other agencies and could be introduced independent of Link21, while not precluding their inclusion in the future.

5.2. BART Representative Concept

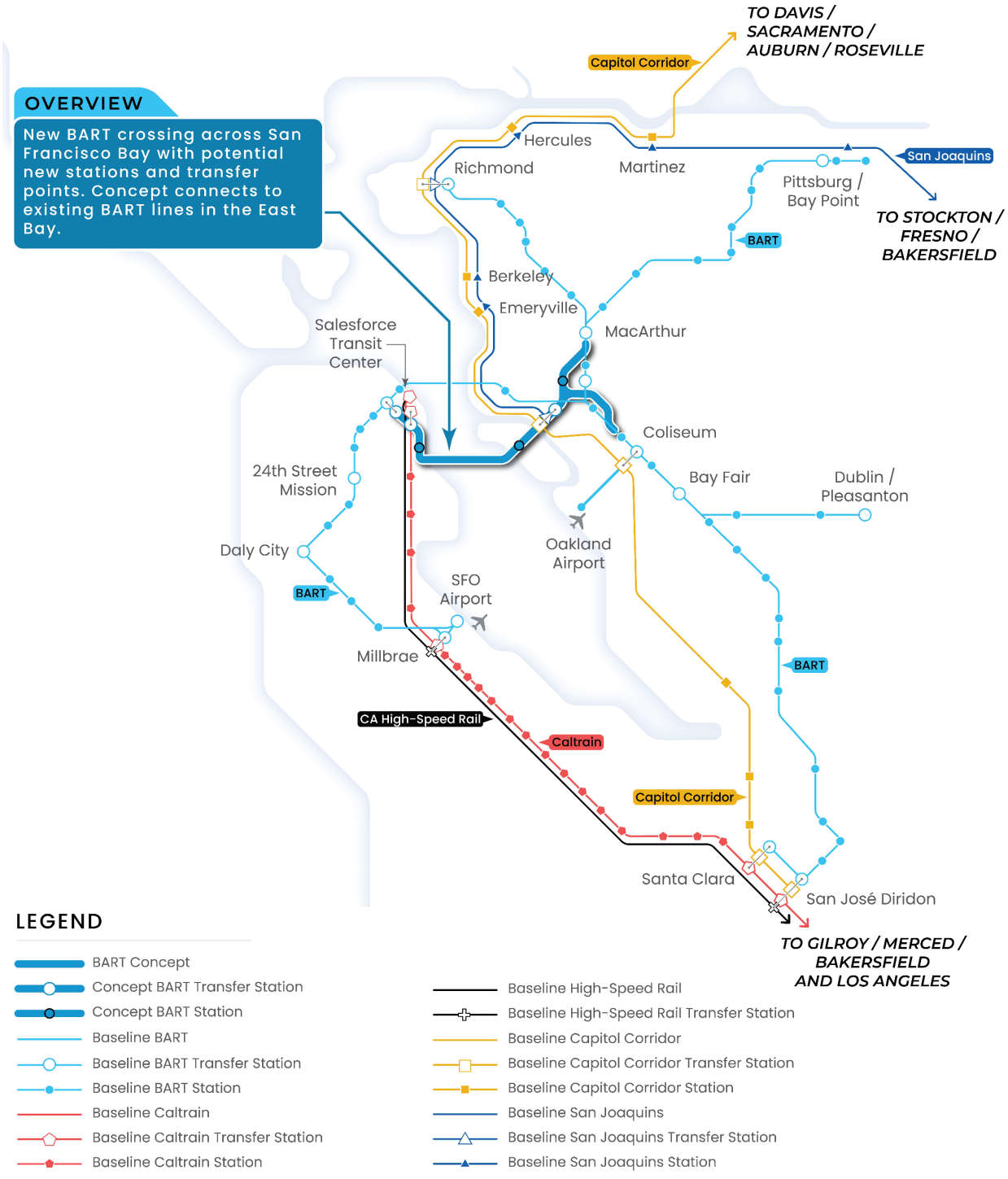
Following the Round 1 evaluation, Concept D: BART Downtown San Francisco via Mission Bay and Alameda was advanced to Round 2 as the BART Representative Concept. This is due to the Round 1 analysis of BART alternatives showing that the Mission Bay - STC alignment offered greater benefits in ridership than Concept C: BART STC, and it had similar cost-effectiveness to other variants considered. Also, it is likely that routing BART to Mission Bay via the STC would make the implementation of a potential future extension to western San Francisco less efficient. Therefore, the BART Representative Concept was an evolution of Concept D.

The BART Representative Concept provides a BART crossing from DTSF at 3rd and Mission streets to Oakland via Mission Bay and Alameda, connecting to existing BART Urban | Metro services near MacArthur Station (Red and Yellow lines) and south of the Lake Merritt Station (Blue and Green lines). The BART Representative Concept also included ancillary improvements to the Regional Rail network.

Figure 5-1 provides an overview of the BART Representative Concept across the San Francisco Bay with potential new stations and transfer points at downtown San Francisco and Coliseum. The concept would connect to existing BART lines in the East Bay. This concept provides a total of 24 tph through the crossing during the peak hours (compared to a practical maximum of 30 tph). Further details on the BART Representative Concept can be found in Section 4 of the *PBC Report* and in the *Concept Planning and Engineering Report*.

Figure 5-1. BART Representative Concept

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

5.3. Regional Rail Representative Concept

Several Regional Rail Initial Concepts were evaluated in Round 1 and the evaluation identified high-performing features to inform the definition of a Regional Rail Representative Concept. Because the Regional Rail network is less developed, additional enhancements are required to further utilize the capacity in the crossing. Further analysis is needed before determining the definition of a Regional Rail Concept, and many features of the Regional Rail Initial Concepts have not been ruled out at this point in time. These will be considered as options after Stage Gate 2.

The Link21 Team held a series of workshops to collaborate on the refinement of the Representative Concepts to address key questions on service, infrastructure, and station locations. Based on the recommendations from Round 1, high-performing features of the Regional Rail Initial Concepts were identified and combined into a Regional Rail Representative Concept**.**

The Regional Rail Representative Concept provides a Regional Rail crossing from STC to Oakland via a potential new station at Alameda. This would enable:

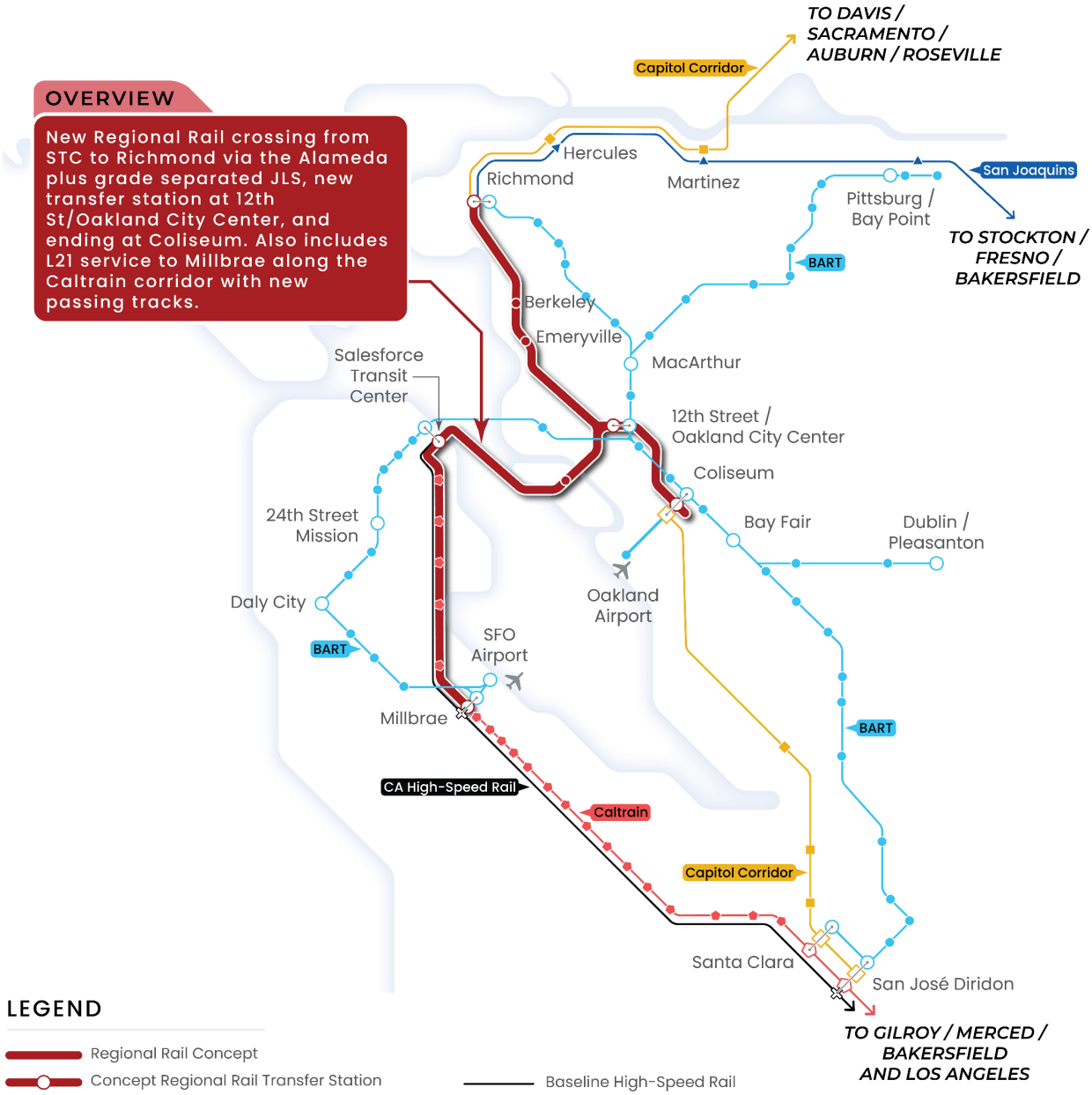
- Urban | Metro services between DTSF, the Peninsula, Richmond, Oakland Coliseum, Emeryville, and Berkeley (Amtrak)
- Intercity | Express services between DTSF and Sacramento/Stockton

The Regional Rail Representative Concept also included ancillary improvements to the BART network.

Figure 5-2 provides an overview of the Regional Rail Representative Concept from the STC to Richmond via Alameda, grade separation at JLS, new transfer station at 12th St./Oakland City Center, and termination at the Coliseum Station. It also includes service to Millbrae along the Caltrain corridor with new passing tracks. This concept provides a total of 16 tph through the crossing during the peak hours (compared to a practical maximum of 24 tph). Further details on the Regional Rail Representative Concept can be found in Section 4 of the *PBC Report* and in the *Concept Planning and Engineering Report*.

Figure 5-2. Regional Rail Representative Concept

CONCEPTUAL. SUBJECT TO CHANGE. NOT TO SCALE.



LEGEND

- Regional Rail Concept
- Concept Regional Rail Transfer Station
- Concept Regional Rail Station
- Baseline BART
- Baseline BART Transfer Station
- Baseline BART Station
- Baseline Caltrain
- Baseline Caltrain Transfer Station
- Baseline Caltrain Station
- Baseline High-Speed Rail
- Baseline High-Speed Rail Transfer Station
- Baseline Capitol Corridor
- Baseline Capitol Corridor Transfer Station
- Baseline Capitol Corridor Station
- Baseline San Joaquins
- Baseline San Joaquins Transfer Station
- Baseline San Joaquins Station

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

5.4. Concepts Considered But Not Advanced

Throughout the concept development process, potential Link21 concepts were screened out at various stages of the evaluation process. Concepts that were screened out does not mean they were precluded from future consideration, as part of Link21 or as a separate project to be promoted by others. Further information and rationale for filtering these is provided in the *Concepts Considered But Not Advanced Summary Memorandum.*

6. Next Steps

The concept development process described in this document identified a BART Representative Concept and a Regional Rail Representative Concept for further evaluation.

The PBC Report and the Round 2 evaluation of the BART and Regional Rail Representative Concepts are intended to support the identification of a **Preliminary Project,** which is centered on a new transbay passenger rail crossing of **an identified technology** between San Francisco and Oakland. The Preliminary Project (and potential options) will then be subject to further development, evaluation, and refinement in subsequent phases of work.