

# Memorandum

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**SUBJECT:** Draft Concepts Considered but Not Advanced Memorandum

## Introduction

The Link21 Program (Link21) is a generational initiative with the vision to transform the Northern California Megaregion's (Megaregion)<sup>1</sup> passenger rail network into a faster, more integrated system that provides safe, efficient, equitable, and affordable travel for everyone. At Link21's core is a new transbay passenger rail crossing project (Crossing Project) between San Francisco and Oakland that could unlock economic, environmental, and quality of life benefits for residents and businesses throughout the Megaregion.

To fulfill this vision, the Link21 Team<sup>2</sup> considered numerous rail concepts leading to the development of a Preliminary Project, defined as the improvements that will be recommended for advancement at Stage Gate 2. These improvements will include an identified rail technology in the crossing (BART or Regional Rail) for service delivery. This memorandum is intended to demonstrate the range and diversity of the concepts that were explored. It also summarizes the process that led to the elimination of most of these concepts.

Concepts were identified while implementing a planning and environmental linkages (PEL) type approach, which is a collaborative and integrated approach to planning to arrive at a project that considers the community, environmental, and economic benefits and impacts of a proposed concept during the planning process. This memorandum supports Link21's future compliance with the National Environmental Policy Act (NEPA)

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<sup>1</sup> The 21-county Megaregion 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.

<sup>2</sup> San Francisco Bay Area Rapid Transit District (BART), Capitol Corridor Joint Powers Authority (CCPA), Program Management Consultants (PMC), and Consultants supporting program identification/project selection (Consultants)

and the California Environmental Quality Act (CEQA) requirement that documentation of what concepts (or alternatives) were or were not advanced is made available to the public and stakeholders.

Concepts are organized in context with Link21's planning process. High-profile concepts are discussed in the following sections. Detailed tables summarizing all the concepts that were not advanced are provided in Attachments A and B for additional reference. Attachment C lists concepts still under consideration prior to Stage Gate 2.

## Link21 Planning Process

Link21 employs a rigorous, decision-driven stage gate process to control risk and ensure the timely and cost-effective delivery of its first project. As part of this process, stage gates are applied at key milestones to memorialize decisions and assess the program's readiness to advance. Link21's past (and future) stage gates are discussed in more detail in the *Preliminary Business Case Report*.

The Crossing Project is defined as a new transbay passenger rail crossing between San Francisco and Oakland that includes connections 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, for BART and Regional Rail.<sup>3</sup> The Link21 Team performed studies to define a range of potential concepts in support of the evaluation of a new transbay passenger rail crossing between San Francisco, Oakland, and beyond.

The Link21 Team established planning requirements to guide concept development of the Crossing Project. These included the following requirements:

- Provide a second rail crossing between Oakland and San Francisco with BART and/or Regional Rail technology.
- Provide wider improvements to the BART and Regional Rail networks that enhance the performance of the crossing and that 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.
  - Build upon existing adopted plans.

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<sup>3</sup> It could include intercity, commuter, or high-speed rail.

## Environmental Considerations

A PEL type approach was adopted throughout the concept development process, and it drew on environmental constraints and opportunities data and workshops. Potential environmental concerns were evaluated during concept development, such as avoiding or minimizing temporary and permanent disruptions to sensitive habitats, historic resources, public parks, schools, hospitals, and other community resources.

## Equity Considerations

The concept development process considered infrastructure locations and construction methods that would minimize temporary or permanent disruptions to communities with priority populations, particularly within residential areas.

## Planning Phases

The planning process is organized into four phases that are defined by specific milestones (stage gates) and activities by which concepts are developed and evaluated in increasing levels of detail.

The process builds from the initial development of the Link21 problem and vision statements and goals and objectives (Program Definition) to inform project concepts (Project Identification). Next the process would identify and define a Preliminary Project (Project Identification) followed by environmental review of the Proposed Project and any alternatives (Project Selection). Ultimately, the process would culminate in project implementation (Project Delivery). Each phase and their corresponding milestones are summarized as follows:

- **Program Definition** established several foundational elements of Link21, including the problem and vision statements and a set of accompanying program goals and objectives. This informed the structure, steps, and timeline for the business case process and the key assumptions to be used in subsequent evaluation steps. This phase concluded in spring 2022.
- **Project Identification**, the current phase, is supported by engagement, and it develops project concepts and evaluates them to identify a Preliminary Project and define a Proposed Project. The goal is to identify a Proposed Project for environmental review that is centered on a new transbay passenger rail crossing with an identified technology (BART or Regional Rail) along with any related infrastructure. This phase began in 2022 and included a pre-evaluation screening, exploratory evaluation, Initial Concept evaluation (Round 1), and Representative Concept evaluation (Round 2). This phase will identify a Preliminary Project at Stage Gate 2 and conclude with a Proposed Project (with alternatives) at Stage Gate 3.

- **Project Selection** will identify and evaluate a range of project alternatives from the concepts(s) selected in the Project Identification phase, which will correspond with the alternative(s) in the Notice of Intent (NEPA) and Notice of Preparation (CEQA). This phase will end with the completion of draft environmental documents and the adoption of a preferred alternative.
- **Project Delivery** will focus on implementing the approved project through final design and construction. The final milestone is the initiation of revenue service.

## Previous Planning Efforts Related to a Transbay Crossing

Planning efforts by other agencies provided the foundation for Link21. The Link21 Team used these efforts to guide its initial direction and help develop the program's vision and goals and objectives. The following documents were formative in Link21's development:

- Metropolitan Transportation Commission (MTC) Plan Bay Area 2050 (2021)
- MTC Horizon Crossings: Transformative Investments for an Uncertain Future (2019)
- California State Rail Plan (2018)
- MTC Plan Bay Area 2040 (2017)
- MTC Bay Area Core Capacity Transit Study (2017)
- BART Sustainable Communities Operational Analysis (2013)
- Bay Area Toll Authority San Francisco Bay Crossings Study Update (2012)
- MTC San Francisco Bay Area Regional Rail Plan (2007)

## Program Definition Phase

The engagement and outreach strategy during the Program Definition phase (2019 to 2022) focused on laying the foundation of the program rather than developing specific concepts. This phase established Link21’s vision and goals and objectives, which were memorialized at Stage Gate 1. To support concept development, the Link21 Business Case Team developed metrics to measure concept benefits and costs. This analytical work would frame concept development in the subsequent phase, Project Identification.

High-profile concepts not advanced during this phase are summarized in this section. These generally related to either technical crossing types or geographical location. [Attachment A](#) provides a summary of all concepts not advanced during Program Definition.

### Key Concepts Not Advanced

- Automobile Transbay Crossing
- Transbay Rail Bridge Crossing
- Non-compatible Technologies
- Diesel Trains in Transbay Crossing
- Rail Corridors Beyond a Transbay Crossing
- Expanded Ferry Service

- Technical Crossings Not Advanced
  - A new **automobile transbay crossing** between San Francisco and Oakland was not advanced because it would be inconsistent with statewide environmental goals and regional/state funding. In 2022, the California Air Resources Board introduced its final proposal to cut fossil fuel consumption by 86% and achieve carbon neutrality by 2045, and a new automobile crossing would not reduce fossil fuel consumption or greenhouse gas emissions. Regional Measure 3 and BART Measure RR designated funding to plan for future rail capacity needs, including a second transbay passenger rail crossing. Furthermore, a new automobile crossing would not meet projected transit demand that is associated with the existing BART crossing.
  - A new **transbay passenger rail crossing on a bridge** was considered. Rail service ran on the San Francisco-Oakland Bay Bridge until 1958, connecting in San Francisco to an elevated second-story-station platform. However, existing and planned rail stations in San Francisco today are underground, which means a new rail bridge crossing would need a transition to be underground in San Francisco and Oakland. Also, a new rail bridge would need to be high enough to allow commercial ships to pass underneath, which would complicate the transition to at-grade (or subgrade) levels in San Francisco and Oakland. These transitions would require extensive building demolition on both sides of the San

Francisco Bay, which would likely be cost prohibitive for right-of-way acquisition. Also, building demolition would displace residents and businesses. A new bridge also would require numerous piers to support it. While the placement of piers would be designed to accommodate commercial ship passage, the footprint of these piers could have significant environmental impacts on the San Francisco Bay. Based on these constructability challenges, a new rail bridge was not advanced.

- **Non-compatible technologies<sup>4</sup> with BART or Regional Rail** were not advanced. Limiting concepts to compatible technologies would be supported by voter-approved funding requirements (including Regional Measure 3 and BART Measure RR which designated funding for a second transbay passenger rail crossing), previous and ongoing regional planning and programming (*California State Rail Plan, Plan Bay Area 2050*, etc.), and BART and CCJPA's roles and responsibilities.
- The operation of **diesel trains** in a new transbay crossing would not meet the State of California's mandate that all transit and rail vehicles should be zero-emission by 2035.<sup>5</sup> In addition, diesel trains would not meet the goals and objectives of Link21. Specifically, operating diesel trains in a new transbay crossing would be inconsistent with the program's goals to promote *equity and livability* and *advance environmental stewardship and protection*. Pollutant emissions from diesel trains would conflict with the related objectives of improving air quality and reducing greenhouse gas emissions. For practical purposes, it would not be feasible to vent air pollutants generated by diesel trains under the San Francisco Bay. Ventilation would be required to protect the health of riders.
- Rail Corridors Beyond a Transbay Crossing
  - A number of **infrastructure improvements that geographically were well beyond a transbay crossing** were evaluated early in the Program Definition phase. These concepts were not advanced as a Preliminary Project because they lacked the travel demand that would substantially increase passenger trips through a new transbay passenger rail crossing. Even though these concepts were not advanced, Link21 did not preclude them from consideration as a potential future project or a separate project by others.
- **Expanded ferry service** was raised during community and stakeholder outreach. Concepts included the expansion of ferry service and/or additional ferry terminal locations. These concepts were not advanced as during Stage Gate 1 the BART and

<sup>4</sup> Examples include hyperloop, light rail, Maglev, people mover, and bus.

<sup>5</sup> California Air Resources Board Innovative Clean Transit regulation adopted in December 2018.

CCJPA Boards determined that the Link21 study would be focused on an underground rail crossing and technology compatible with BART or Regional Rail.

## Project Identification Phase to Stage Gate 2

The Project Identification phase (2022 to present) uses Link21’s vision, goals and objectives, and business case framework to develop BART and Regional Rail crossing concepts. In addition, concepts explore key service and supporting infrastructure improvements for the BART and Regional Rail networks.

Concept development during the Project Identification phase occurred in stages (**Figure 1**). This work was informed by the market analysis and technical planning efforts (including the identified environmental constraints and opportunities). Concept evaluation was driven by the need to “right-size” a concept to advance as the Preliminary Project at Stage Gate 2.

This phase contains five stages for the concept identification, development, evaluation, and refinement process:

- Pre-evaluation Screening
- Exploratory Evaluation
- Initial Concept Evaluation (Round 1)
- Representative Concept Evaluation (Round 2)
- Preliminary Project Identification

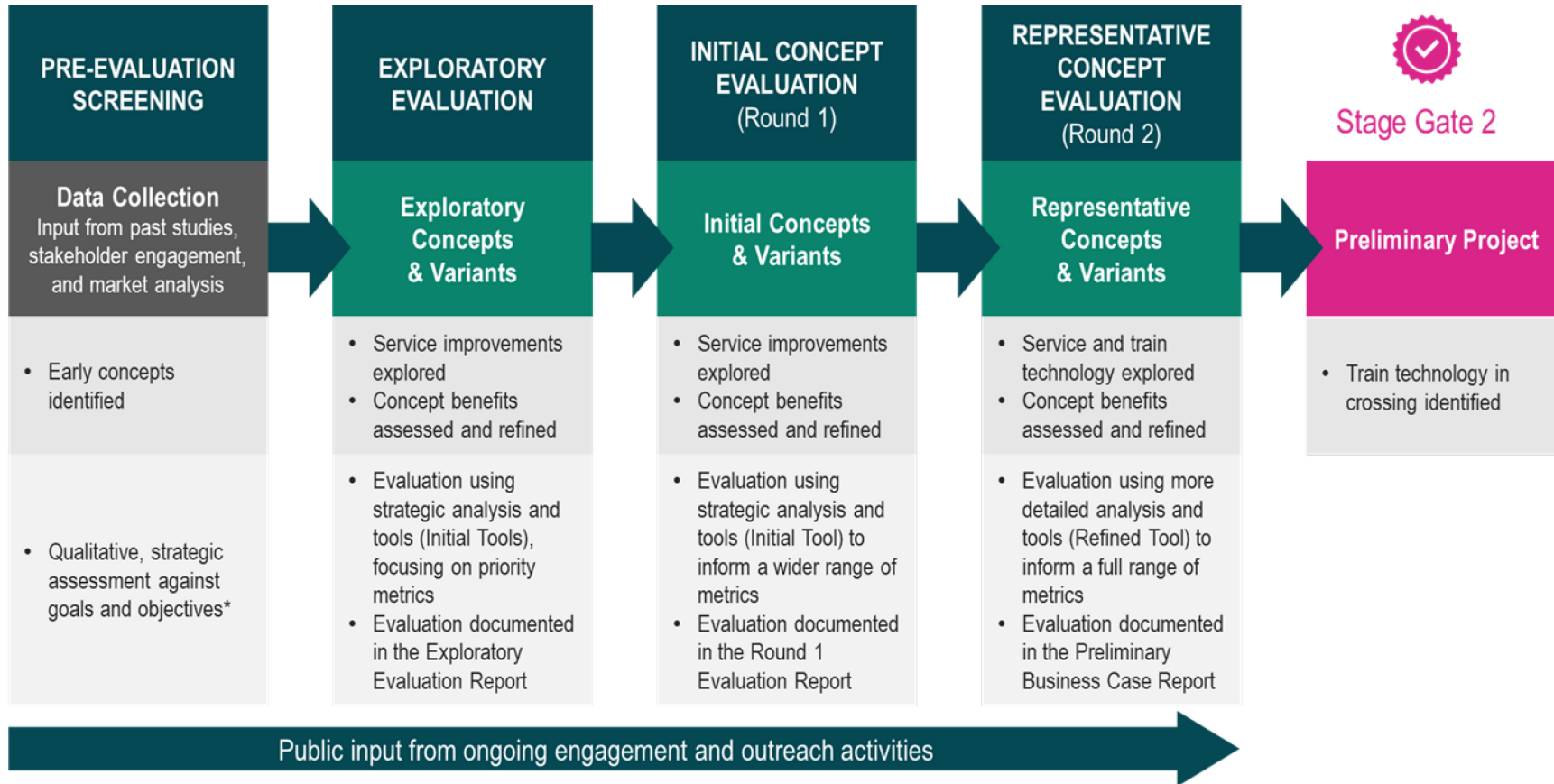
Details on the development of concepts during each stage is provided in the *Preliminary Business Case Report, Appendix C*.

During the Program Identification phase, concept development was informed by engagement and outreach efforts. Input was obtained during educational and milestone-specific campaigns that shared Link21’s planning progress. Specific input was requested on the market analysis, concepts, service plans, and Preliminary Purpose and Need statement. Through this input, additional concepts (and concept components) were identified for consideration.

### Key Concepts Not Advanced

- Dual-gauge Crossing
- Four-track Crossing
- Service Along the I-580/ MacArthur Corridor
- BART Transbay Crossing to Bayview
- Alternative Bay Crossings
- Regional Rail Transbay Crossing to Mission Bay
- Regional Rail Service to Hercules

**Figure 1. Concept Development and Evaluation Process During the Project Identification Phase**



\* Link21 goals and objectives are consistent with the preliminary Purpose and Need



High-profile concepts not advanced during the Project Identification phase are summarized in this section. [Attachment B](#) provides a summary of all concepts not advanced during this phase.

- Types of technical crossings not advanced:
  - A **dual-gauge crossing**, which BART and Regional Rail would share, was not advanced due to operational concerns. A BART train would sustain more damage (and passenger injuries) than a heavier Regional Rail train during a collision. To address this, BART trains would need to be made more crashworthy or there would need to be greater time separation between BART and Regional Rail trains. Upgrading the BART fleet and its associated elevated guideways would incur an estimated cost of \$5 to 8 billion. Providing additional time between trains would lower the number of trains using the transbay crossing, thereby reducing system capacity and revenue. Maintenance of a dual-gauge crossing would be more frequent than a single-gauge crossing and result in increased maintenance costs and decreased track availability.
  - A **four-track crossing**, either as a single four-track crossing or two separate two-track crossings, was evaluated to carry BART and Regional Rail across the San Francisco Bay. The analysis showed that two tracks would provide sufficient ridership capacity to meet future demand; therefore, the additional two tracks were not justified. Constructing one crossing would not preclude a second crossing in the future.
- **Service along the I-580/MacArthur corridor** was evaluated for BART and Regional Rail. This concept would connect the cities of Oakland and San Leandro. It was not advanced because it was not necessary to support a new rail crossing in the Transbay Corridor. As such, the concept would not meet Link21’s Preliminary Purpose and Need statement.
- A **BART transbay crossing to Bayview** would connect Oakland to the Bayview neighborhood of San Francisco. A longer rail connection through the Bayview neighborhood would have longer travel times and be less attractive to riders traveling to downtown San Francisco. It is likely this concept would be less effective in increasing passenger ridership in the Transbay Corridor, which is a key element of the Preliminary Purpose and Need statement.
- Community and stakeholder outreach efforts<sup>6</sup> raised the idea for **alternative bay crossings**. Concepts included a direct rail connection between the San Francisco International (SFO) and Oakland International (OAK) airports and rail crossings along existing automobile corridors (e.g., Dumbarton and San Mateo-Hayward

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<sup>6</sup> Refer to the *Engagement and Outreach Stage Gate 2 Summary Report* for more information on Link21’s community and stakeholder outreach efforts.

bridges). Crossings were advanced that serviced the travel markets with the greatest potential and provided competitive travel times. These alternative corridors were not advanced due to market and travel time factors and a lack of density to support rail. Specifically, the lack of a new transbay passenger rail crossing between San Francisco and Oakland would not address long-term forecasted travel demand.

- **A Regional Rail transbay crossing to Mission Bay** would include a Regional Rail connection between the Mission Bay neighborhood in San Francisco and downtown Oakland. This concept was not advanced because the new rail corridor from the East Bay should connect to an existing rail corridor on the San Francisco Peninsula. A crossing to Mission Bay creates challenges in connecting to the Salesforce Transit Center and would create a circuitous alignment that is inferior operationally and in passenger travel time. In addition, it would not be feasible to construct this concept without demolishing numerous buildings, which would result in the relocation of residents and businesses
- Multiple concepts considered urban metro<sup>7</sup> **Regional Rail service to Hercules**, which would involve additional infrastructure improvements north of Richmond to deliver more frequent rail service to the planned station for intercity service in Hercules. Analysis indicated ridership did not justify additional infrastructure north of Richmond, which could also require a rail turnaround and storage yard. However, Link21 would not preclude these infrastructure improvements as a separate project by others.

## Concepts Still Under Consideration

Concepts that remain under consideration prior to Stage Gate 2 generally fall into three major categories: potential infrastructure improvements, potential technologies, and potential service changes. [Attachment C](#) provides a summary of the concepts (and concept components) that are still under consideration.

- Potential infrastructure improvements:
  - A **Regional Rail transbay crossing** would connect the Salesforce Transit Center in San Francisco to Oakland City Center via an alignment through Alameda. In the East Bay, Regional Rail infrastructure improvements would extend north to Richmond and south to the Coliseum Station. In the San Francisco Peninsula, infrastructure improvements would extend from the Salesforce Transit Center south to a point to be determined by subsequent study.

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<sup>7</sup> Urban metro service would be frequent rail service between stations approximately 1-5 miles apart.

- A **BART transbay crossing** would connect downtown San Francisco (3rd Street and Mission Street) to Oakland. The alignment would pass through the Mission Bay neighborhood in San Francisco and connect to Oakland through Alameda.
- A **BART or Regional Rail service extension into western San Francisco** could be accomplished through multiple potential concepts, with connections to the Haight-Ashbury, Panhandle, Richmond, and/or Sunset neighborhoods. Concepts could bring rail service near universities (University of San Francisco; University of California, San Francisco; San Francisco State University) and major destinations (Golden Gate Park, San Francisco Zoo). Each concept would connect to the existing BART line near the Daly City Station.
- Community and stakeholder outreach proposed **new rail stations** and **expanded transfer opportunities** between BART and Regional Rail for consideration. These concepts will be evaluated as the Preliminary Project is identified and further defined.
- Planning and outreach efforts identified other **potential technologies**, such as electric multiple unit and hydrogen-powered trains, which could be used by a new crossing during its operation. Technologies will be fully evaluated after the Preliminary Project is identified and defined further.
- Community and stakeholder outreach efforts raised **potential service changes**, including 24-hour service, for the program’s consideration. Service planning would occur after the preliminary project is identified and further defined.

## Next Steps

The following next steps are anticipated after a Stage Gate 2 decision:

- The Link21 Team will initiate technical feasibility studies and engagement/outreach efforts on the Preliminary Project. This work will identify the scope of the Proposed Project and potential alternatives to consider for advancement at Stage Gate 3.
- The Link21 Team will prepare a report to formally document the concepts that were not advanced to fully support future NEPA/CEQA compliance post-Stage Gate 3.

## Attachment A: Concepts Not Advanced During the Program Definition Phase

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
<b>TYPES OF TECHNICAL CROSSINGS</b>			
Planning	Automobile transbay crossing	This concept would construct a new automobile transbay crossing between San Francisco and Oakland.	A new automobile crossing between San Francisco and Oakland would not meet statewide goals to reduce greenhouse gas emissions. In 2022, the California Air Resources Board introduced its final proposal to cut fossil fuel consumption by 86% and achieve carbon neutrality by 2045. A new automobile crossing would not reduce fossil fuel consumption or greenhouse gas emissions. Regional Measure 3 (2018) and BART Measure RR (2016) designated funding to plan for future rail capacity needs, including a second transbay passenger rail crossing. In addition, a new automobile crossing would not meet projected transit demand that is associated with the existing transbay BART crossing. Based on this, a new automobile transbay crossing was not advanced.
Planning	Transbay rail crossing on a bridge	This concept would provide a new transbay passenger rail crossing on an elevated bridge across the San Francisco Bay.	Rail service ran on the San Francisco-Oakland Bay Bridge until 1958, connecting in San Francisco to an elevated second story station platform. However, existing and planned rail stations in San Francisco are underground. As a result, a new rail bridge would need to transition to underground levels in San Francisco and Oakland. A new rail bridge would have to be high enough to allow commercial ships to pass underneath. Due to the anticipated height of the bridge (220-feet tall) and its maximum grade (3%), substantial impacts in San Francisco and Oakland would occur to transfer a rail bridge to at-grade (or subgrade) levels. These transitions would require extensive building demolition in both cities for right-of-way acquisition. Also, building demolition would displace residents and businesses. A new bridge would require numerous piers to support it. While the placement of piers would be designed to accommodate commercial ship passage, the footprint of these piers could have significant environmental impacts on the San Francisco Bay. Based on these constructability challenges, a new rail bridge connecting Oakland and San Francisco was not advanced.
Planning	Transbay crossing using incompatible technologies with BART or Regional Rail	A new transbay crossing utilizing vehicle technologies not compatible with BART broad-gauge rail or Regional Rail standard-gauge rail, such as a hyperloop, Maglev, people mover, or buses. Hyperloop is a proposed high-speed transportation system involving capsules supported by air bearings in a low-pressure environment inside a tube. Maglev is a train system that levitates along a guideway using magnetic forces. A people mover is a small-scale automated guideway transit system.	These technologies were not advanced due to their incompatibility with BART and Regional Rail (standard-gauge rail) infrastructure. Limiting Link21's potential concepts to compatible rail technologies is supported by voter-approved funding requirements (Regional Measure 3 and BART Measure RR that designated funding for a second transbay passenger rail crossing), previous and ongoing regional planning and programming ( <i>California State Rail Plan, Plan Bay Area 2050</i> , etc.), and BART and CCJPA's roles and responsibilities.
Planning	Diesel trains operating in a new transbay crossing	A new transbay passenger rail crossing that accommodates diesel-powered trains.	Regional Rail is largely powered by diesel fuel today. However, Regional Rail can be powered by electricity, hydrogen, or battery. The use of diesel trains was not advanced. First, it would not meet Link21's goals and objectives. Specifically, it would be inconsistent with the goals to promote equity and livability and advance environmental stewardship and protection. Pollutant emissions from diesel trains would conflict with the related objectives of improving air quality and reducing greenhouse gas emissions. Second, it would not be feasible to vent air pollutants generated by diesel trains operating in a crossing under the San Francisco Bay, and ventilation would be required to protect riders' health. In addition to not meeting the program's goals and objectives, the State of California has mandated that transit and rail vehicles need to be zero emission by 2035.

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
<b>RAIL CORRIDORS BEYOND A TRANSBAY CROSSING</b>			
Planning	Regional Rail – Lathrop to Ceres/Merced	This concept is based on plans by others (San Joaquin Regional Rail Authority) to provide a rail connection between Stockton, Lathrop, and Merced.	This is an existing rail corridor with proposed improvements as part of the Valley Rail Program. The project is being led by others and not included in Link21 because it would not directly serve travel demand in the Transbay Corridor via a new transbay passenger rail crossing. However, Link21 would not preclude rail infrastructure improvements of this future project.
Planning	Regional Rail – Marin County and North Bay	This concept is based on plans by others (Sonoma-Marín Area Rail Transit) for a Sonoma-Solano rail connection. This rail service would enable direct service from Marin County to Sacramento and south Bay Area markets.	This concept was studied by Sonoma-Marín Area Rail Transit. The project is being led by others and is not included in Link21 because it would not directly serve travel demand in the Transbay Corridor via a new transbay passenger rail crossing. However, Link21 would not preclude rail infrastructure improvements of this future project.
Planning	Regional Rail – Martinez to Stockton	This corridor connects Martinez to Stockton using BNSF-owned tracks, which are currently used by the San Joaquins intercity rail service.	Improvements in this corridor were not advanced because they would not directly serve travel demand in the Transbay Corridor via a new transbay passenger rail crossing. However, Link21 would not preclude rail infrastructure improvements in this corridor in the future.
Planning	Regional Rail – Richmond to Suisun-Fairfield	This concept would improve the existing Regional Rail corridor from Richmond to Martinez along either the existing shoreline route or a new southern route along State Route 4. The rail corridor would include several Carquinez Strait crossing options that lead to either Vallejo or Benicia before converging in Fairfield.	This concept was not included in Link21 because it would not directly serve travel demand in the Transbay Corridor. Capitol Corridor is conducting a planning and engineering feasibility study to improve travel time and reliability in this corridor. This concept may be advanced by others. Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Planning	Regional Rail – Sacramento to Auburn	This concept would improve the frequency of rail service between Sacramento to Auburn on shared tracks with the Union Pacific Railroad.	This concept was not included in Link21 because it would not directly serve travel demand in the Transbay Corridor. Capital Corridor already serves this corridor and has a project to increase frequencies.
Planning	Regional Rail – Oakland to San Jose	This concept would include BART and Regional Rail track improvements in the East Bay to better connect Oakland and San Jose.	Capitol Corridor is studying potential improvements to this corridor as part of the South Bay Connect project and the Alviso Rail Adaptation studies. Link21 considered adding double tracking to support an increase in the level of train service in this segment; however, the concept was not advanced because it did not increase or improve service through the Transbay Corridor. The South Bay Connect project environmental document assumes a footprint large enough for double tracking should such improvements be needed in the future.
Planning	Regional Rail – San Jose to Salinas	This corridor contains plans by others (Transportation Agency for Monterey County [TAMC]) that would connect San Jose to Gilroy, Salinas, Monterey, Santa Cruz, and other locations.	Link21 reviewed this corridor to identify constraints and opportunities but did not advance any concepts that would increase or improve service through the Transbay Corridor. Improvements in this corridor are planned by others and would not be precluded by Link21.
Planning	Regional Rail – Stockton to Sacramento	This concept would connect Stockton and Sacramento on two parallel sets of Union Pacific Railroad tracks.	Link21 reviewed this corridor but did not advance any concepts that would increase or improve service through the Transbay Corridor. Improvements in this corridor are planned by the San Joaquin Joint Powers Authority as part of the Valley Rail program. Link21 would not preclude this work by others
Planning	Regional Rail – Suisun-Fairfield to Sacramento	This concept would connect Suisun-Fairfield to Sacramento on shared or separate Union Pacific Railroad tracks.	Link21 considered increasing service levels in this segment on shared or separate tracks. This concept was not advanced because it did not improve the quality of the service through the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Planning	Tri-valley connection	This concept would provide Regional Rail service along the existing BART alignment from Oakland to Bay Fair. From Bay Fair, the rail corridor would turn east along existing BART tracks to Dublin. From	This concept was not advanced because existing rail service to Dublin/Pleasanton is provided by BART and additional service through the Tri-Valley to Livermore and San Joaquin County is being planned by others (Valley Link). This concept would require the removal of existing BART broad-gauge tracks and replacing them with standard-gauge tracks. This concept would increase Link21's scale and complexity without a commensurate increase in the quality of train service through the Transbay Corridor.

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
		Dublin, Regional Rail service would extend to Stockton.	
Outreach	BART extension to Vallejo	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed the intent of this concept would be to extend BART service to Vallejo.	A new BART extension to Vallejo would connect to the existing BART system; however, this would not provide any additional train service through the Transbay Corridor. As a result, this concept was not advanced by Link21. However, Link21 would not preclude future study of this concept.
Outreach	BART extension to Solano County	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed the intent of this concept would be to extend BART service to Solano County.	A new BART extension to Solano County would connect to the existing BART system; however, this would not provide any additional train service through the Transbay Corridor. As a result, this concept was not advanced by Link21. However, Link21 would not preclude future study of this concept.
Outreach	BART extension to Vacaville	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed the intent of this concept would be to extend BART service to Vacaville.	A new BART extension to Vacaville would connect to the existing BART system; however, this would not provide any additional train service through the Transbay Corridor. As a result, this concept was not advanced by Link21. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
<b>EXPANDED FERRY SERVICE</b>			
Outreach	Additional ferry stops	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include expanded ferry service and/or additional ferry terminal locations.	This concept was not advanced because during Stage Gate 1 the BART and CCJPA Boards determined that the Link21 study would be limited to an underground rail technology compatible with BART or Regional Rail. In addition, it does not meet the Preliminary Purpose and Need statement. Specifically, it would not address the need to expand access for priority populations to affordable rail service. Ferry service would require transfers on both sides of the San Francisco Bay creating additional transfers and wait time. Also, it is likely the concept would not address the long-term forecasted travel demand for the Transbay Corridor.
Outreach	West Oakland transit hub with ferry service	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include a new West Oakland transit hub with a ferry terminal that integrates transit services (rail, bus, etc.).	The Water Emergency Transportation Authority has no current plans for a West Oakland ferry terminal. A potential location for a new terminal would be at the Port of Oakland where ferry services could be provided within the Transbay Corridor. However, it is unlikely expanded ferry service would offset the forecasted rail ridership demand within the Transbay Corridor. Additionally, the distance between a new West Oakland ferry terminal and existing transit services (rail and bus) would require extended travel times for riders to travel to/from the new ferry terminal at the Port of Oakland.
<b>MISCELLANEOUS CONCEPTS OR CONCEPT COMPONENTS</b>			
Planning	Connection to BART M-Line in downtown San Francisco	This concept would connect a new BART transbay crossing to the existing BART M-Line west of the Civic Center/UN Plaza Station in San Francisco. BART's M-Line runs from Oakland through the Transbay Tube into downtown San Francisco. It continues under Mission Street and ultimately connects to Daly City.	This concept would require a construction period of up to two years to construct an approximately 400-foot-long transition structure. To prevent full closure of the existing M-Line during construction, the transition structure could be constructed from the ground surface one side at a time leaving one existing M-Line track in service. This sequencing would allow for continued BART operations using a single track between the Embarcadero and 24th St./Mission stations. However, this single tracking would reduce existing BART capacity by 75-85%. BART would not be able to offset this loss of rail capacity during this construction period. Delays likely would require BART riders to find alternative means of transportation during construction, including bus and Caltrain service. These separate services would not be able to offset the capacity lost in the BART system. Additionally, excavation for the transition structure could result in the demolition of buildings and impacts to traffic circulation, including motorists traveling to/from nearby U.S. 101. Based on these considerations, this concept was not advanced.

## Attachment B: Concepts Not Advanced During the Project Identification Phase

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
<b>TYPES OF TECHNICAL CROSSINGS</b>			
Planning/ Outreach	Dual-gauge crossing	A new dual-gauge crossing would accommodate BART and Regional Rail in a single, two-track crossing. This concept would allow both services to share right-of-way and use a two-track crossing that connects Oakland and San Francisco, eliminating the need for separate crossings.	This concept was not advanced due to operational concerns. A BART train would sustain more damage (and passenger injuries) than a heavier Regional Rail train during a collision. To address this, BART trains would either need to be made more crashworthy or there would need to be greater time separation between BART and Regional Rail trains. Upgrading the BART train fleet and its associated elevated guideways would incur an estimated cost of \$5-8 billion. Providing additional time between trains would lower the number of trains using the new transbay passenger rail crossing, thereby reducing system capacity and revenue. Also, maintenance of a dual-gauge crossing would be more frequent than a single-gauge crossing, resulting in increased maintenance costs and decreased track availability.
Planning	Four-track transbay rail crossing	This concept includes a new four-track transbay crossing for BART and Regional Rail between San Francisco and Oakland. All tracks would be a single crossing or separated into two crossings (one for each service).	A four-track crossing, either as a single four-track crossing or two separate two-track crossings, was evaluated to carry BART and Regional Rail across the San Francisco Bay. The analysis showed that two tracks would provide sufficient ridership capacity to meet future demand; therefore, the additional two tracks were not justified. Constructing one crossing would not preclude construction of a second crossing in the future.
<b>SERVICE ALONG I-580/MACARTHUR CORRIDOR</b>			
Planning	Rail service along the I-580/MacArthur Boulevard corridor	BART or Regional Rail service would be provided along the I-580/MacArthur Boulevard corridor. This corridor would connect the cities of Oakland and San Leandro while providing connections to several existing AC Transit transbay express bus lines.	This concept was not advanced as it did not include and was not necessary to support a new transbay passenger rail crossing. As such, it would not meet Link21's Preliminary Purpose and Need statement. Specifically, the concept would not provide a redundant transbay rail crossing.
<b>BART TRANSBAY CROSSING TO BAYVIEW</b>			
Planning	BART transbay crossing from Oakland to the Bayview neighborhood of San Francisco	This concept would include a new BART transbay crossing between Oakland and San Francisco's Bayview neighborhood via Alameda. The alignment would potentially extend into the Bernal Heights neighborhood and downtown San Francisco. The concept would include a new transfer station to Regional Rail at Jack London Square. In Oakland, the alignment would continue north to the existing MacArthur Station and south to connect to the existing BART network.	It is likely this concept, which would serve the Bayview neighborhood prior to downtown San Francisco, would likely have lower ridership than concepts that provide direct service to downtown San Francisco. A longer rail connection through the Bayview neighborhood would have longer travel times and be less attractive to riders traveling to downtown San Francisco. Increasing passenger ridership in the Transbay Corridor is a key element of the Preliminary Purpose and Need statement. Therefore, this concept was not advanced in favor of other BART concepts serving downtown San Francisco with higher potential ridership.
Outreach	Hunters Point Shipyard BART station	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed a new Hunters Point Shipyard station would be a component of a new BART transbay crossing to San Francisco's Bayview neighborhood.	A BART station at this location would only be feasible with a BART Bayview concept. BART concepts that connect through Bayview would potentially have lower ridership compared to those that provide a direct BART connection to downtown San Francisco. A longer rail connection through the Bayview neighborhood would likely have longer travel times and be less attractive to riders traveling to downtown San Francisco. Increasing passenger ridership in the Transbay Corridor is a key element of the Preliminary Purpose and Need statement. Therefore, this concept was not advanced in favor of other BART concepts serving downtown San Francisco with higher potential ridership.

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
<b>ALTERNATIVE BAY CROSSINGS</b>			
Outreach	Direct rail crossing between airports	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include a direct transbay passenger rail crossing (BART or Regional Rail) that connects the San Francisco International (SFO) and Oakland International (OAK) airports.	A transbay rail crossing between SFO and OAK would require a crossing nearly twice as long as a new transbay passenger rail crossing in the Transbay Corridor (approximately 9 miles compared to approximately 5 miles). A direct rail connection between Oakland and San Francisco through the Transbay Corridor would provide faster travel times for riders compared to a rail connection between SFO and OAK, which would still require riders to travel north from SFO to San Francisco. Based on its slower travel times to a more direct crossing, this concept was not advanced.
Outreach	Rail crossing in the Dumbarton Bridge corridor	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include a new transbay passenger rail crossing (tunnel or bridge) in the Dumbarton Bridge (State Route 84) corridor. This would connect existing rail services in the East Bay and the San Francisco Peninsula.	A transbay rail crossing along the Dumbarton Bridge corridor would require a longer crossing than a new transbay passenger rail crossing in the Transbay Corridor. A direct rail connection between Oakland and San Francisco through the Transbay Corridor would provide faster travel times for riders compared to a Dumbarton rail connection, which would still require riders to travel north to San Francisco. Based on its slower travel times to a more direct crossing, this concept was not advanced.
Outreach	Rail crossing in the San Mateo-Hayward Bridge corridor	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include a new transbay passenger rail crossing (tunnel or bridge) in the San Mateo-Hayward Bridge (State Route 92) corridor. This would connect existing rail services in the East Bay and the San Francisco Peninsula.	A transbay rail crossing along the San Mateo-Hayward corridor would require a longer crossing than a new transbay passenger rail crossing in the Transbay Corridor. A direct rail connection between Oakland and San Francisco through the Transbay Corridor would provide faster travel times for riders compared to a San Mateo-Hayward rail connection, which would still require riders to travel north to San Francisco. Based on its slower travel times to a more direct crossing, this concept was not advanced.
<b>REGIONAL RAIL TRANSBAY CROSSING TO MISSION BAY</b>			
Planning	Regional Rail crossing connecting the Mission Bay neighborhood of San Francisco to Oakland	The concept would include a new Regional Rail alignment along I-980 that connects to Emeryville. The corridor would continue south to Alameda through a new Jack London Square station. After crossing the San Francisco Bay, the alignment would connect to San Francisco's Dogpatch neighborhood before connecting to the Mission Bay neighborhood. From there, one alignment would follow 3rd Street across Market Street to a station near Union Square. A second alignment would connect to western San Francisco. From its proposed Alameda Station, the Regional Rail alignment would connect to a new San Antonio station in Oakland.	This concept was not advanced because the new rail corridor from the East Bay should connect to an existing rail corridor on the San Francisco Peninsula. A crossing to Mission Bay creates challenges in connecting to the Salesforce Transit Center and would create a circuitous alignment that is inferior operationally and in passenger travel time. In San Francisco, the new rail alignment would split into two lines. One line would connect to the Salesforce Transit Center, and another line would allow for future rail service to western San Francisco. This split would need to be constructed underground and would require deep excavation from the surface, which would result in surface disturbance over a large area. Construction would demolish numerous buildings and result in the relocation of residents and businesses. As a result, this concept was not advanced.
<b>REGIONAL RAIL SERVICE TO HERCULES</b>			
Planning	Extension of Regional Rail service to Hercules	This concept would include additional infrastructure improvements north of Richmond to deliver Urban   Metro service to the planned intercity service station in Hercules. Improvements would include track upgrades.	Ridership forecasts did not support Regional Rail infrastructure improvements north of Richmond to Hercules to support Urban   Metro service. Insufficient forecasted ridership would not justify the additional infrastructure north of Richmond, which could require a train turnaround and storage yard. Therefore, the extension of Regional Rail service from Richmond to Hercules was not advanced. However, Link21 would not preclude the planned intercity service station in Hercules or future infrastructure improvements to support Urban   Metro service as separate projects by others.



PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
<b>MISCELLANEOUS CONCEPTS OR CONCEPT COMPONENTS</b>			
Planning	Carquinez Strait Regional Rail crossing to Solano County	This concept would replace the Carquinez Strait rail crossing (Benicia-Martinez Railroad Bridge) to accommodate additional rail service.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project. CCJPA is studying the potential replacement of the Carquinez Strait rail crossing as a separate effort from Link21.
Planning	Rail service to San Ramon	This concept would extend rail service (BART or Regional Rail) to San Ramon. Link21's market analysis identified San Ramon as a location with high unmet potential for train travel.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or redundancy within the Transbay Corridor. In addition, this concept is inconsistent with regional transportation planning by the Contra Costa Transportation Authority, which has designated the I-680 corridor for express bus transit to meet transit demand. Link21 would not preclude a separate project by others extending transit services (bus or rail) to San Ramon.
Planning	Rail service to southeast Berkeley	This concept would provide rail service (BART or Regional Rail) from Oakland to southeast Berkeley. The rail alignment would connect the University of California, Berkeley campus and Oakland's Rockridge neighborhood. This concept would connect to areas with unmet market potential for train travel as identified by Link21.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or redundancy within the Transbay Corridor. In addition, portions of the corridor have existing BART stations nearby.
Planning	Additional Regional Rail service between Emeryville and Richmond along San Pablo Avenue	This concept would expand upon existing Regional Rail service between Emeryville and Richmond using a new underground alignment along San Pablo Avenue.	Providing improvements along an existing at-grade rail corridor would be less disruptive than constructing a new subsurface alignment and could help address needed improvements in the corridor (e.g., grade crossings). Expanding Regional Rail service between Emeryville and Richmond will continue to be evaluated within the existing Union Pacific Railroad corridor (refer to Attachment C).
Planning	BART service connecting the Salesforce Transit Center to the MacArthur Station	This concept included a new transbay BART crossing that connected a proposed station near the Salesforce Transit Center to a new Alameda Station. The alignment would extend north from Alameda to BART's MacArthur Station via Jack London Square. A new BART station would be constructed in Oakland's San Antonio neighborhood.	This concept was not advanced because it had lower forecasted ridership than a BART transbay crossing to Mission Bay, and it provided a direct connection and additional service to the Salesforce Transit Center, which is an existing market. Whereas Mission Bay represents a new market that is not currently served by BART. While a new BART alignment through Mission Bay to the Salesforce Transit Center would be longer than this concept's direct connection to the Salesforce Transit Center, the ability to serve new markets makes the Mission Bay concept better able to meet Link21's goals and objectives.
Outreach	BART extension to San Jose	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include BART service to additional locations in San Jose.	This concept was not advanced because it is currently being advanced under the Santa Clara Valley Transportation Authority's BART Silicon Valley Phase II Project, which would extend service approximately 6 miles from the existing Berryessa Station to downtown San Jose. The new BART alignment also will connect to the City of Santa Clara. Construction is scheduled for completion by 2036.
Outreach	BART extension to national parks	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include extending BART service to national parks (e.g., Pinnacles National Park, Point Reyes National Seashore, etc.).	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or redundancy within the Transbay Corridor. In addition, the focus on national parks would not address the need to expand affordable passenger rail access to priority populations. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	BART extension to San Rafael and Larkspur	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include extending BART service into eastern Marin County.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	Improved rail connection to Mendocino	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure or service improvements represented in this concept as a future project.

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
		improved rail service between the Bay Area and Mendocino (or Mendocino County).	
Outreach	Rail connection to Seaside and Monterey	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include improved rail service between the Bay Area and cities in northwest Monterey County.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	Rail connection along State Route 37	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include a rail corridor along State Route 37 between Marin and Solano counties.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	Davis Station improvements	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include improved service to the existing CCJPA station in Davis or station improvements.	A new bridge over the Carquinez Strait would be required to provide a better rail connection between Davis and the Bay Area and accommodate service improvements to the Davis Station. A new Carquinez bridge is not part of Link21, but it is being investigated by others. Link21 would not preclude rail service or infrastructure improvements represented in this concept as a future project.
Outreach	Rail connection between Fairfield and Walnut Creek	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include rail service (BART or Regional Rail) between Fairfield and Walnut Creek.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude future study of rail improvements in this corridor.
Planning/ Outreach	Extension of Regional Rail service to Pinole	This concept would include a dedicated Regional Rail alignment from the existing Richmond Regional Rail/BART transfer station north to Pinole.	Ridership forecasts supported potential Regional Rail infrastructure improvements to Richmond. However, extending Regional Rail service north of Richmond to Pinole was not supported by ridership forecasts. There would be insufficient ridership to justify the associated infrastructure; therefore, this concept was not advanced.
Outreach	Rail service south towards San Mateo	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would provide additional rail service to San Mateo.	An extension of rail service south to San Mateo was not advanced because it would be redundant with existing and planned rail service. Caltrain has an existing station in San Mateo, and California High-Speed Rail will provide future rail service between Millbrae and San Jose.
Outreach	Sonoma-Marín Area Rail Transit connection to San Francisco	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would extend Sonoma-Marín Area Rail Transit service from Larkspur to San Francisco.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	Sonoma-Marín Area Rail Transit connection to Suisun – Fairfield	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would extend Sonoma-Marín Area Rail Transit service from Novato to Fairfield.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	Sonoma-Marín Area Rail Transit track connection with new stops and stations	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. Sonoma-Marín Area Rail Transit provides existing rail service in the area and would be responsible for additional stations or service along its corridor.

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION	DETERMINATION AND RATIONALE
		additional stations within the existing Sonoma-Marín Area Rail Transit system.	
Outreach	Tourist train from San Jose to Santa Cruz	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would serve tourists traveling between San Jose and Santa Cruz.	This concept was not advanced because it does not meet the Preliminary Purpose and Need statement. Specifically, it would not increase rail capacity or add redundancy within the Transbay Corridor. In addition, focusing on tourists would not address the need to expand affordable passenger rail access to priority populations. However, Link21 would not preclude rail infrastructure improvements represented in this concept as a future project.
Outreach	Bayview Caltrain Station	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed this concept would include a new Caltrain station in Bayview.	This concept was not advanced because the San Francisco County Transportation Authority is currently evaluating a new Caltrain station in Bayview. Improvements proposed under Link21 would not preclude this as a separate project by the authority.

## Attachment C: Concepts Under Consideration Prior to the Stage Gate 2 Recommendation

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION
<b>POTENTIAL INFRASTRUCTURE IMPROVEMENTS</b>		
Planning	Regional Rail – Salesforce Transit Center to Oakland City Center via Alameda	This concept would provide a new Regional Rail crossing from the Salesforce Transit Center to Oakland via a new station in Alameda. Rail service would extend north to the existing Richmond Station with stations in Emeryville and Berkeley. The concept would have transfer stations with BART at 12th St./Oakland City Center, Coliseum, and Richmond. Various supporting improvements would be made to the existing BART network as well.
Planning	Regional Rail – Northern San Mateo County to Oakland City Center via Alameda	This concept includes all the improvements described for the Regional Rail to the Salesforce Transit Center to Oakland City Center via Alameda concept. In addition to those improvements, this concept would connect Regional Rail between the Salesforce Transit Center and destinations in northern San Mateo County along existing Caltrain right-of-way.
Planning	BART – San Francisco to Oakland via Mission Bay and Alameda	This concept would provide a new BART crossing from downtown San Francisco (3rd Street/Mission Street) to Oakland via Mission Bay and Alameda. BART service would connect to a new Jack London Square station and then travel north to the existing BART MacArthur Station. BART service would connect to existing tracks south of its Lake Merritt Station. Various supporting improvements would be made to the Regional Rail network, including the transfer station at Jack London Square.
Planning/ Outreach	I-980 rail corridor	The I-980 corridor was identified as a potential new rail corridor for BART or Regional Rail, which is consistent with the Caltrans District 4 <i>Vision 980 Study</i> . This concept originated outside of the program via a community-driven proposal to remove I-980 within downtown Oakland and replace it with an at-grade boulevard. Removing the interstate would allow construction of a rail tunnel beneath the new boulevard. A potential BART alignment would connect to the existing BART MacArthur Station to the east. A potential Regional Rail alignment would either continue along San Pablo Avenue to Emeryville or use the BART MacArthur Station for transfers.
Planning	Rail service to western San Francisco (Haight-Ashbury and Panhandle neighborhoods with service near the University of San Francisco; University of California, San Francisco; and San Francisco State University)	A new rail alignment (BART or Regional Rail) would follow Geary Boulevard to the University of San Francisco. The alignment would turn south to Parnassus Avenue near the University of California, San Francisco and pass through the Haight-Ashbury and Panhandle neighborhoods. There it would continue west towards 19th Avenue through the Sunset neighborhood. At 19th Avenue, the alignment would head south to San Francisco State University before connecting to the existing BART network at Daly City. The San Francisco County Transportation Authority is evaluating rail service to western San Francisco, and as Link21 advances, coordination will occur with the authority on a potential interface.
Planning	Rail service to western San Francisco (Outer Richmond and Sunset Boulevard neighborhoods with service near Golden Gate Park, San Francisco Zoo, and San Francisco State University)	The San Francisco County Transportation Authority is studying this new rail extension. The alignment (BART or Regional Rail or light rail) would follow Geary to the Outer Richmond neighborhood where it would turn south under Golden Gate Park and Sunset Boulevard. The alignment would turn east near the San Francisco Zoo before heading south on 19th Avenue near San Francisco State University. Then the rail alignment would rejoin the current BART network at Daly City. As Link21 advances, Link21 staff will continue to coordinate with authority staff.
Planning	BART service to western San Francisco (Richmond neighborhood with service near Golden Gate Park and San Francisco State University)	This new BART alignment would follow Geary until Park Presidio Boulevard in the Richmond neighborhood. There the alignment would turn south under Golden Gate Park to follow 19th Avenue towards San Francisco State University. The alignment would rejoin the existing BART network near Daly City. The San Francisco County Transportation Authority is evaluating rail service to western San Francisco, and as Link21 advances, Link21 staff will continue to coordinate with authority staff.
Planning	Regional Rail service to western San Francisco (Inner Richmond neighborhood with service near San Francisco State University)	The San Francisco County Transportation Authority is studying this new rail extension. The new Regional Rail alignment would follow Geary Boulevard to the Inner Richmond neighborhood and then turn to the Inner Sunset neighborhood via 19th Avenue. The alignment would have potential new stations at Judah Street, Taraval Street, and San Francisco State University. An expanded Daly City Station would allow riders to transfer to the existing BART network. As Link21 advances, Link21 staff will continue to coordinate with authority staff.
Planning	Additional Regional Rail service between Emeryville and Richmond	This concept would expand upon existing intercity Regional Rail service that is provided between Emeryville and Richmond along the existing Union Pacific Railroad corridor.
Outreach	BART service along Brannan Street or King Street in San Francisco that connects to Geary Boulevard via 7th Street	This concept was identified through community and stakeholder outreach efforts. While specific details were not provided, it was assumed it would involve a BART crossing entering San Francisco along Brannan/King streets (near Oracle Park). The concept would then turn north along 7th Street before turning west along Geary Boulevard.

PROCESS IDENTIFIED	CONCEPT OR CONCEPT ELEMENT	DESCRIPTION
Planning/ Outreach	New rail stations in Oakland (16th Street, Brooklyn Basin, San Antonio, and East Lake), Alameda (5th Street and College of Alameda), and San Francisco (Treasure Island)	Potential rail stations will be evaluated as the Preliminary Project is identified and defined further. Several potential stations were identified during planning based on identified priority populations. For example, the Link21 Team identified potential stations between Jack London Square and Richmond and between Jack London Square and the Coliseum Station that would serve dense priority populations clusters. Additional potential stations were also raised during the program’s community and stakeholder outreach efforts.
Outreach	New transfer opportunities at BART stations (Richmond, West Oakland, Powell St., and Civic Center/UN Plaza) and Regional Rail stations (Emeryville)	Transfer opportunities will be evaluated as the Preliminary Project is identified and defined further.
Outreach	New multimodal connections at stations	Enhancing multimodal connectivity for bicyclists, pedestrians, and transit riders at existing and proposed rail stations will be evaluated after the Preliminary Project is identified and defined further.
<b>POTENTIAL TECHNOLOGIES</b>		
Planning	Electric multiple unit technology	Emerging electric multiple unit technology, as well as other zero-emission vehicles, would enable Regional Rail providers to serve additional market types. The current diesel-powered Regional Rail trains are unable to provide competitive performance in the urban core, but new electric train technology, currently in use elsewhere (and coming to the Caltrain corridor in 2024), is expected to enable competitive performance. High-Performance Regional Rail trains have the potential to provide higher-speed megaregional trips from places beyond the reach of BART. Once in the urban core, High-Performance Regional Rail trains could provide rapid transit functionality with frequent stops and acceleration speeds comparable to BART.
Outreach	Hydrogen or battery powered trains	Energy used to power trains will be evaluated after the Preliminary Project is identified and defined further.
<b>POTENTIAL SERVICE CHANGES</b>		
Outreach	Service changes, including 24-hour train service and through-run transbay trains	More detailed service planning will occur after the Preliminary Project is identified. This will include potential operating hours, transfers, express trains, and the use of through-run trains, which would allow passengers to travel within the system without disembarking from their train of origin.