METROPOLITAN TRANSPORTATION COMMISSION

Southern Alameda County Integrated Rail Analysis

Phase 1 Report

November 4, 2021

In partnership with:

ALAMEDA County Transportation Commission

CalSTA

San Joaquin Regional Rail Commission

Capitol Corridor

Caltrans

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Acronyms

ABAG	Association of Bay Area Governments
ACE	Altamont Corridor Express
Alameda CTC	Alameda County Transportation Commission
BART	San Francisco Bay Area Rapid Transit
CalSTA	California State Transportation Agency
Caltrans	California State Department of Transportation
CCJPA	Capital Corridor Joint Powers Authority
CHSRA	California High-Speed Rail Authority
CP	Central Pacific
CSRP	California State Rail Plan
HIFLD	Homeland Infrastructure Foundation-Level Data
HSR	High Speed Rail
MTC	Metropolitan Transportation Commission
OSHPD	Office of Statewide Health Planning and Development
PCJPB	Peninsula Corridor Joint Powers Board
PDA	Priority Development Area
R&D	Research and Development
SamTrans	San Mateo County Transit District
SJJPA	San Joaquin Joint Powers Authority
SJRRC	San Joaquin Regional Rail Commission
SoCo Rail	Southern Alameda County Integrated Rail Analysis
The Authority	Tri-Valley - San Joaquin Valley Regional Rail Authority
TOD	Transit-Oriented Development
TPHPD	Trains per Hour per Direction
TWG	Technical Working Group
UP	Union Pacific Railroad
USGS	United States Geological Survey
VTA	Santa Clara Valley Transportation Authority

Executive Summary

Overview

The Southern Alameda County Integrated Rail Analysis (SoCo Rail Study) builds on the foundation of the 2018 California State Rail Plan (CSRP), which established a 2040 statewide vision for an integrated statewide passenger rail and express bus network. The 2018 CSRP also identified rail hub stations, including an "East Bay" hub located in Southern Alameda County, which sits at the nexus of megaregional rail services and Bay Area rail and bus services. Additionally, the 2018 CSRP called for further study of potential East Bay hub locations so that recommendations can be integrated with the 2022 CSRP, which is currently under development.

In an effort to implement the rail planning for the East Bay called for in the 2018 CSRP, the SoCo Rail Study was undertaken with the primary task of identifying concepts for a "rail-to-rail" transfer hub. Given the confluence of trains from the Northern California Megaregion in Southern Alameda County, along with several BART stations, the effort focuses on identifying and assessing "East Bay Hub" concepts in this region.

What is the SoCo Rail Study?

The Southern Alameda County Integrated Rail Analysis (SoCo Rail Study) evaluates passenger rail needs in southern Alameda County and the Northern California Megaregion and opportunities for seamless rail and bus service connectivity with a goal of identifying and developing **an East Bay Rail-to-Rail Hub in the Mid-Term Horizon.**

To effectively examine hub concepts, understanding the needs and current and future service plans of the three passenger rail operators is critical to understanding how to approach the identification of hub concepts. The Capitol Corridor rail service currently runs seven round trips to San Jose, and the Capitol Corridor Joint Powers Authority (CCJPA) plans to expand service frequencies to San Jose when the major infrastructure improvements can be completed along the Union Pacific (UP) Coast Subdivision (on which they operate) between Newark and San Jose via the Alviso Wetlands. In the meantime, CCJPA is working to increase service speeds and connectivity to their system as part of the South Bay Connect Project.

Bay Area Rapid Transit (BART) already runs a very robust metro-level rail service within southern Alameda County and is working to extend the service to San Jose and Santa Clara in the mid-term. Like the Capitol Corridor, the Altamont Corridor Express (ACE) rail service, operated by the San Joaquin Regional Rail Commission (SJRRC), is currently limited in the amount of service that can be provided to San Jose, which is currently four round trips a day; this service can only expand to a maximum five round trips per day until major improvements along the UP Coast Subdivision (on which ACE also operates) can be completed. Therefore, the consideration of how to provide additional ACE service in the mid-term to

the Bay Area without having to run trains to San Jose is a fundamental factor considered in the SoCo Rail Study.

A solution to this situation is the identification of a location in southern Alameda County where ACE could terminate trains short of the constrained sections of the UP Coast Subdivision, thereby allowing the service to connect to other rail and bus services, which can then bring travelers from origins east of southern Alameda County, including the Central Valley, to destinations around the Bay Area.

Study Context and Partners

Given this foundation of statewide rail planning and the understanding that passenger rail is an integral part of the Bay Area's overall transportation network, the Metropolitan Transportation Commission (MTC) partnered with the California State Transportation Agency (CalSTA), Caltrans, Alameda County Transportation Commission (Alameda CTC), Capital Corridor Joint Powers Authority (CCJPA), and San Joaquin Regional Rail Commission (SJRRC) to conduct the SoCo Rail Study to begin the process of implementing an East Bay Rail Hub (East Bay Hub) in Southern Alameda County.

The SoCo Rail Study partners have also closely coordinated with the Bay Area Rapid Transit District (BART), San Mateo County Transit District (SamTrans), Caltrain, and California High Speed Rail Authority (CHSRA) by seeking their input on the goals and objectives, service level goals, and preliminary study findings at key milestones.

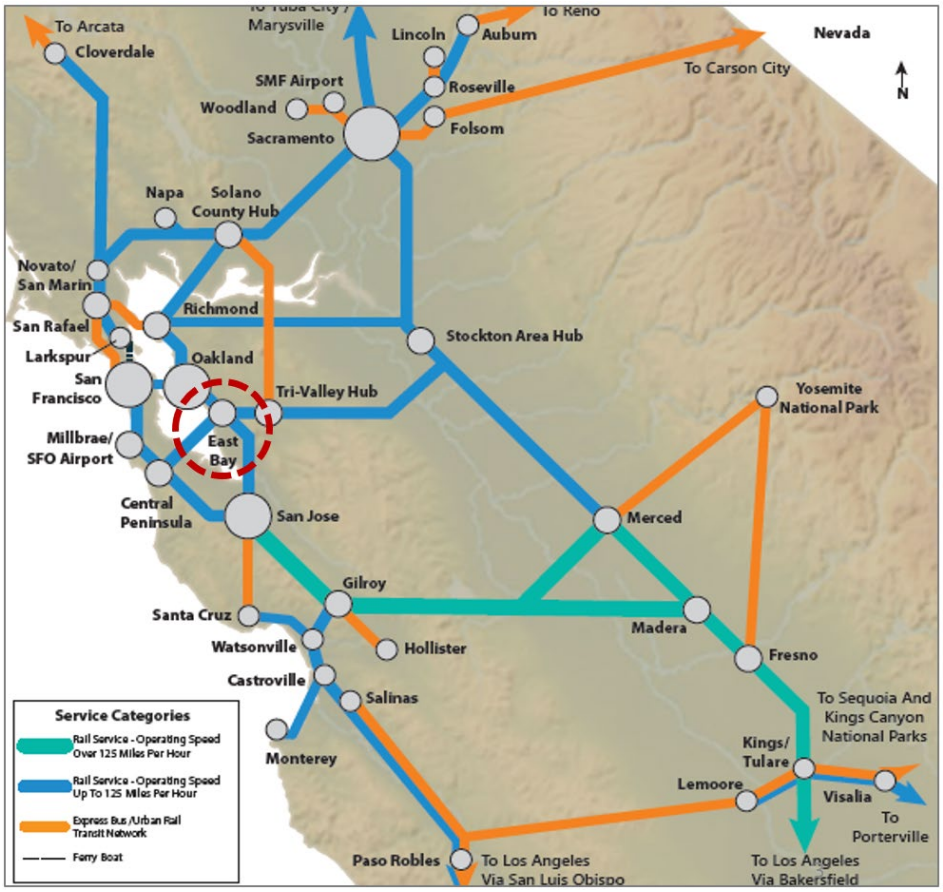
California State Rail Plan

The 2018 California State Rail Plan (CSRP) establishes a 2040 Vision for passenger rail service in the state with three key components:

- An integrated statewide network that ties together high-speed rail with intercity and regional services as well as integrated express bus services;
- Coordinated schedules with regular, pulsed service at key transfer hubs enabling easy and intuitive connections between services; and
- A customer-focus, integrated network that provides seamless first/last-mile access to rail hubs, integrated ticketing, and competitive travel times with auto and air travel alternatives.

*As an initial step in CSRP implementation, the **Metropolitan Transportation Commission received a grant from the State to study the potential for a new passenger rail hub in southern Alameda County**, including conducting passenger rail planning and feasibility analysis, evaluation of station locations, and conceptual engineering and initial design focused on improving intermodal rail connectivity.*

The 2040 Vision includes phased investments for near-term (2022), mid-term (2027) and long-term (2040). It also envisions the establishment of an East Bay Hub for all phases to facilitate better transit mobility and service connectivity.



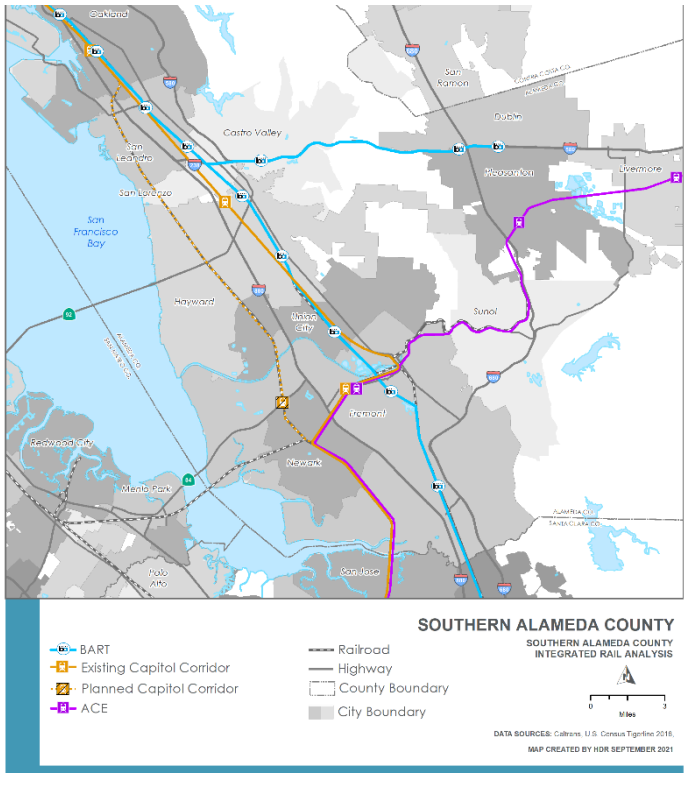
Study Overview

The SoCo Rail Study is being conducted in two phases. Phase 1 includes planning efforts to examine an existing and future transportation system, land use conditions, existing travel markets, potential feasible service scenarios, and potential station locations for an East Bay Hub identified in the 2018 CSRP. Phase 1 concludes with the identification of an East Bay Hub concept for further development. Phase 2 includes detailed planning, initial project development, and implementation planning for the East Bay Hub concept identified in Phase 1 for further development. During Phase 2, station, alignment, and service planning details will be developed based on comprehensive ridership and operational analyses.

Study Area

The SoCo Rail Study Area (Study Area) includes the Cities of Fremont, Union City, and Newark within the South County Planning Area of Alameda County. The study also considers the 21-county northern California megaregional context to understand the existing and future rail network.

SoCo Study Area



SoCo Study Megaregion Context

Goals and Objectives

In assessing potential East Bay Hub concepts that might provide benefit in the mid-term horizon and be compatible with the long-term vision, the study focuses on goals developed in collaboration with the project partners/stakeholders. The goals described below provide the foundation for the work completed in Phase 1 and will help guide project development in Phase 2 of the SoCo Rail Study.

	1	2	3	4	5
GOALS	**Enhance Regional Connectivity and Increase Equitable Access**	**Enhance Service Reliability and Safety**	**Promote Sustainability and Resiliency**	**Serve Surrounding Communities and Shape Growth**	**Develop Feasible Infrastructure Improvements**
OBJECTIVES	▪ Provide enhanced access for priority populations across the Northern California Megaregion ▪ Increase connections to destinations including major employers, healthcare facilities, higher education, and entertainment districts ▪ Enhance transit connections to provide seamless service between key markets ▪ Provide opportunities for multimodal access	▪ Maximize consistency with 2018 CSRP and contribute to the 2022 CSRP ▪ Achieve operator service frequency goals in the Mid-Term and Long-Term Horizons ▪ Reduce travel times and increase reliability of megaregional and regional trips ▪ Maintain freight rail reliability and/or capacity ▪ Avoids significant impacts to passenger loading on BART ▪ Ability of hub to provide necessary station staff access, and emergency vehicle and personnel access and egress	▪ Provide environmental benefits and avoids impacts ▪ Provide a resilient and sustainable hub location(s) and/or corridors ▪ Reduce vehicle miles traveled ▪ Reduce greenhouse gas and improve air quality	▪ Provide compatibility with current and/or future land uses ▪ Provide convenient access to the rail network from surrounding community ▪ Conform with local and regional plans and priorities ▪ Promote transit-supportive land use potential ▪ Increase opportunities for economic development potential	▪ Deliver a cost-effective hub with a favorable cost-benefit ratio that can be delivered in the Mid-Term ▪ Define a constructible hub that can be delivered in the Mid-Term ▪ Deliver a hub that avoids or minimizes impacts to existing rail operations for rail operators and BART

Key Considerations for the SoCo Rail Study by Goal

1. The opportunity to create rail-to-rail connections that do not currently exist.

2. How might hubs enable operators to achieve their mid- and long-term service goals (frequency, reliability, and travel time) and address capacity and community impacts?

3. Environmental considerations, including the potential for increased ridership that reduces VMT and GHG emissions by connecting services at hub locations to growing travel markets.

4. How does each hub's land use and community plans, including multimodal station access, affect future ridership growth?

5. How can a cost-effective hub be delivered that provides benefits in the mid-term and is compatible with the long-term vision for passenger rail service?

Initial Planning

Initial planning reviewed and documented community characteristics, existing transportation network, and existing travel markets. More details are available in Appendix A (Existing Conditions Report).

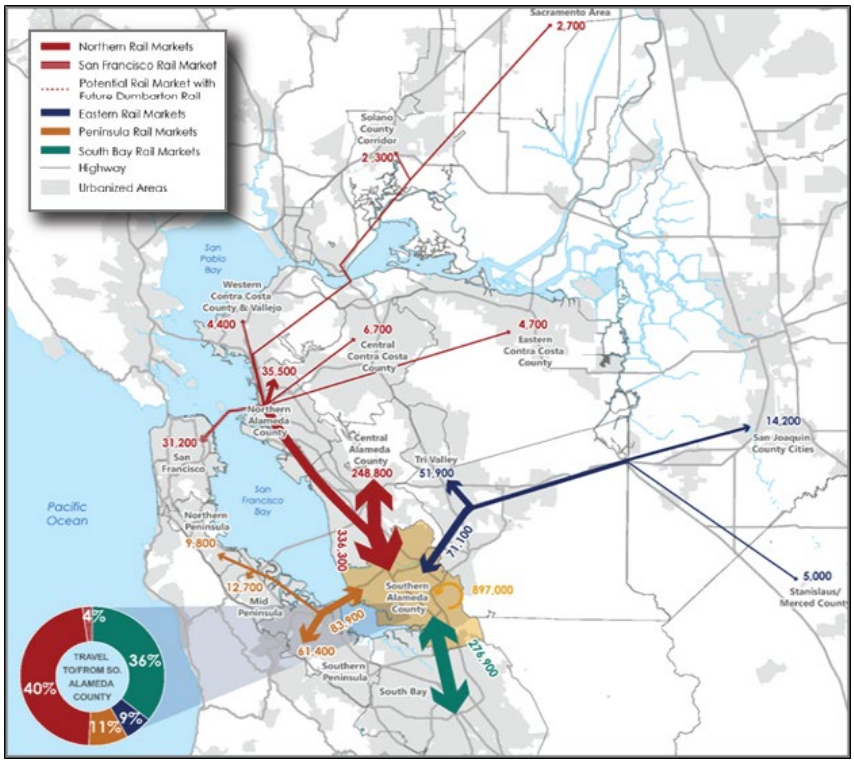
Community Characteristics

Key findings related to community characteristics include: 1) Most of Alameda County's Equity Priority Communities are located in Oakland, San Leandro, and Hayward; 2) The three cities comprising the Study Area have plans for transit-oriented developments (TODs); and 3) The regional vacancy rate for both the region and Alameda County is less than 6 percent.

Existing Transportation Networks

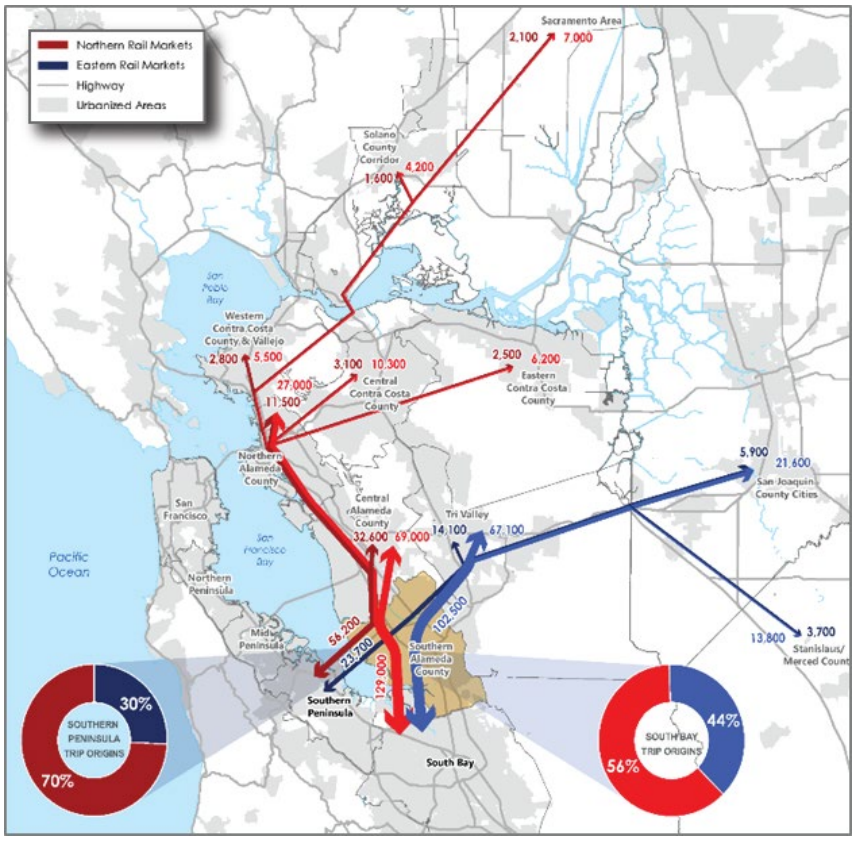
- Numerous freeway corridors experience high levels of unreliability in travel times.
- Capitol Corridor, ACE, and BART passenger rail services have operations in the Study Area, including at least one station for each carrier.
- UP owns several rail mainlines in the Study Area; the Dumbarton line is owned by SamTrans.
- AC Transit, the primary bus service operator in the Study Area, has connections at every BART station. Transbay bus services provided by AC Transit, Dumbarton Express, and Stanford Marguerite are available at Union City BART and Ardenwood Park-and-Ride.
- Many existing rail transit trips in the Study Area include an automobile trip to access the station as a solution to first-mile/last-mile access issues.
- Before the onset of the Covid-19 pandemic and subsequent shelter in place orders, intercity, commuter, and transit ridership of carriers serving the Study Area was strong.

Existing Travel Markets To/From Study Area



- The Bay Area experiences a weekday flow of residents from the East Bay, Central Valley, and North Bay to jobs in San Francisco, the Peninsula, and South Bay.
- South Bay and Central Alameda County account for most trips to and from the Study Area.
- Transit currently serves a small share of regional travel associated with the Study Area.
- Transit mode share is highest for trips to San Francisco/Daly City; and the transit mode share is lower for connections between the Study Area and more suburban population and employment hubs.

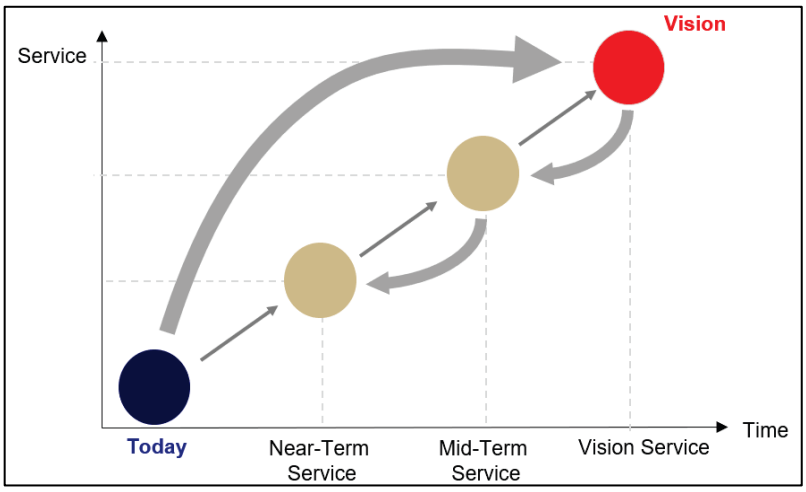
Existing Travel Markets Through Study Area



- South Bay and Central Alameda County account for most trips to through the Study Area.
- Major flows through the Study Area include the following corridors:
  - South Bay – Central/Northern Alameda County
  - South Bay – Tri-Valley
  - Peninsula – North/Central Alameda County

Operational and Service Planning and Assumptions

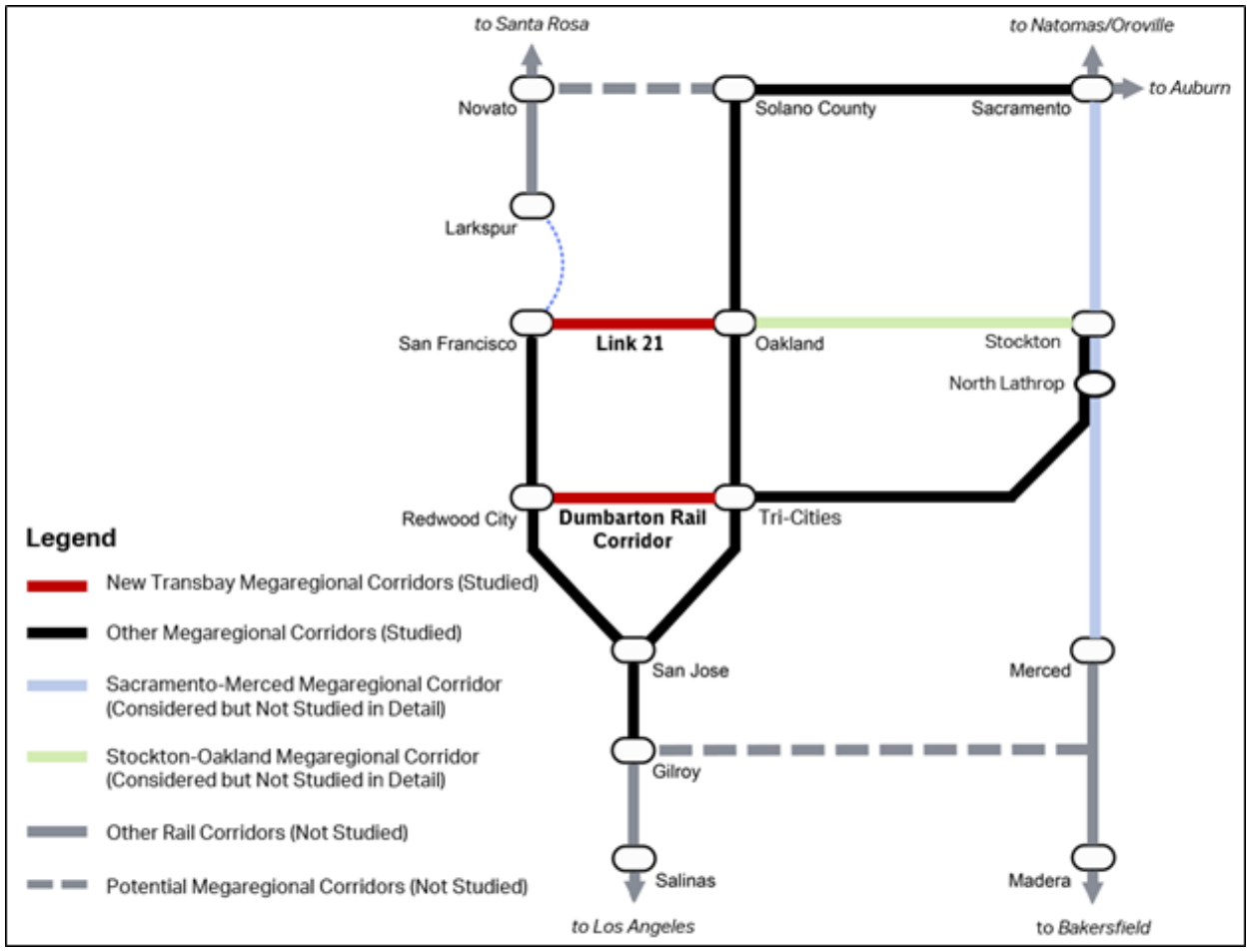
To identify the East Bay Hub concepts, operational and service plans were analyzed in detail. The effort included a review of service levels, equipment, infrastructure needs, and long-term visions for existing and potential intercity and commuter rail services plus potential connections to the BART system. The planning process took the existing conditions and the ultimate Long-Term Vision then worked backward toward the Mid-Term Horizon to develop assumptions and to identify East Bay Hub concepts that meet the mid-term needs and do not preclude the Long-Term Vision.



Operational and Service Planning for the Long-Term Horizon

An important consideration in locating an East Bay Hub is understanding how megaregional rail services may be passing through Southern Alameda County in the long-term and how the routing of each rail service relates to others in terms of what connections are most valuable. Based on the understanding of the Megaregional network, several Long-Term Service Scenarios were developed for consideration on how the megaregional rail network could be configured.

Framework for Development of Long-Term Scenarios

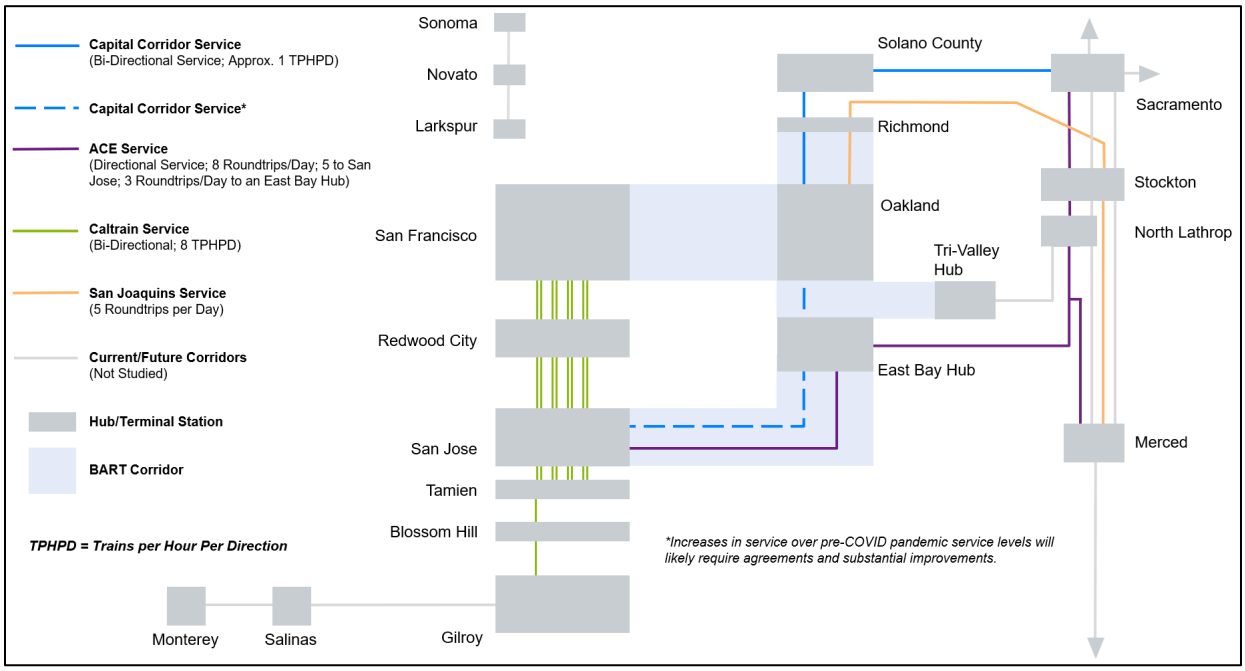


KEY FINDINGS FOR LONG-TERM HORIZON (20+ YEARS)

- Planning efforts that would have a direct effect on the SoCo Study Area were included in the scenarios; Link21 and the Dumbarton Rail Corridor were key to differentiating travel patterns and scenarios.
- Four scenarios were reviewed – Link 21 (Transbay) Focused, Dumbarton Focused, Transbay Connections Focused, and Link21 and Dumbarton Focused.
- All scenarios are viable for the Long-Term Horizon and should be considered in the development of the Mid-Term East Bay Hubs.

Operational and Service Planning for the Mid-Term Horizon

Following the Long-Term Horizon operational and service planning, mid-term goals were developed by the operators based on the 2018 CSRP 2027 mid-term service goals, with refinements based on an assessment of the realistic capacity that can be provided in the Mid-Term Horizon. Based on the operator goals identified, a single Mid-Term Scenario was developed, which is illustrated in the figure below.



KEY FINDINGS FOR MID-TERM (APPROXIMATELY 10 YEARS)

Key findings from the operational and service planning process highlight why an East Bay Hub is critical to increased passenger rail service between the Megaregion and Bay Area in the mid-term:

- Based on infrastructure constraints along the Coast Subdivision between Newark and Santa Clara via the Alviso Wetlands, the ability to provide additional passenger rail service to San Jose beyond the planned one additional roundtrip for ACE is not possible without extensive upgrades to the Coast Subdivision. This is unlikely in the Mid-Term Horizon due to cost and complexity.
- Given capacity constraints along the Coast Subdivision and the time it would require for capacity improvements, an East Bay Hub would provide a great opportunity to run additional passenger rail trains that could terminate in Southern Alameda County without having to trigger large-scale improvement along the Coast Subdivision.
- An East Bay Hub would provide regional connections to rail and bus networks, allowing Megaregional rail services to have additional regional connectivity around the Bay Area.
- SJRRC supports turning back ACE trains in southern Alameda County at an East Bay Hub as a strategy for increasing service in the Mid-Term Horizon.
- CCJPA is planning to move operations of the Capitol Corridor service to the UP Coast Subdivision (between southern Oakland and Newark) from the UP Niles Subdivision in the Mid-Term

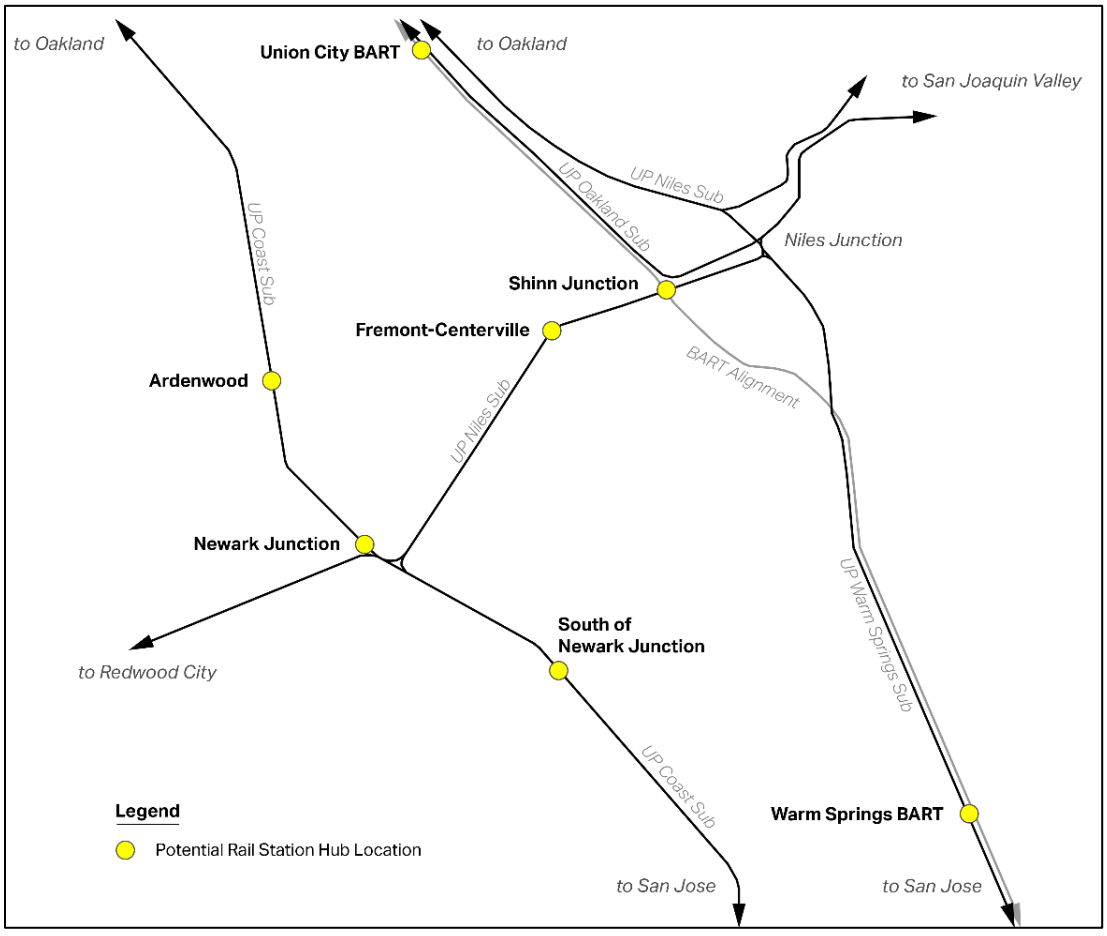
Horizon as part of the South Bay Connect Project and to construct a new station at the Ardenwood Park-and-Ride.

- CCJPA is not planning to turn back trains in Southern Alameda County, so improvements would be needed along the Coast Subdivision to provide additional ACE service to San Jose and accommodate freight rail traffic.
- A new passenger rail service along the Dumbarton Corridor is unlikely to be implemented in the mid-term due to constraints in Redwood City, significant infrastructure costs involved in rebuilding or rehabilitating the rail bridge across San Francisco Bay, and lack of progress in project development.
- In the Mid-Term Horizon, enhanced Transbay bus services via the Dumbarton Bridge to the Peninsula market can provide connectivity to both ACE and Capitol Corridor services in southern Alameda County. These enhanced Transbay bus services could serve the East Bay Hub(s).

Identification and Assessment of East Bay Hub Concepts

Based on the operational and service planning, seven concepts for the East Bay Hub were identified and considered, as shown in the figure below. Locations were selected based on their ability to provide mid-term benefits, compatibility with the CSRP, and usefulness in the long-term.

Locations Considered for East Bay Hub



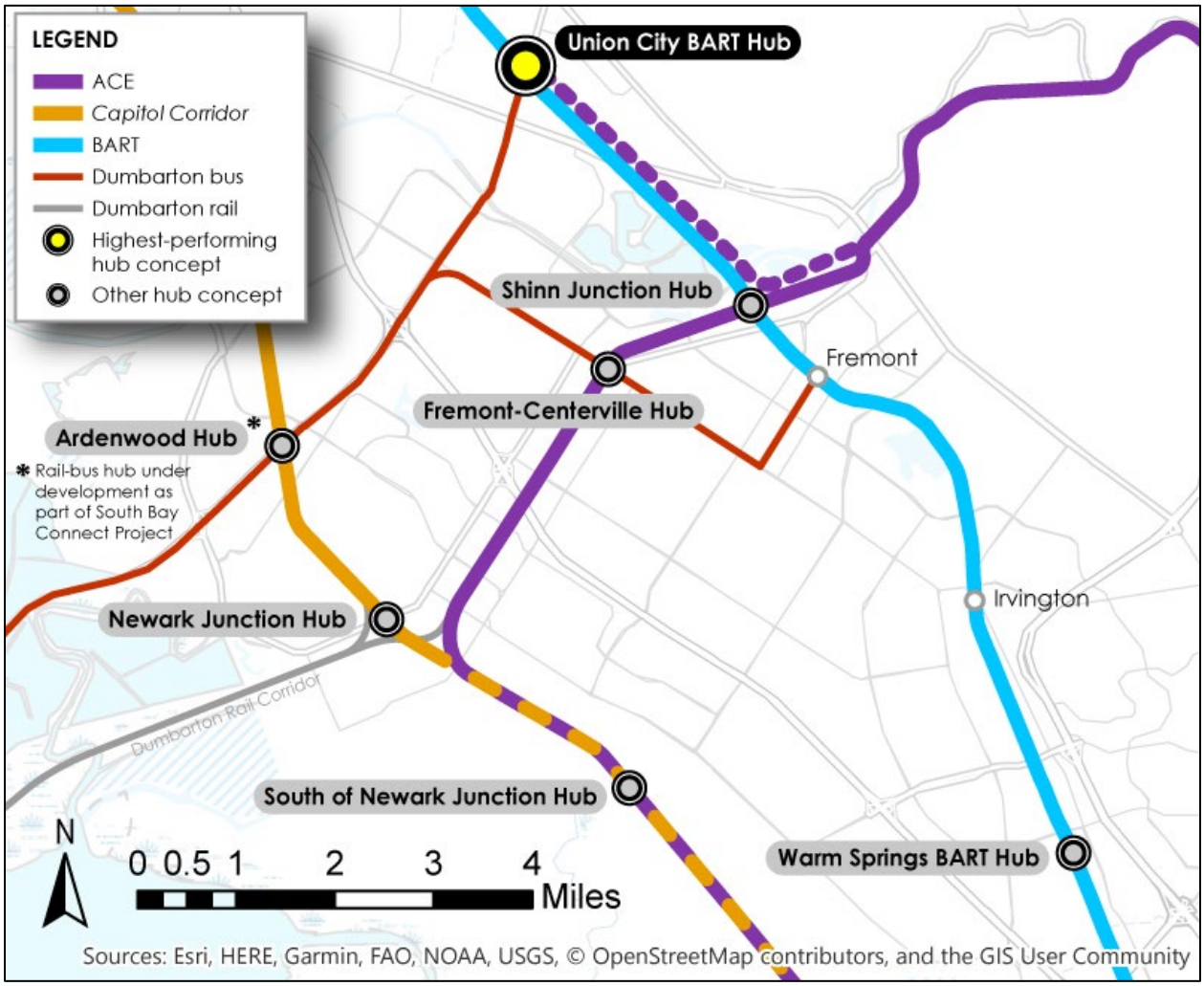
Assessment of East Bay Hub Concepts

A thorough assessment of the seven hubs was conducted, which compared each hub based on several factors. These factors were based on the goals and objectives for the SoCo Rail Study. This assessment is summarized in the matrix below and is illustrated on the following map. The result was that the Union City East Bay Hub concept was the highest performing "rail-to-rail" hub concept for the Mid-Term Horizon.

East Bay Hub Concepts Assessment Matrix

	ACE–BART Hubs			ACE–Capitol Corridor Hubs			ACE-only Hub
	Union City BART	Shinn	Warm Springs BART	Ardenwood	Newark Junction	South of Newark Junction	Centerville
Connecting Regional Services							
Operators Serving Hub	High	Medium	Medium	High	Medium	Medium	Low
Connectivity to Key Travel Markets and Destinations							
Regional Connectivity	High	High	High	Medium	Medium	Medium	Low
Local Connectivity and Land Use	High	Low to Medium	High	Medium to High	Low	Medium	Medium to High
Equity Considerations							
Benefits to Surrounding Disadvantaged Populations	Medium	Low	Medium	Medium	Low	Low to Medium	Low
Service Reliability							
Travel time to key destinations	Medium to Fast	Medium to Fast	Medium	Medium	Slow to Medium	Slow	Medium
Level of Difficulty Accommodating Service Levels and Hub Facilities	Low	Low to Medium	Low	Medium	Medium	Low to Medium	Medium
Potential Capital Improvement Cost							
Potential Cost	Medium	High	Medium	Medium	Medium	Medium	Low
Consistency with Operator Plans for Mid-term Horizon							
Consistency with Mid-Term Operator Plans	High	Low to Medium	High	High	Low	Low	Low

Highest Performing East Bay Hub Concept and Associated Connections



Recommendations and Next Steps

PHASE 1 RECOMMENDATIONS

1 Based on analysis conduced during Phase 1 of the SoCo Rail Study, the Union City BART East Bay Hub is recommended as the only "rail-to-rail" hub concept for the Mid-Term Horizon (approximately 10 years) in order to allow for additional ACE service into the Bay Area, to provide an ACE-BART connection, and to ensure the highest level of connectivity to key travel markets throughout the Bay Area.

2 To begin project implementation of the Union City BART East Bay Hub, immediately pursue detailed planning and initial project development as part of Phase 2 of the SoCo Rail Study.

3 The other East Bay Hub concepts studied during Phase 1 of the SoCo Rail Study for the Mid-Term Horizon – which include the Ardenwood*, Fremont-Centerville, Newark Junction, South of Newark, Shinn Junction and Warm Springs BART concepts – are not recommended for further study as part of Phase 2 of the SoCo Rail Study.

**While the Ardenwood East Bay Hub concept is not recommended for further study under the purview of the SoCo Rail Study as the "rail-to-rail" hub, it is noted that a "rail-bus" hub is currently being pursued by CCJPA as part of the South Bay Connect Project. Along with a new Capitol Corridor station at Ardenwood, high-quality transfer facilities are being studied that would speed travel times between Ardenwood and the Peninsula, thereby enhancing the connection this future rail-bus connection and helping implement and meet goals contained in the 2018 State Rail Plan.*

PHASE 2 NEXT STEPS

1 Develop the Union City East Bay Hub concept for the Mid-Term Horizon to a sufficient level to begin environmental documentation and preliminary engineering, including:

- ❑ Development of a conceptual operations plan (service characteristics, number and length of trains, capacity, etc.)
- ❑ Model the estimated ridership for the increase in ACE trains to the Union City East Bay Hub concept
- ❑ Conduct an Equity analysis
- ❑ Identification and conceptual design of infrastructure improvements (hub / station, track, layover facility, etc.)
- ❑ Develop rough order of magnitude capital and operating cost estimates
- ❑ Establish a conceptual level funding and financing plan
- ❑ Create an implementation plan outlining steps for project development and opening service

2 Continue coordination with stakeholders and conduct community outreach for the SoCo Rail Study throughout Phase 2.

3 Prepare documentation required for and in support of inclusion into regional transportation plans.

4 Develop a high-level understanding of potential East Bay Hub(s) for the Long-Term Horizon, that includes Dumbarton Rail Service, Link21, and improvements along UP Coast Subdivision between Newark and San Jose including additional capacity through the Alviso Wetlands.

1.0 Introduction

The Southern Alameda County Integrated Rail Analysis (SoCo Rail Study) builds on the foundation of the 2018 California State Rail Plan (CSRP), which established a 2040 statewide vision for an integrated statewide passenger rail and express bus network that would be implemented in near-term, medium-term, and long-term phases. As part of this vision, the 2018 CSRP identified numerous rail hub stations around the state. One hub identified is an "East Bay" hub located in southern Alameda County, which sits at the nexus of the megaregional rail services from Sacramento and Central Valley and the Bay Area rail and bus services. Additionally, the 2018 CSRP called for implementation of rail planning for the East Bay so that recommendations can be integrated with the 2022 CSRP, which is currently under development.

To effectively examine hub concepts, understanding the needs of the three rail operators is critical to understanding how to approach the identification of hub concepts. The Capitol Corridor rail service currently runs seven round trips to San Jose, and the Capitol Corridor Joint Powers Authority (CCJPA) plans to expand service frequencies to San Jose when the major infrastructure improvements can be completed along the Union Pacific (UP) Coast Subdivision (on which they operate) between Newark and San Jose via the Alviso Wetlands. In the meantime, CCJPA is working to increase service speeds and connectivity to their system as part of the South Bay Connect Project.

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1.1. Project Partners

Given this foundation of statewide rail planning and the understanding that passenger rail is an integral part of the Bay Area's overall transportation network, the Metropolitan Transportation Commission (MTC) partnered with California State Transportation Agency (CalSTA), Alameda County Transportation Commission (Alameda CTC), CCJPA, and SJRRC to conduct the SoCo Rail Study to begin the process of implementing an East Bay Rail Hub (East Bay Hub) in southern Alameda County. The SoCo Rail Study partners have also closely coordinated with BART, San Mateo County Transit District (SamTrans), Peninsula Corridor Joint Powers Board (PCJPB), and the California High Speed Rail Authority (CHSRA) by seeking their input on the goals and objectives, service level goals, and preliminary study findings at key milestones. Figure 1-1 illustrates the interaction of the project partners with the other relevant stakeholders and planning efforts.

Figure 1-1. Relevant Stakeholders and Planning Efforts

To achieve the goals outlined in Chapter 2.0, the SoCo Rail Study incorporates a collaborative approach among rail providers and other agencies in the region to provide direction in ultimately reaching viable recommendations. These guiding considerations inform the project's planning and conceptual design phases.

1.2. Study Overview

The purpose of the SoCo Rail Study is to conduct planning-level analysis related to the development of an East Bay Hub in the Mid-Term Horizon (i.e., approximately 10 years), while not precluding expansion of services or implementation of other improvements consistent with the network integration vision for the Northern California Megaregion.

The SoCo Rail Study is being conducted in two phases, as shown in Figure 1-2:

- Phase 1 includes planning efforts to examine the existing and future transportation system, land use conditions, existing travel markets, potential operational and service scenarios, and the identification and assessment of potential East Bay Hub concepts. Phase 1 concludes with the identification of an East Bay Hub concept for further development.
- Phase 2 includes detailed planning, initial project development, and implementation planning for the East Bay Hub concept identified in Phase 1 for further development. During Phase 2, station, alignment, and operational and service planning details will be developed based on comprehensive ridership and operational analysis.

This report documents the planning work completed during Phase 1 of the SoCo Rail Study, which includes existing conditions, initial planning, operational and service planning and hub concept identification, and the hub assessment undertaken to identify hub concepts for further development. With the completion of this Phase 1 report, the SoCo Rail Study is entering Phase 2.

Figure 1-2. Phases 1 and 2 of the SoCo Rail Study

1.3. California State Rail Plan

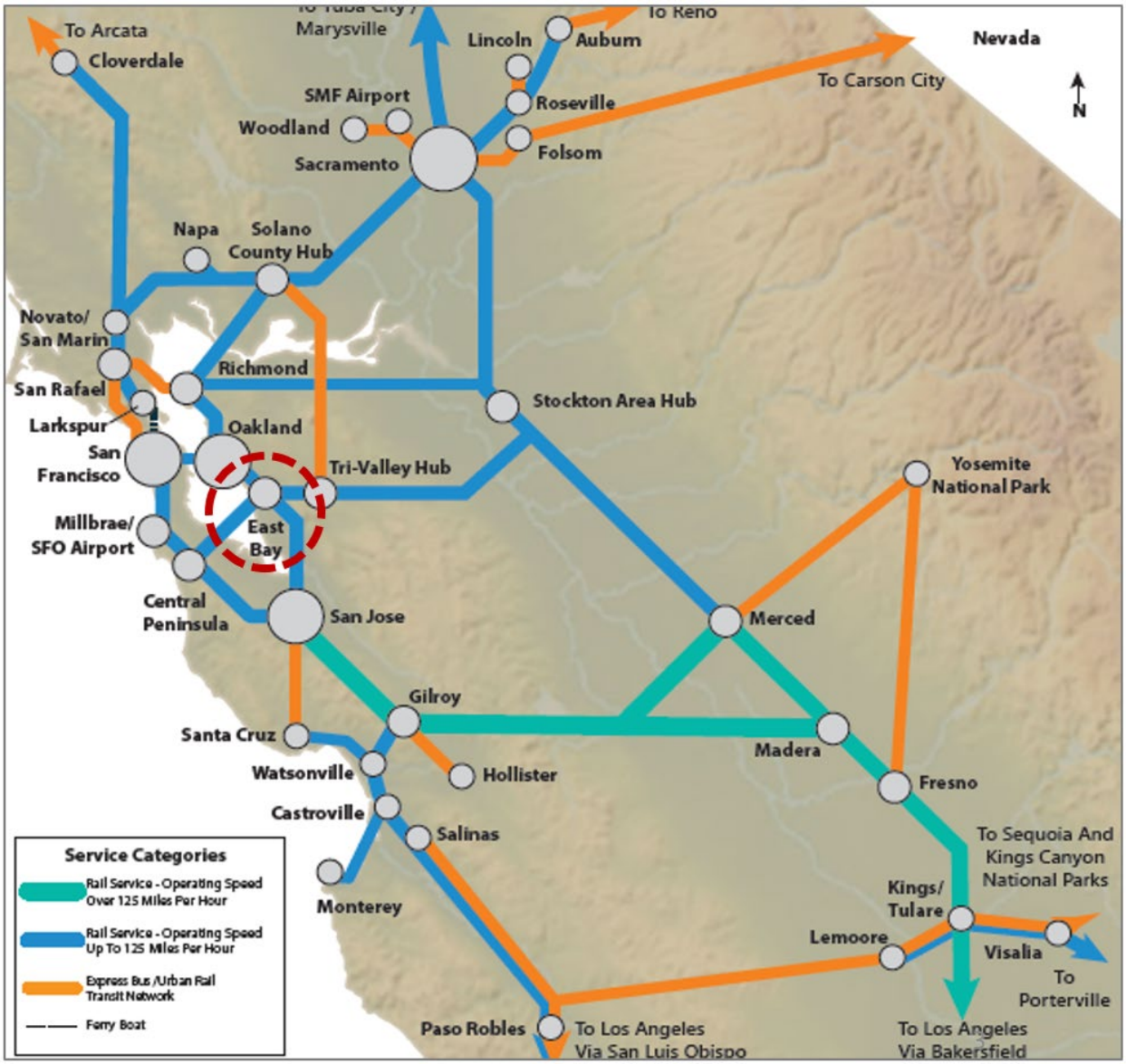
The 2018 CSRP establishes a 2040 Vision for passenger rail service in the state with three key components:

- An integrated statewide network that ties together high-speed rail (HSR) with intercity and regional services as well as integrated express bus services
- Coordinated schedules with regular, pulsed service at key transfer hubs enabling easy and intuitive connections between services
- A customer-focused, integrated network that provides seamless first/last-mile access to rail hubs, integrated ticketing, and competitive travel times with auto and air travel alternatives

Implementation of this vision will be incremental and phased over time; a key focus is on understanding how rail services already in place can be leveraged to deliver benefits in the near- and mid-term while continuing to move toward implementation of the long-term vision.

As shown on the map in Figure 1-3, the 2040 Vision includes an East Bay Hub to facilitate transit mobility and service connectivity within the Northern California Megaregion. The 2040 Vision includes phased investments for near-term (2022), mid-term (2027) and long-term (2040). It also envisions the establishment of an East Bay Hub for all phases to facilitate better transit mobility and service connectivity. As an initial step in CSRP implementation, MTC received a grant from the State to study the potential for a new passenger rail hub in southern Alameda County, including analysis of passenger rail plans of the rail operators, evaluation of station locations, and conceptual engineering and initial design focused on improving intermodal rail connectivity. A key objective of the SoCo Rail Study is to determine how best to deliver benefits to existing and future rail passengers in the mid-term while continuing to enable advancement of the long-term vision.

Figure 1-3. State Rail Plan Vison for 2040 in Northern California Megaregion

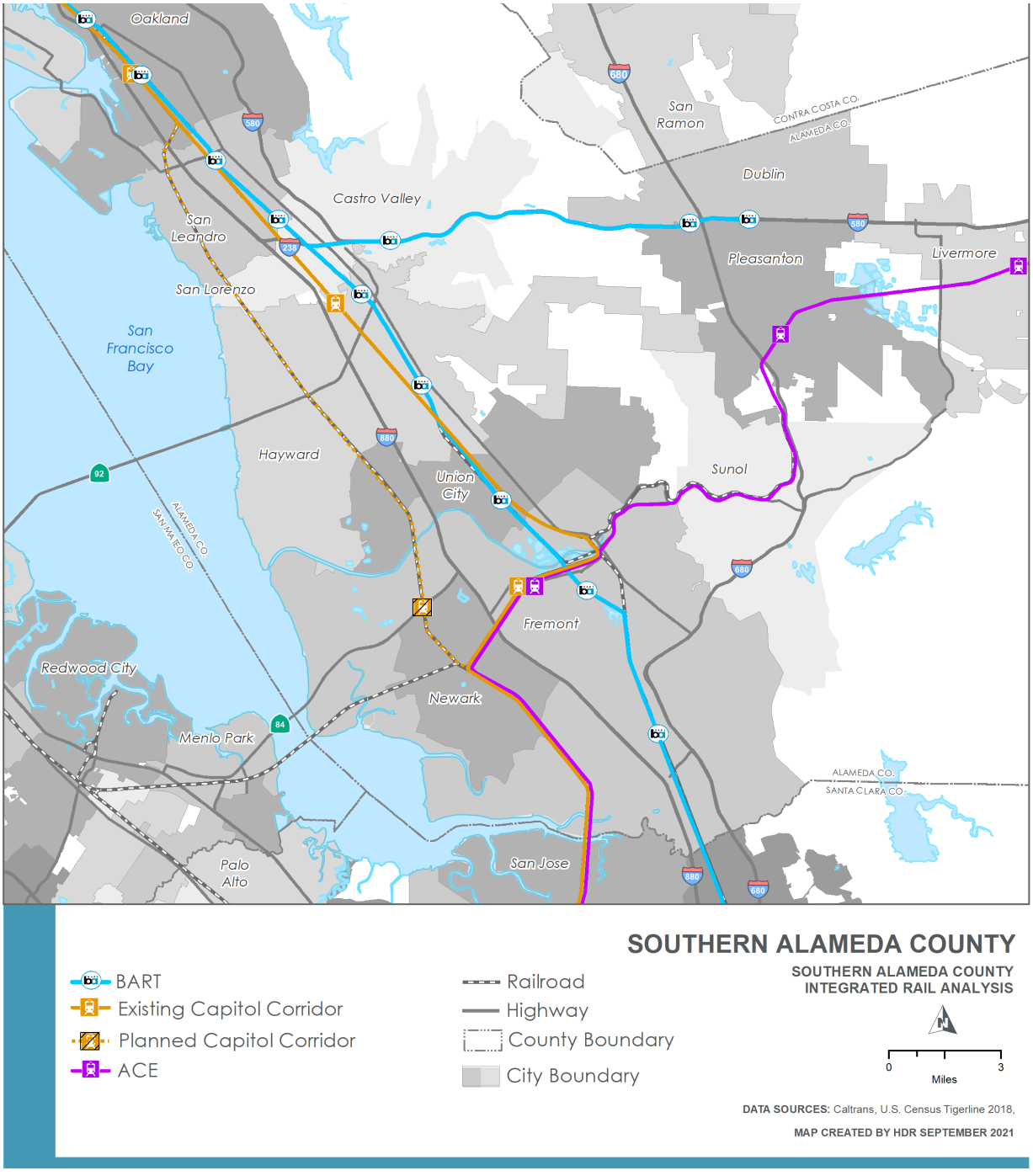


Source: 2018 California State Rail Plan

1.4. Study Area

The specific Study Area for the SoCo Rail Study includes the Cities of Fremont, Union City, and Newark within the South County Planning Area of Alameda County, as shown on Figure 1-4.

Figure 1-4. SoCo Rail Study Area



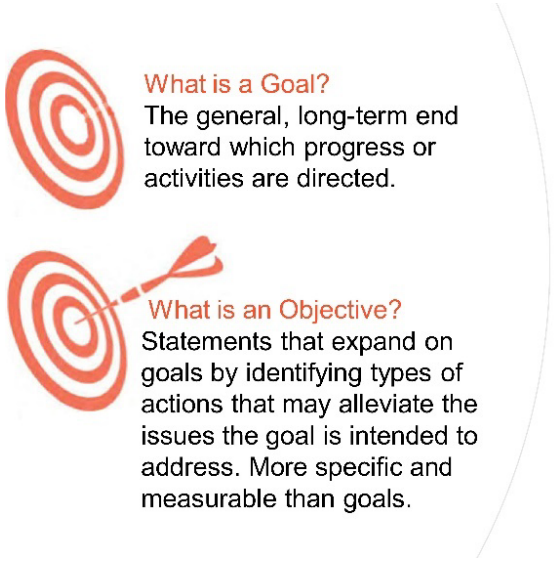
The SoCo Rail Study Area (Study Area) is located in the context of the 21-county Northern California Megaregion, which is shown on Figure 1-5. Understanding the megaregional context is important as the passenger rail systems that service southern Alameda County also serve large portions of the Northern California Megaregion.

Figure 1-5. Northern California Megaregion

2.0 Goals and Objectives of the Study

In assessing potential East Bay Hub concepts that might provide benefit in the Mid-Term Horizon and be compatible with the long-term vision, the team developed goals in collaboration with the project partners/stakeholders.

The goals described below provide the foundation of the work completed in Phase 1 and will help guide the forthcoming project development in Phase 2 of the SoCo Rail Study:



1. **Enhance regional connectivity and increase equitable access** – This goal addresses the opportunity to create connections that do not currently exist.
2. **Enhance service reliability and safety** – This goal addresses how different hub locations enable passenger rail operators to achieve their mid- and long-term service goals with respect to frequency, reliability, and travel time improvements. Given that passenger rail services (other than BART) operate on freight rail right-of-way, this goal also looks at freight capacity and impacts.
3. **Promote sustainability and resiliency** - This goal includes environmental considerations, including the potential for increased passenger rail ridership that reduces vehicle miles traveled and greenhouse gas emissions by matching service and hub locations to growing travel markets and how resilient the hub location is to climate change and other hazards.
4. **Serve surrounding communities and shape growth** – This goal addresses how land use and community plans, including multimodal station access, affect potential hub locations and future ridership growth.
5. **Develop feasible infrastructure improvements** – This goal is focused on how rail partners can deliver a cost-effective hub that can provide benefits in the mid-term and is compatible with the long-term vision for passenger rail service.

The SoCo Rail Study Steering Committee, comprised of passenger rail operators and state agencies, ranked the five goals in order of preferred importance; the highest ranked goals included *Enhance Regional Connectivity and Increase Equitable Access* (ranked most important) and *Enhance Service Reliability and Safety*. After the stakeholders defined the overall goals of the SoCo Rail Study, they identified objectives that the East Bay Hub should achieve, as shown on Figure 2-1.

Given their priority, the goals *Enhance Regional Connectivity and Increase Equitable Access* and *Enhance Service Reliability and Safety* and their objectives were the focus of analysis conducted during Phase 1. The other three goals and their objectives were also considered.

All five of goals and their objectives will continue to inform work done during Phase 2.

Figure 2-1. Goals and Objectives of the SoCo Rail Study

	1	2	3	4	5
GOALS	Enhance Regional Connectivity and Increase Equitable Access	Enhance Service Reliability and Safety	Promote Sustainability and Resiliency	Serve Surrounding Communities and Shape Growth	Develop Feasible Infrastructure Improvements
OBJECTIVES	▪ Provide enhanced access for priority populations across the Northern California Megaregion ▪ Increase connections to destinations including major employers, healthcare facilities, higher education, and entertainment districts ▪ Enhance transit connections to provide seamless service between key markets ▪ Provide opportunities for multimodal access	▪ Maximize consistency with 2018 CSRP and contribute to the 2022 CSRP ▪ Achieve operator service frequency goals in the Mid-Term and Long-Term Horizons ▪ Reduce travel times and increase reliability of megaregional and regional trips ▪ Maintain freight rail reliability and/or capacity ▪ Avoids significant impacts to passenger loading on BART ▪ Ability of hub to provide necessary station staff access, and emergency vehicle and personnel access and egress	▪ Provide environmental benefits and avoids impacts ▪ Provide a resilient and sustainable hub location(s) and/or corridors ▪ Reduce vehicle miles traveled ▪ Reduce greenhouse gas and improve air quality	▪ Provide compatibility with current and/or future land uses ▪ Provide convenient access to the rail network from surrounding community ▪ Conform with local and regional plans and priorities ▪ Promote transit-supportive land use potential ▪ Increase opportunities for economic development potential	▪ Deliver a cost-effective hub with a favorable cost-benefit ratio that can be delivered in the Mid-Term ▪ Define a constructible hub that can be delivered in the Mid-Term ▪ Deliver a hub that avoids or minimizes impacts to existing rail operations for rail operators and BART

3.0 Initial Planning

As part of Phase 1, existing projects and plans for rail service were reviewed for relevance to the East Bay Hub analysis. The existing conditions in the Study Area were reviewed to inform the analysis of East Bay Hub concepts in relation to the community characteristics, existing travel patterns and land use. This initial planning supported the operational and service planning that followed and is described in Chapter 4.0.

3.1. Existing Conditions

The existing conditions of the region and the Study Area are key to understanding the context within which a future East Bay Hub(s) will exist and the potential for success of that hub(s) to serve the community and riders. The existing community characteristics, transportation network, and travel patterns within the Study Area comprised of the Cities of Union City, Fremont, and Newark in southern Alameda County were reviewed. This information provides the context for the development of the East Bay Hub locations identified as possible solutions to improve overall connectivity for the regional rail network.

The following summarizes some of the key findings of the existing conditions analysis. The full existing conditions report can be found in Appendix A.

3.1.1. Community Characteristics

Based on an examination of low-income, minority, single-parent, zero-vehicle, and rent-burdened households, as well as elderly, disabled, and limited-English proficiency populations (which together assist in identifying Equity Priority Communities (EPCs), formerly known as Communities of Concern [1], as well as land use and development, housing supply and costs, population and income disparity, and vehicle ownership, key findings related to the community characteristics include:

- Most of Alameda County's Communities of Concern, as identified using MTC criteria, are located in Oakland, San Leandro, and Hayward. In 2018, there was a clustering in Union City and Newark as well; however, based on MTC's recent definition of Equity Priority Communities and the most recently available U.S. Census Bureau data, there are no EPCs in Union City, Fremont, or Newark.
- While population throughout the Study Area has grown since 2010, the growth has not been evenly distributed among income levels, with declines in incomes less than $35,000 and the largest increase in incomes greater than $150,000. Incomes between these categories experienced the sharpest decline over the period.

[1] An "Equity Priority Community", and its predecessor term, "Community of Concern", is defined as a Census Tract that exceeds the thresholds for Low-income Households and either People of Color or 3 or more of the following: Limited English Proficiency, Population over 75, Zero-vehicle Households, Single-parent Households, Disabled Population, and Rent-burdened Households.

- The regional vacancy rate (ratio of available housing stock to total housing stock) for both the region and Alameda County is less than 6 percent.
- The three cities comprising the Study Area have plans for denser, mixed-use transit-oriented developments (TODs) in their jurisdictions. The cities identified seven Priority Development Areas (PDAs) for focused housing and commercial growth. The Union City BART Station, the Fremont-Centerville Station, the Fremont BART Station, and the Warm Springs BART Station are incorporated in four of the PDAs.
- Driving is significantly more expensive than transit or active transportation on a per-trip basis.

3.1.2. Existing Transportation Network

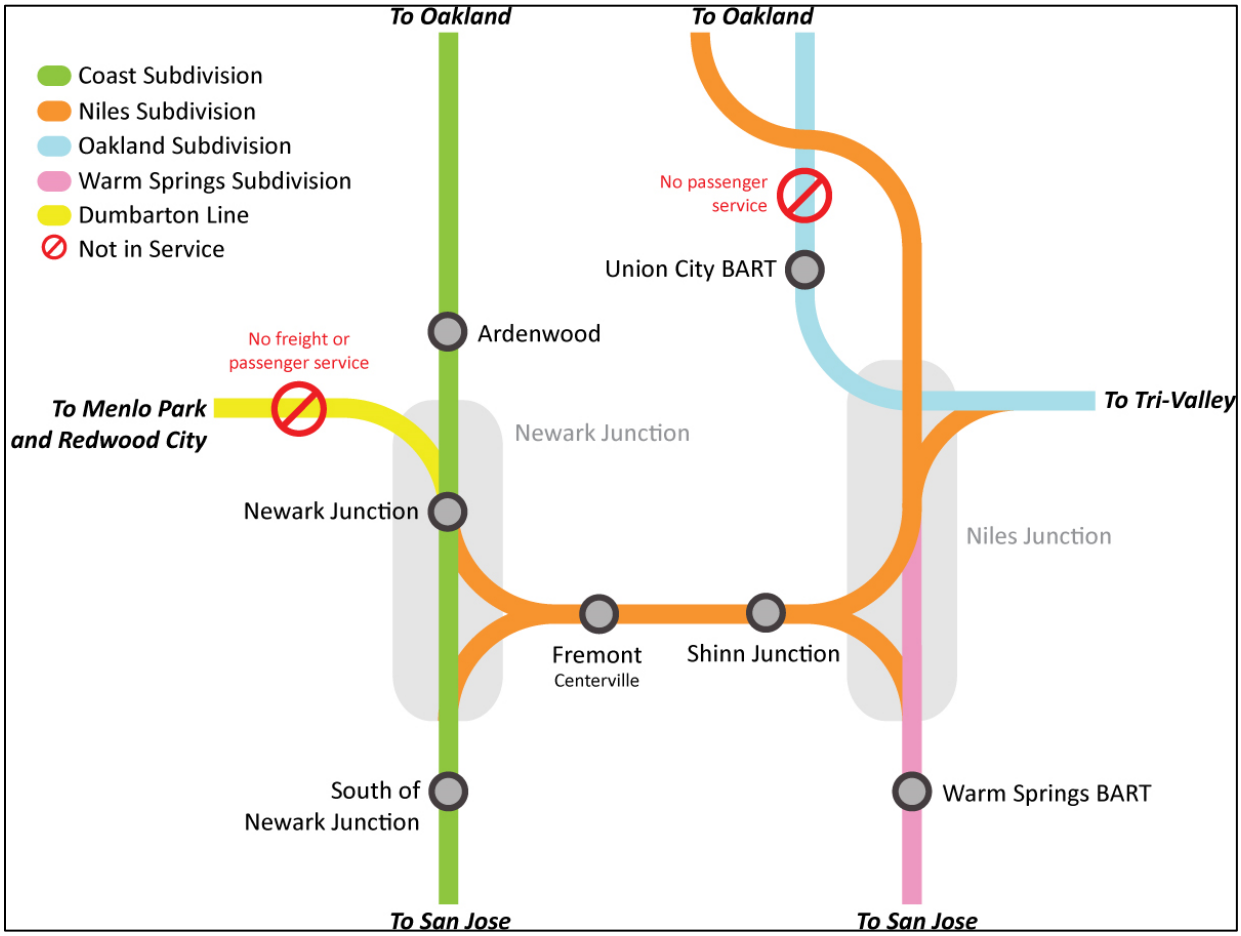
Findings from a review of the highway, rail, and transit networks in the Study Area, as well as grade crossings and station access, include:

- Numerous freeway corridors experience high levels of unreliability in travel times. Northbound I-680 from Milpitas to Sunol is the fourth most congested freeway segment in the Bay Area.[2] Much of northbound I-680 and southbound I-880 in southern Alameda County, as well as portions of eastbound I-580 in the Tri-Valley, operate at LOS F during the afternoon peak period, with average travel speeds during the of 30 miles per hour or less .[3]
- Capitol Corridor, Altamont Corridor Express (ACE), and BART passenger rail services have operations in the Study Area, including at least one station for each carrier.
- Union Pacific Railroad (UP) owns several rail mainlines in the Study Area; the Dumbarton Line is owned by the San Mateo County Transit District (SamTrans). BNSF Railway operates over two UP lines via trackage rights (i.e., the Niles and Warm Springs Subdivisions). Portions of another two of the mainlines, the Oakland Subdivision north of Union City and the Dumbarton Line between just east of US 101 in Menlo Park on the San Francisco Peninsula and Newark, are out of service, as seen on Figure 3-1.
- AC Transit, the primary bus transit service operator in the Study Area, has bus connections at every BART station. Transbay bus services that utilize the Dumbarton Bridge are provided by AC Transit, Dumbarton Express, and Stanford Marguerite are available at the Union City BART and Ardenwood Park-and-Ride.
- Many existing rail transit trips in the Study Area include an automobile trip to access the station as a solution to first-mile/last-mile access issues.

[2] MTC. *Vital Signs: Time Spent in Congestion*. https://www.alamedactc.org/wp-content/uploads/2019/11/2019_Alameda_County_CMP_FINAL.pdf[3] Alameda CTC. *Congestion Management Program*. https://www.alamedactc.org/wp-content/uploads/2019/11/2019_Alameda_County_CMP_FINAL.pdf

[3] Alameda CTC. *Congestion Management Program*. https://www.alamedactc.org/wp-content/uploads/2019/11/2019_Alameda_County_CMP_FINAL.pdf

Figure 3-1. UP Rail Subdivisions and the Dumbarton Line in the Study Area



Source: AECOM 2020

3.1.3. Existing Travel Patterns

The key findings from an assessment of exiting travel patterns to and from, as well as through the Study Area are shown on Figure 3-2 and Figure 3-3 and include:

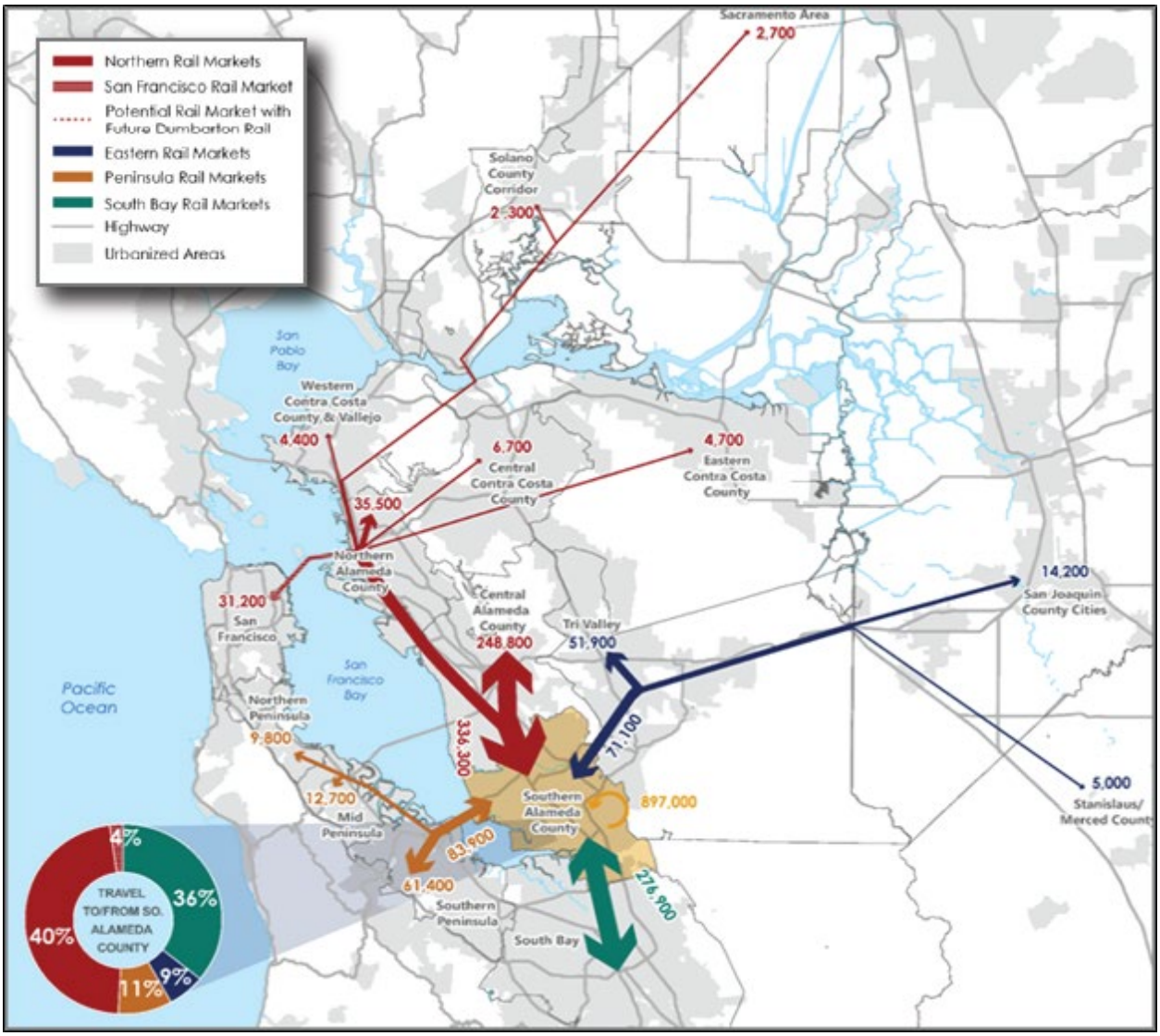
- The Bay Area experiences a weekday flow of residents from the East Bay, Central Valley, and North Bay to jobs in San Francisco, the Peninsula, and the South Bay.
- Before the onset of the Covid-19 pandemic and subsequent shelter in place orders, intercity, commuter, and transit ridership of carriers serving the Study Area was strong:
  - Capitol Corridor had an annual system ridership of 1.7 million boardings and alightings in FY 2018.[4]
  - ACE's annual systemwide ridership was approximately 1.5 million boardings and alightings in 2019.[5]

[4] CCJPA. *Capitol Corridor Intercity Passenger Rail Service Business Plan Update FY 2021-22 – FY 2021-22.* https://www.capitolcorridor.org/wp-content/uploads/2020/12/CCJPA-Revised-ABP-FY20-21_Nov2020.pdf

[5] Altamont Corridor Express: 2019 Annual Agency Profile. https://www7.fta.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2019/90182.pdf

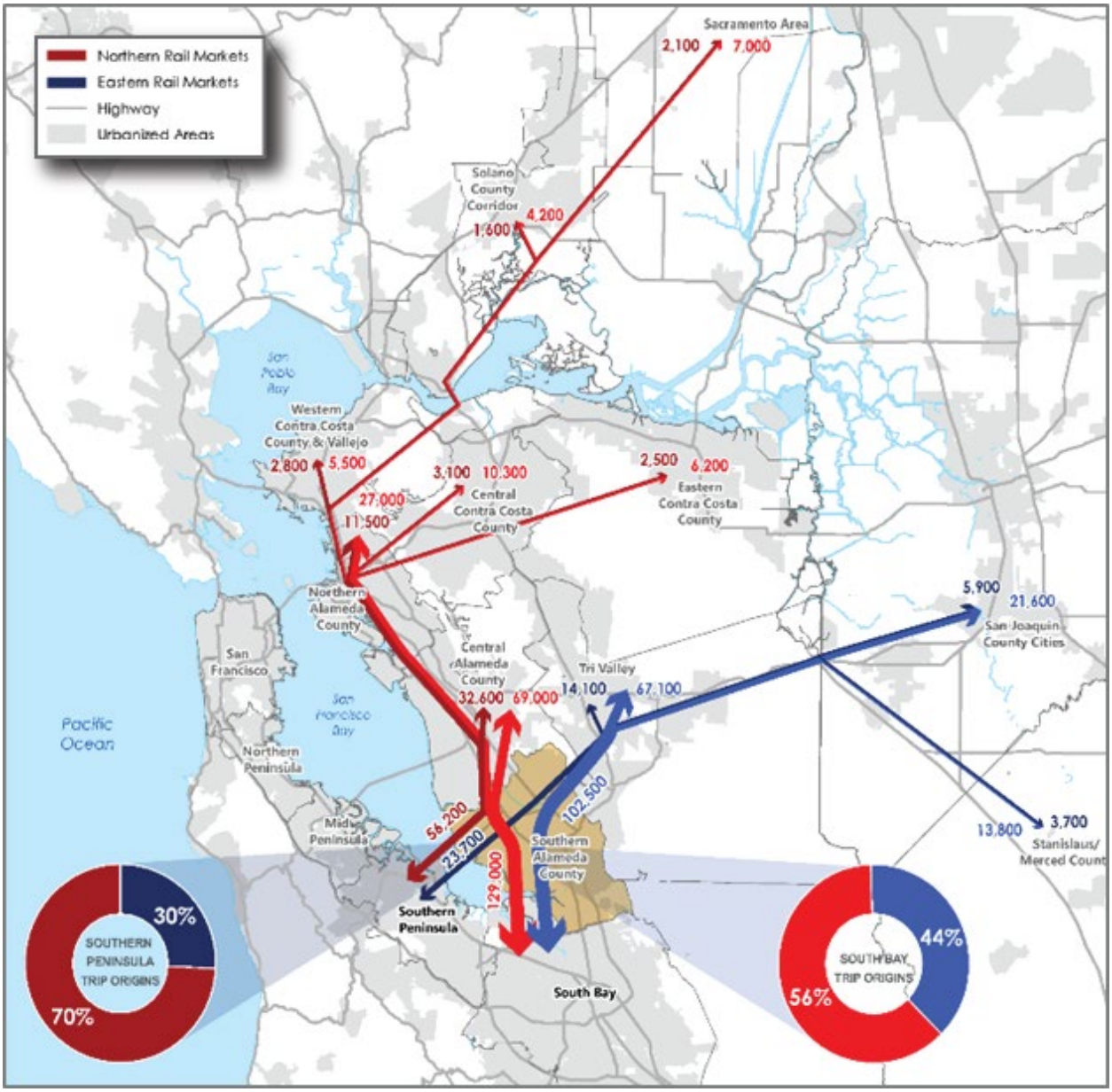
  - Amtrak's long-distance Coast Starlight service (Seattle-Oakland-San Jose-Los Angeles) had annual route ridership of 412,500 boardings and alightings in FY 2018.
  - BART had a systemwide annual ridership of 120.6 million in 2018.
- Transit currently serves a small share of regional travel associated with the Study Area.
- Transit mode share is highest for trips to San Francisco/Daly City; and the transit mode share is lower for connections between the Study Area and more suburban population and employment hubs.

Figure 3-2. Travel Markets *To/From* Study Area



Source: StreetLight Data, Caltrans, City of Menlo Park, MTC, U.S. Census Bureau, and transit operators (compiled and processed by Fehr & Peers)
Note: Indicated values represent weekday person-trips.

Figure 3-3. Travel Markets *Through* Study Area



Source: StreetLight Data, Caltrans, City of Menlo Park, MTC, U.S. Census Bureau, and transit operators (compiled and processed by Fehr & Peers)
Note: Indicated values represent weekday person-trips through Southern Alameda County.

3.2. Related Projects and Plans

Several related projects and plans establish the mid-term and long-term transit context of a future East Bay Hub in southern Alameda County. Included are key projects and plans of service providers that operate within the Study Area as described in the following sections and in Appendix B.

3.2.1. Mid-Term Projects and Plans

The following rail improvement and expansion projects and services are assumed to be in place in the Mid-Term Horizon:

- CCJPA – South Bay Connect
- SamTrans – Dumbarton Corridor Transportation Study (express bus service phase)
- SJRRC / San Joaquin Joint Powers Authority (SJJPA) – Valley Rail Program
- Santa Clara Valley Transportation Authority (VTA) – BART Silicon Valley Phase II
- Peninsula Corridor Joint Powers Board (PCJPB) – Caltrain Business Plan (mid-term operational scenario)
- California High Speed Rail Authority (CHSRA) – Merced-Bakersfield HSR Interim Service
- Tri-Valley - San Joaquin Valley Regional Rail Authority (the Authority) – Valley Link
- BART – Irvington Station

3.2.2. Long-Term Projects and Plans

The Long-Term Horizon (20+ years) envisions unified rail corridors that could accommodate a variety of operators throughout the Northern California Megaregion. To support this unified vision, several operators have projects or programs in planning that are anticipated to be in operation in the longer term. The long-term projects and plans include the following:

- CCJPA – Capital Corridor Vision
- SJRRC – Altamont Corridor Vision
- SamTrans – Dumbarton Rail Project
- City of San Jose – Diridon Integrated Station Concept Plan
- BART / CCJPA – Link21
- PCJPB – Caltrain Business Plan (Long Range Service Vision)
- CHSRA – HSR Phase 1 Service (San Francisco to Anaheim)

4.0 Operational and Service Planning and Assumptions

Operational and service planning was conducted for both the Long-Term Horizon (20+ years) and the Mid-Term Horizon (10 years) to understand the operational parameters of the various passenger rail services and to inform the identification of potential East Bay Hub locations. Understanding the patterns and frequencies of service is critical to identifying possible locations for an East Bay Hub.

4.1. Operational and Service Planning Process

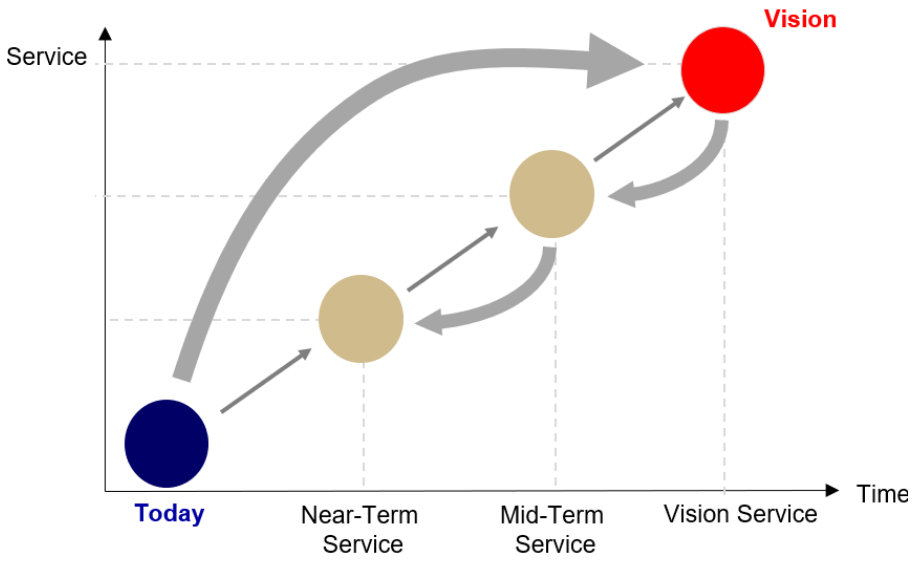
Existing and potential intercity and commuter rail services operating on the conventional railway system (i.e., standard-gauge tracks operating in dedicated passenger rail corridors or shared corridors with freight trains) in the Northern California Megaregion were reviewed to understand possible service levels, equipment, and infrastructure needs for multiple rail operators. The operational and service planning process also considered the importance of the BART mass transit system as a potential connection with regional rail within the SoCo Rail Study Area.

The process was guided by input from the Technical Working Group (TWG) and the Steering Committee established for the SoCo Rail Study. The TWG consisted of representatives from the California State Department of Transportation (Caltrans), Caltrain's Division of Mass Transportation and Rail, CCJPA, SJRRC, and SJJPA. The Steering Committee included members from MTC, Alameda CTC, Caltrans, CCJPA, SJRRC, and SJJPA.

The operational and service planning process included the following steps, which are summarized on Figure 4-1:

1. Identify planning parameters and operator assumptions
2. Develop long-term service scenarios
3. Refine long-term service scenarios
4. Develop mid-term service scenarios
5. Refine mid-term service scenarios
6. Conduct rail hub station analysis

Figure 4-1. Operational and Service Planning Process



Source: DB, 2019

4.2. Planning Parameters Defined by the California State Rail Plan

The SoCo Rail Study effort is based on the goals identified in the 2018 CSRP. The 2018 CSRP provides the overarching vision and foundation for rail service planning statewide; it articulates a strategic vision for rail service throughout California and provides specific service goals for regional service in northern California, including San Francisco Bay, Sacramento, the San Joaquin Valley, and the Central Coast. The CSRP identifies the need for and prioritizes the establishment of an integrated statewide passenger rail network, connecting regions through coordinated schedules and pulsed operations organized around shared nodes (also known as hubs).

The 2018 CSRP is organized around service goals and seeks to be operator-neutral. It differentiates regional, intercity, and HSR with frequency goals for each corridor. Envisioned service levels contained in the 2018 CSRP for both the mid-term and long-term are the foundation for the refined operator goals that were set during the SoCo Rail Study. While BART is a major rail transit service provider in the Bay Area and is germane to the SoCo Rail Study, the 2018 CSRP focused on rail services operating on the conventional railway system, consistent with the requirements of the Passenger Rail Investment and Improvement Act of 2008.

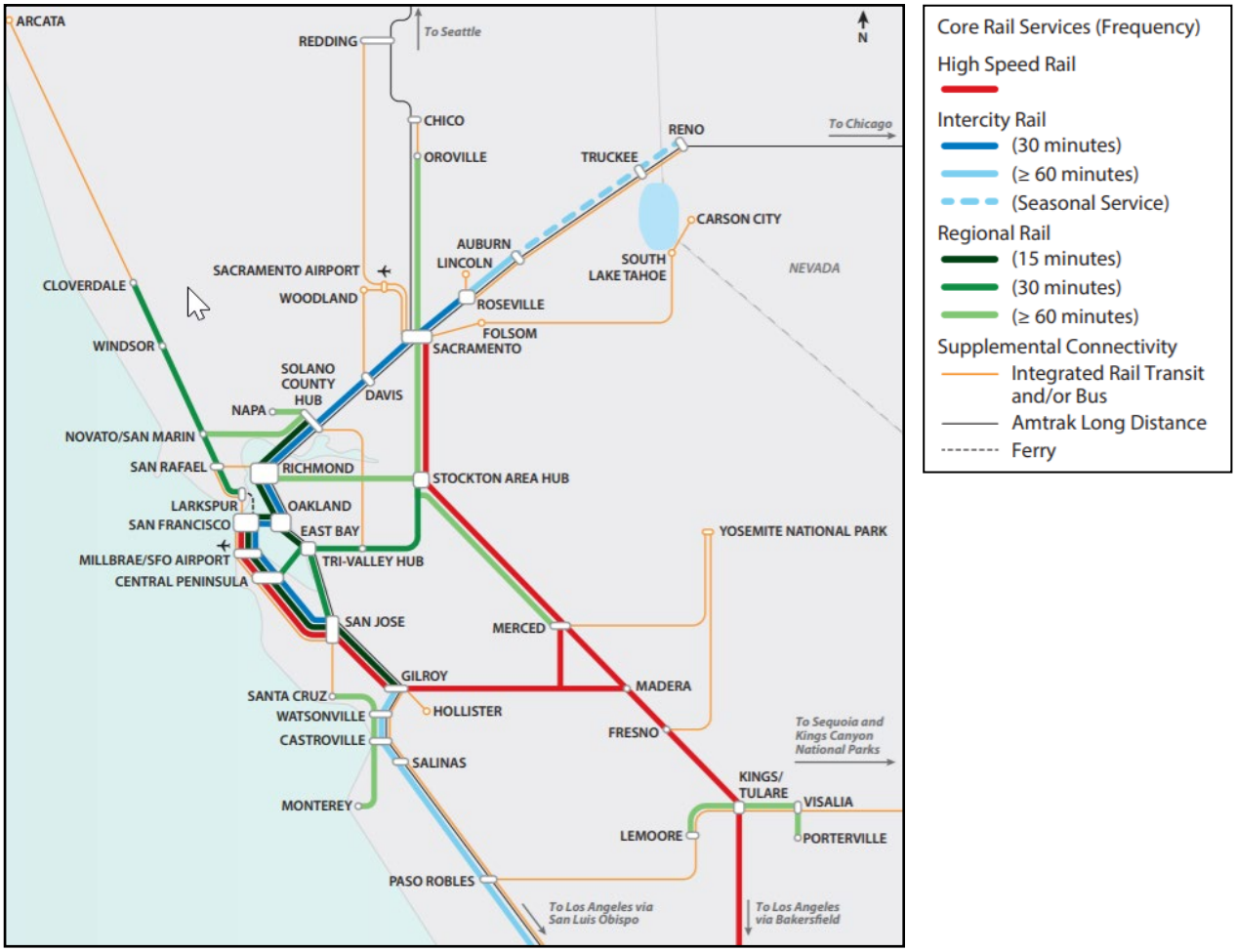
4.2.1. 2040 Integrated Network (Long-Term)

The long-term planning vision of the 2018 CSRP identifies a "2040 Integrated Network" for all of California. In terms of reginal planning and funding, the 2040 Integrated Network is unconstrained and additional funding sources would need to be identified to implement much of the envisioned rail network. Figure 4-2 shows the northern California portion of the 2040 Integrated Network.

The 2018 CSRP identifies major service improvements for the Northern California Megaregion through:

- Direct service between Sacramento and San Francisco, via a second Transbay crossing, carrying both intercity and regional service
- Direct service between the Central Valley/East Bay and the Peninsula, via a restored Dumbarton bridge, carrying regional service
- Increased frequency on the peninsula, over the Altamont Corridor, and between Oakland and San Jose

Figure 4-2. 2018 CSRP – 2040 Integrated Network (Northern California)



Source: 2018 California State Rail Plan

4.2.2. 2027 Integrated Network (Mid-Term)

Shown on Figure 4-3, the 2018 CSRP identifies improvements for implementation in the mid-term (or by 2027) for northern California as follows:

- Increased frequencies through the Altamont Corridor, along the Peninsula Corridor, and between Oakland and San Jose; and
- Initiation of high-speed service in the Central Valley.

Figure 4-3. 2018 CSRP – 2027 Integrated Network (Northern California)

Source: 2018 California State Rail Plan

4.2.3. East Bay Hub

In addition to increased service frequencies, the 2018 CSRP identifies the need for a connection node in the East Bay. According to the CSRP, this East Bay Hub would "*allow connections to north-south service between Oakland and San Jose; and east-west services between the Stockton area and San Jose, and a regional Dumbarton Bay Crossing.*"

The operational and service planning process focused analysis on the role such a node would fill, what operational characteristics it would need to serve, and where in the network it would need to be developed to provide the desired connectivity between services.

4.3. Operational and Service Planning for the Long-Term Horizon

An important consideration in locating an East Bay Hub is the understanding of how megaregional rail services may be passing through southern Alameda County in the long-term and how the routing of each rail service relates to others in terms of what connections are most valuable.

4.3.1. Rail Operator Long-Term Goals

Building on the 2018 CSRP 2040 Integrated Network vision, operator goals were established for the Long-Term Horizon. This goal setting, facilitated by the Steering Committee and the TWG, focused on SJRRC's ACE, CCJPA's Capitol Corridor, and PCJPB's Caltrain service level goals and are summarized in Table 4-1.

Table 4-1. Long-Term Service Goals of Rail Operators

SJRRC Long-Term Service Goals for Altamont Corridor Express	CCJPA Long-Term Service Goals for Capitol Corridor [a]	PCJPB Long-Term Service Goals for Caltrain
Central Valley – Bay Area [b] • 15 minutes (peak) • 30 minutes (off-peak) **Butte County – Merced** • 4 roundtrips (Butte County – Sacramento) • 4 roundtrips (Natomas – Merced) [b]	• 10 maximum roundtrips (Auburn – Roseville) • 10 maximum roundtrips (Roseville – Sacramento) • 2-4 TPHPD (Sacramento – Oakland/San Jose) [c]	**Moderate Growth Scenario** [d] • 8 TPHPD (San Francisco – Tamien) • 4 TPHPD (Tamien – Blossom Hill) • 2 TPHPD (Blossom Hill – Gilroy) **High Growth Scenario (if region supports)** [e] • 12 TPHPD (San Francisco – Tamien) [f] • 4 TPHPD (Tamien – Blossom Hill) • 2 TPHPD (Blossom Hill – Gilroy) • Possible Megaregional Service to East Bay and toward Sacramento (service levels/destinations stations TBD) [g]

[a] Detailed market analysis work needed to refine long-term service goals.

[b] For Bay Area trains, there could be several destinations as trains could possibly access the Peninsula via new Dumbarton rail crossing or via Link21. Further planning is needed in the context of regional planning to determine long-term service configuration.

[c] Access to San Jose could potentially be accomplished along three routes: (1) along the East Bay; (2) via Link21; and (3) via the East Bay and then across a new Dumbarton rail crossing and then down the Peninsula. Further planning need in the context of regional planning to determine long-term service configuration.

[d] Based on adopted Caltrain 2040 Long-Range Service Vision

[e] Based on Caltrain Business Plan Presentation (August 2019)

[f] Could include some mix of interlined regional trains.

[g] CHSRA is planning for 4 TPHPD along the Caltrain Corridor (on top of the service identified by PCJPB above).

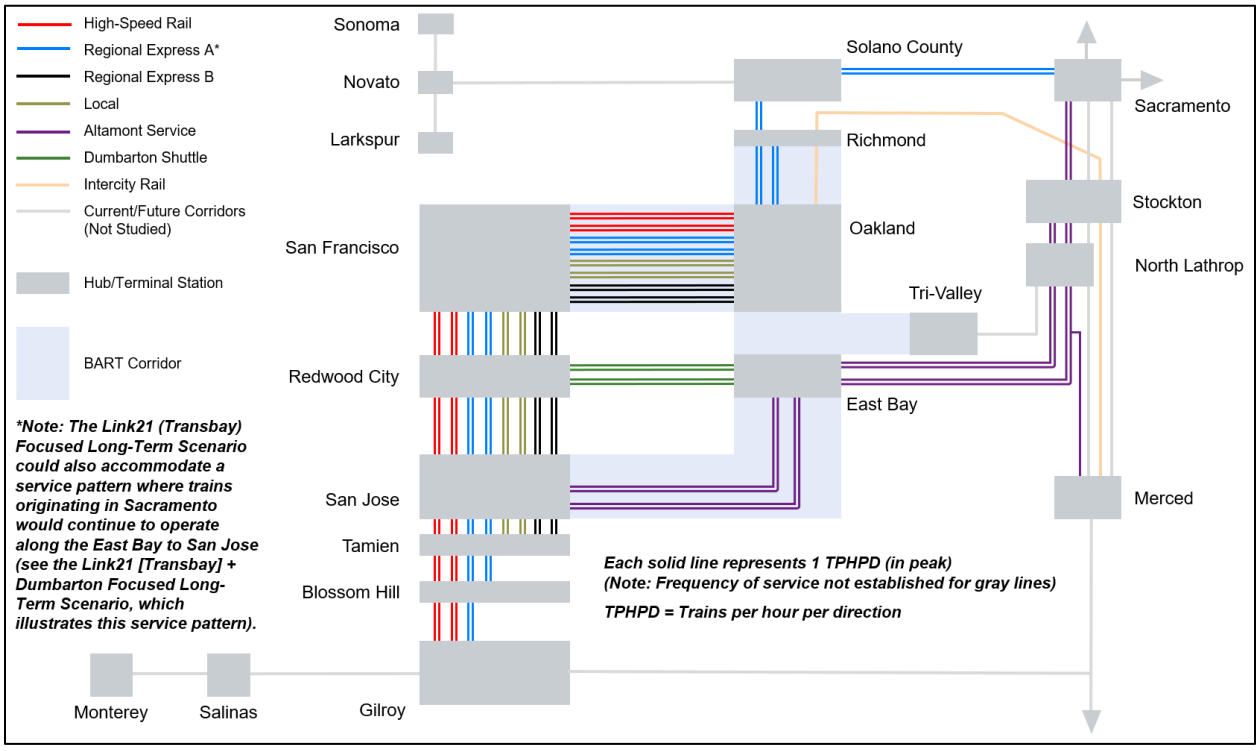
4.3.2. Long-Term Service Scenarios

Given the Long-Term Horizon (20+ years), there has not been enough rail planning advanced to date, nor sufficient regional consensus, to have developed a single unified vision of the entire Northern California Megaregion rail network. Accordingly, four long-term service scenarios were developed for this study to accommodate this uncertainty:

- Link 21 (Transbay) Focused
- Dumbarton Focused
- Transbay Connections Focused
- Link21 (Transbay) + Dumbarton Focused

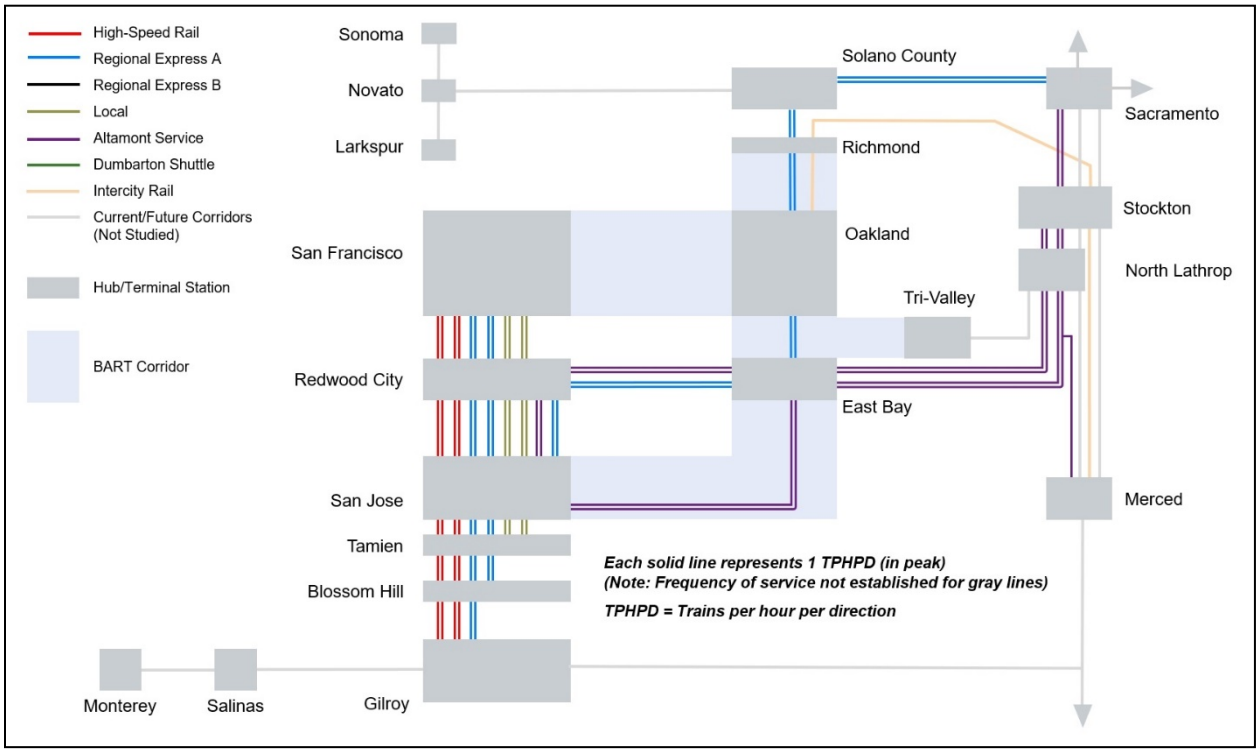
Details of the four long-term scenarios are illustrated on Figure 4-4 through Figure 4-7, which show the rail network and service characteristics. These figures display the trains per hour per direction (TPHPD) for each of the high speed, intercity, and regional rail services. The gray squares represent rail hubs where trains meet and where interconnections can be made by riders. Each line represents one TPHPD. For example, the two blue lines between Sacramento and Solano County represents two roundtrips per hour, or approximately 30-minute headways.

Figure 4-4. Link 21 (Transbay) Focused Long-Term Scenario



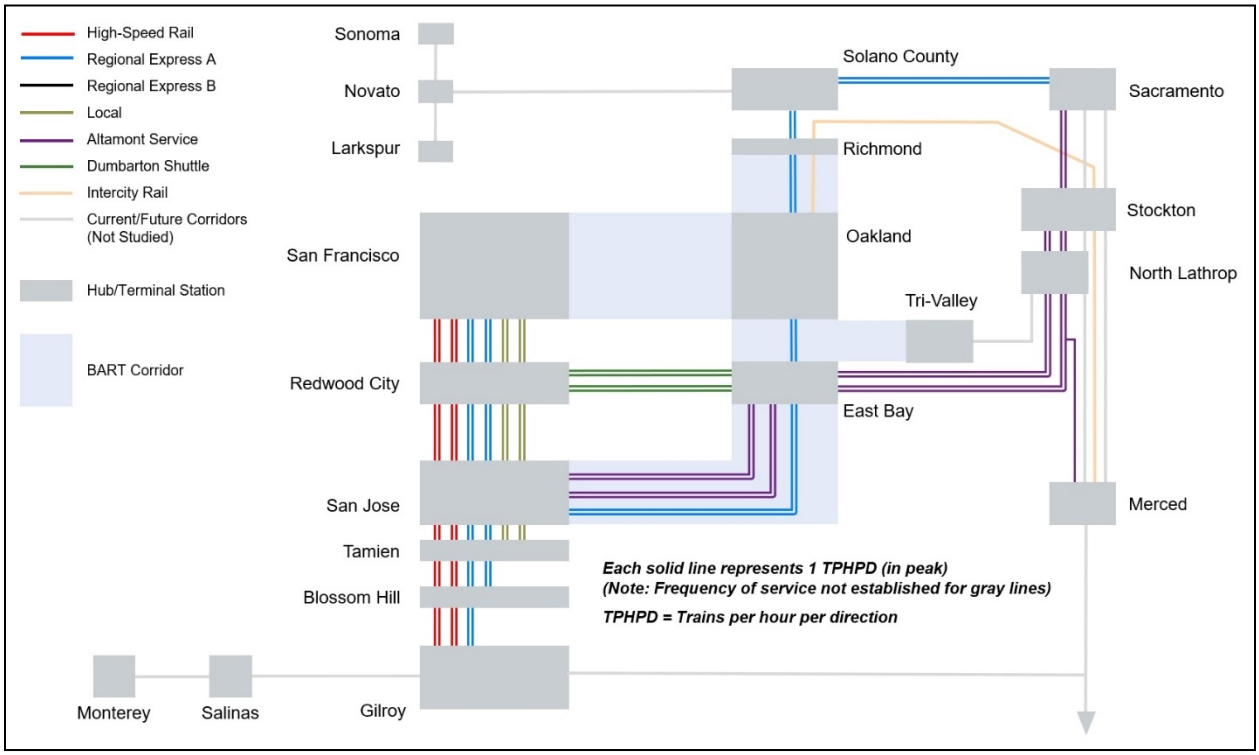
Source: DB, 2020; AECOM, 2021

Figure 4-5. Dumbarton Focused Long-Term Scenario



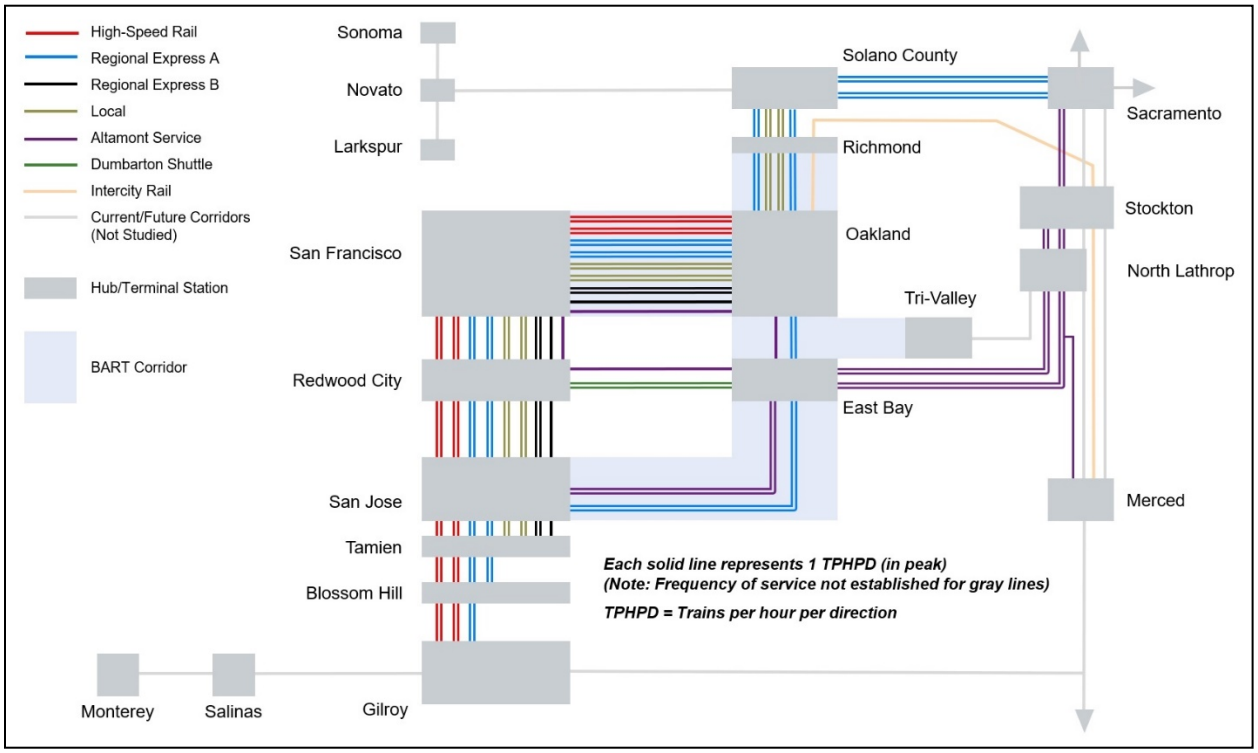
Source: DB, 2020; AECOM, 2021

Figure 4-6. Transbay Connections Long-Term Scenario



Source: DB, 2020; AECOM, 2021

Figure 4-7. Link 21 (Transbay) + Dumbarton Focused Long-Term Scenario



Source: DB, 2020; AECOM, 2021

4.3.3. Key Findings for Long-Term Horizon

Key findings from the operational and service planning analysis for the Long-Term Horizon include:

- Planning efforts that would have a direct effect on the SoCo Study Area were included in the scenarios; Link21 and the Dumbarton Rail Corridor were key to differentiating travel patterns and scenarios.
- Four scenarios were reviewed – Link 21 (Transbay) Focused, Dumbarton Focused, Transbay Connections Focused, and Link21 + Dumbarton Focused.
- All scenarios are viable for the Long-Term Horizon and should be considered in the development of the Mid-Term East Bay Hubs.

4.4. Operational and Service Planning for the Mid-Term Horizon

Following the Long-Term Horizon operational and service planning, mid-term goals were developed by the operators based on the 2018 CSRP 2027 Mid-Term Service Goals, with refinements based on an assessment of the realistic capacity that can be provided in the Mid-Term Horizon via the individual capital improvement programs of each operator.

The following rail expansion projects and services (not including ACE and Capitol Corridor service) were assumed to be in place for the Mid-Term Horizon:

- Valley Link (to North Lathrop)
- BART to San Jose/Santa Clara
- Caltrain Mid-Term Operational Scenario (8 TPHPD for Caltrain with no HSR service)

The Dumbarton Rail Corridor Project and the CAHSR segment from San Francisco to Central Valley to Gilroy were eliminated as assumptions in the mid-term due to the uncertainty of the timing and funding during the Mid-Term Horizon.

4.4.1. Rail Operator Mid-Term Goals

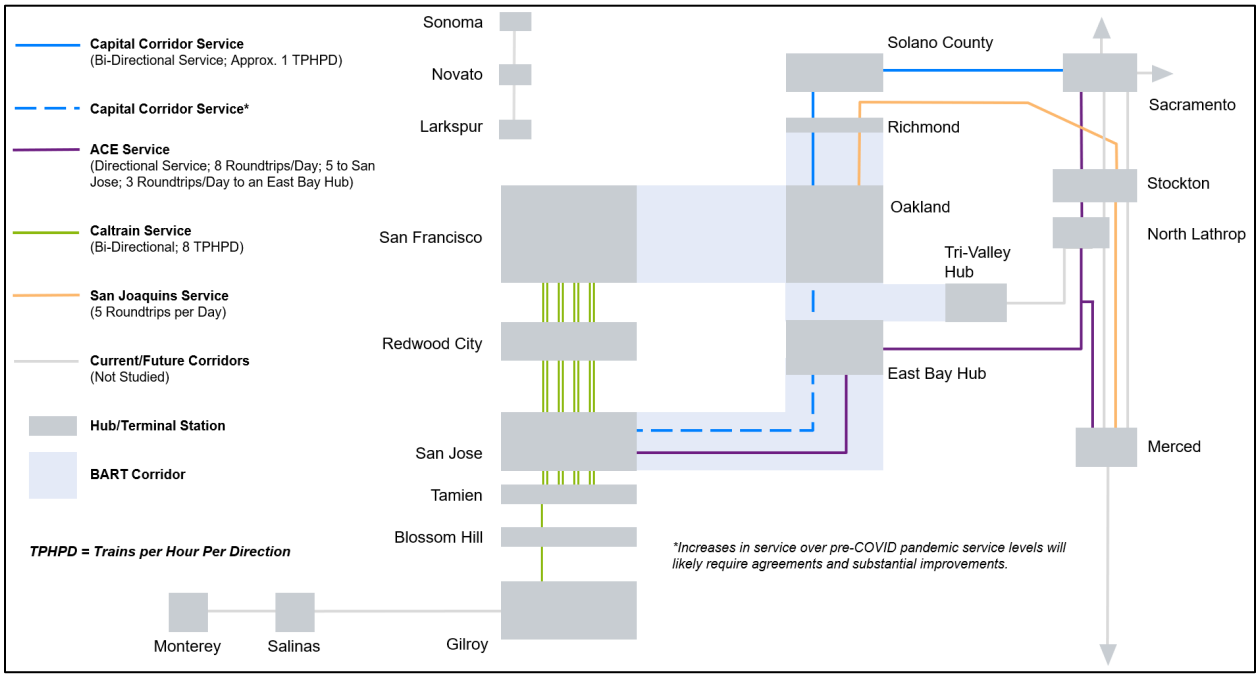
During operational and service planning, operator goals for the Mid-Term Horizon were established as shown in Table 4-2. These goals were also used as assumptions for the development a single Mid-Term Scenario, which is illustrated on Figure 4-8.

Table 4-2. Mid-Term Service Goals of Rail Operators

SJRRC Mid-Term Service Goals for Altamont Corridor Express	CCJPA Mid-Term Service Goals for Capitol Corridor	PCJPB Mid-Term Service Goals for Caltrain
Central Valley – Bay Area • 5 roundtrips (Central Valley – San Jose) [a] • 3 roundtrips (Central Valley – East Bay Hub) [b] **Butte County – Sacramento/Merced** • 2 roundtrips (Butte County – Sacramento) • 3 roundtrips (Natomas – Merced)	• 1 roundtrip (Auburn – Roseville) • 10 roundtrips (Roseville – Sacramento) • 15+ roundtrips (Sacramento – Oakland) • Up to 15 roundtrips (Oakland – San Jose) [c] • Relocate service between southern Oakland and Newark to the UP Coast Subdivision [d] • Construct a new Capitol Corridor Station at Ardenwood	• 8 TPHPD (San Francisco – San Jose) • 4 TPHPD (San Jose – Tamien) • 5 roundtrips (San Jose – Gilroy) [e] • 2 roundtrips (Gilroy to Salinas) [f]

[a] If Alviso improvements are accelerated and completed in mid-term, then additional service could extend to San Jose (beyond the 5 roundtrips currently planned).
[b] While SJRRC is planning for 3 roundtrips in the mid-term to an East Bay Hub, additional ACE trains may eventually serve and East Bay Hub beyond the Mid-Term Horizon.
[c] Further analysis needed to determine what service increases are possible in the mid-term above pre-COVID service levels. Any increases would likely require development of agreements with the host railroads and the prioritization of substantial infrastructure improvements (including through the Alviso wetlands) in the mid-term.
[d] This new alignment is being implemented as part of the South Bay Connect Project. Capitol Corridor trains currently run along the UP Niles Subdivision between Oakland and Newark.
[e] Based on Caltrain Business Plan Spring Update Presentation (March 2020)
[f] Based on TAMC Monterey County Rail Extension Fact Sheet (March 2020)

Figure 4-8. Mid-Term Service Scenario



Source: AECOM, 2021; DB, 2020

4.4.2. Constraints on the Rail Network Related to Study Area

Constraints to increasing service identified during service planning for the Long-Term Horizon were critical for service planning in the Mid-Term Horizon. Constraints on a rail network fall into four categories: infrastructure, operating agreements, dispatching policies, and operating plan. For Phase 1 of the SoCo Rail Study, the focus was on infrastructure constraints for the Mid-Term Horizon since coordination with the freight railroads and operations planning will be a component of Phase 2 of the SoCo Rail Study.

In the East Bay, the network is constrained by long single-track sections between sidings where trains can safely pass or meet. The UP Coast, UP Niles, and UP Oakland Subdivisions present challenges managing traffic through single track sections. The primary constraint preventing significant increase in service to San Jose from southern Alameda County is along the single-track section of the UP Coast Subdivision between Newark and Santa Clara through the Alviso Wetlands and a single-platform at Great America Station.

Pre-pandemic service levels included seven Capitol Corridor roundtrips, four ACE roundtrips, and one Coast Starlight roundtrip, all of which utilized the Alviso section of the UP Coast Subdivision for a total of 12 roundtrips per day. Much of this service was peak hour / peak direction oriented and utilized the corridor like a one-way street. Significant increases in service will require expanding the infrastructure through the Alviso Wetlands. Such a project would be a significant capital investment, complicated by the protected wetlands, environmental sensitivities, rising sea level, and other factors.

Given these constraints, there is a clear need to improve passenger rail service and connectivity in southern Alameda County, and that an East Bay Hub can provide new connections to Santa Clara County, southern Peninsula, and other Bay Area destinations.

4.4.3. Key Findings from Mid-Term Horizon

Key findings from the Service Planning analysis conducted during Phase 1 of the SoCo Rail Study highlight why an East Bay Hub is critical to increased passenger rail service between the Megaregion and the Bay Area.

- Based on infrastructure constraints discussed in the previous section, especially along the UP Coast Subdivision between Newark and Santa Clara via the Alviso Wetlands, the ability to provide additional passenger rail service to San Jose beyond the planned one additional roundtrip for ACE is not possible without extensive upgrades to the UP Coast Subdivision. This is unlikely to be accomplished in the Mid-Term Horizon due to cost and complexity.
- Given capacity constraints along the UP Coast Subdivision and the timing it would take to accomplish capacity enhancing improvements, an East Bay Hub would provide a unique opportunity to run additional passenger rail trains that could terminate in southern Alameda County without having to trigger large-scale improvement along the UP Coast Subdivision.
- An East Bay Hub would provide regional connections to rail and bus networks that would allow megaregional rail services to have regional connectivity around the Bay Area.
- SJRRC supports turning back ACE trains in southern Alameda County at an East Bay Hub as a strategy for allowing increases in service in the Mid-Term Horizon.
- CCJPA is not planning to turnback trains in southern Alameda County, so improvements would be needed along the UP Coast Subdivision to provide additional service to San Jose.
- A new passenger rail service along the Dumbarton Corridor is likely infeasible in the mid-term due to constraints at Redwood City and capacity along the Peninsula.
- In the Mid-Term Horizon, enhanced Transbay bus services via the Dumbarton Bridge to the Peninsula market can provide connectivity to both ACE and Capitol Corridor services in southern Alameda County. These enhanced Transbay bus services could serve the East Bay Hub(s).

5.0 Identification and Assessment of East Bay Hub Concepts

This chapter identifies and assesses East Bay Hub concepts considered during Phase 1 of the SoCo Rail Study. Phase 1 considered seven new East Bay Hub concepts, with each at different locations within the Study Area. The objective was to identify locations that may potentially provide mid-term benefits and are compatible with and help progress toward long-term vision concepts for rail operators and the CSRP. The seven East Bay Hub concepts considered are described below.[6]

Additionally, this chapter documents analysis completed to determine which of the seven East Bay Hub concepts should be selected for detailed planning, conceptual design, and initial project development. Factors utilized in this assessment include: regional connectivity with key travel markets and destinations; local connectivity and land use; benefits and burdens to disadvantaged populations; travel times to key destinations; level of difficulty in accommodating anticipated service levels and hub facilities; potential capital cost; consistency with mid-term rail operator plans; and long-term considerations such as consistency with long-term rail operator plans and potential for an efficient connection to a future Dumbarton rail service.

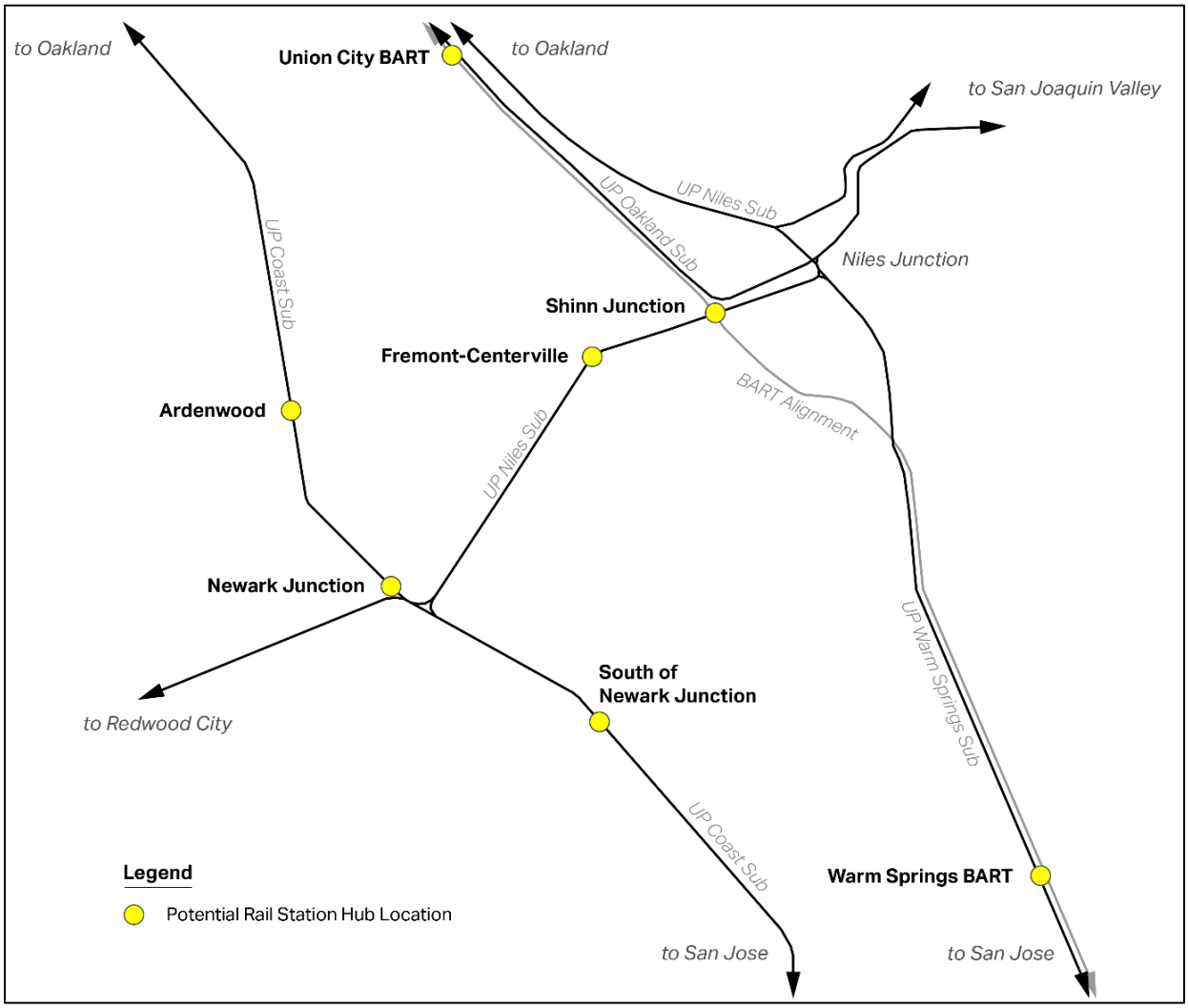
5.1. Description of the East Bay Hub Concepts Considered

This section discusses the seven locations shown on Figure 5-1 that have been identified as potential sites for an East Bay Hub within southern Alameda County that would provide connectivity with east-west passenger rail service (i.e., ACE trains from San Joaquin County). At each of these potential locations, future ACE trains would originate and terminate primarily during commute periods and provide connections to BART heavy rail, Capital Corridor intercity passenger rial, or to Transbay bus services to the Peninsula.

All hub concepts except Fremont-Centerville would require new platforms for ACE to enable passenger transfers to either BART or Capitol Corridor trains. At a minimum, hub stations would have side or center platforms that would be 1,000 feet in length to accommodate 10-car ACE trainsets, which is SJRRC's current standard for future service. While a provision for layover of ACE trainsets mid-day is not discussed, a layover facility would be required for an East Bay Hub and will be explored in Phase 2 of the SoCo Rail Study.

[6] Shinn Junction was initially identified as a logical location for an East Bay Hub since both BART and ACE cross at this point; therefore, this site was a high priority for the study based on discussions with regional stakeholders. However, during initial analysis of the Shinn Junction site, significant issues were identified, most notably in relation to cost and operational impacts to the BART system. Based on this, it was concluded by the Study partners that additional concepts for an East Bay Hub were needed. The total number of East Bay Hub concepts were finalized at seven, including Shinn, which are evaluated in Phase 1 of the SoCo Rail Study.

Figure 5-1. Potential East Bay Hub Locations



Source: DB and AECOM (2021)

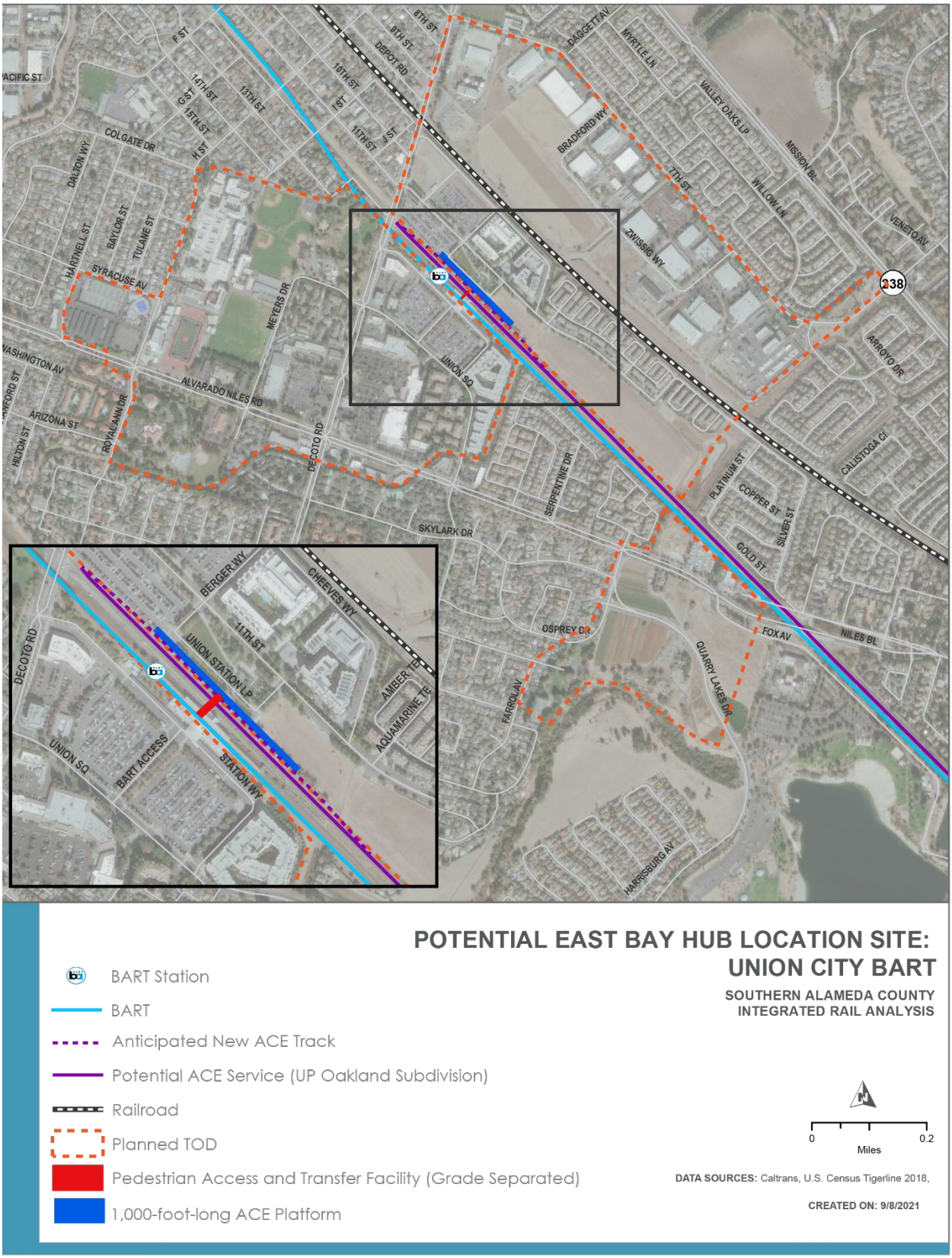
5.1.1. Union City BART

A hub at Union City BART would provide ACE riders with connections to BART, Transbay Dumbarton Express and Stanford Marguerite buses to the Peninsula via the Dumbarton Bridge, and local bus transit.

The Union City BART Station is located immediately south of Decoto Road and west of 11th Street in Union City. The hub would include a 1,000-foot-long platform along the UP Oakland Subdivision, which runs at-grade parallel to BART. The platform would be located between the BART Station structure to the west and both Union City Parking Lot 1 and a municipal park to the east. The approximate location of this hub is shown on Figure 5-2. The exact location of the platform and other elements would need to be confirmed with more detailed planning and engineering.

If a station track is required, resulting in two tracks on the UP Oakland Subdivision, passengers transferring between the BART Station and the hub platform would need a grade-separated walkway over or under the Oakland Subdivision and vertical circulation to and from the platform.

Figure 5-2. Potential East Bay Hub Location: Union City BART



5.1.2. Shinn Junction

The crossing of BART alignment with the tracks of the UP Niles Subdivision generated interest in the Shinn Junction Hub concept initially, which helped lead to the grant funding for the SoCo Rail Study. Therefore, this hub concept was included in the SoCo Rail Study. A hub at Shinn Junction would provide ACE riders with connections to BART trains, which would stop at a new BART station just north of BART's overcrossing with the Niles Subdivision. There are no current Transbay buses serving this location; therefore, new services or re-routing of existing lines would need to be established at this location to provide connectivity to the Peninsula.

The hub location is north of Peralta Boulevard just west of Shinn Street. In addition to the BART station, the hub would include 1,000-foot-long side platforms outside the two main tracks of the Niles Subdivision. Passengers transferring between BART and the hub platforms would require a transfer pathway and vertical circulation. The location of the hub is shown on Figure 5-3. The exact location of the platforms and other elements would need to be confirmed with more detailed planning and engineering.

5.1.3. Warm Springs BART

A hub at Warm Springs BART would provide ACE riders with connections to BART trains, as well as to local transit. There are no current Transbay buses serving this location; therefore, new services or re-routing of existing lines would need to be established at this location to provide connectivity to the Peninsula.

The BART station is located along Warm Springs Boulevard and south of South Grimmer Boulevard in Fremont. The hub would include a 1,000-foot-long platform along the UP Warm Springs Subdivision, which runs at-grade parallel to BART. The platform would be between the BART station structure to the east and the Warm Springs Subdivision main line and Warm Springs Yard to the west. A station track may be required. Access between the platform and the BART station would be grade separated. The location of the platform is shown on Figure 5-4. The exact location of the platform and other elements would need to be confirmed with more detailed planning and engineering.

5.1.4. Ardenwood

A hub at Ardenwood would provide ACE riders with connections to Capitol Corridor trains, as well as Dumbarton Express, Stanford Marguerite Shuttle, and AC Transit Transbay buses that serve the Peninsula via the Dumbarton Bridge (all of which currently serve the Ardenwood Park-and-Ride facility). The Ardenwood Station site is bordered by Ardenwood Boulevard to the east and north, SR 84 to the south, and the UP Coast Subdivision to the west. The location has been identified for a proposed Capitol Corridor Station, scheduled to open in 2026. CCJPA is advancing a project to construct an intermodal facility within the median of SR 84, at the overcrossing of the UP Coast Subdivision. Vertical circulation facilities and a new parking structure are proposed by CCJPA and indicated in Figure 5-5.

The hub would include a 1,000-foot-long platform along the Coast Subdivision. The approximate location of this hub is shown on Figure 5-5. The exact location of the platform and other elements would need to be confirmed with more detailed planning and engineering.

Figure 5-3. Potential East Bay Hub Location: Shinn Junction

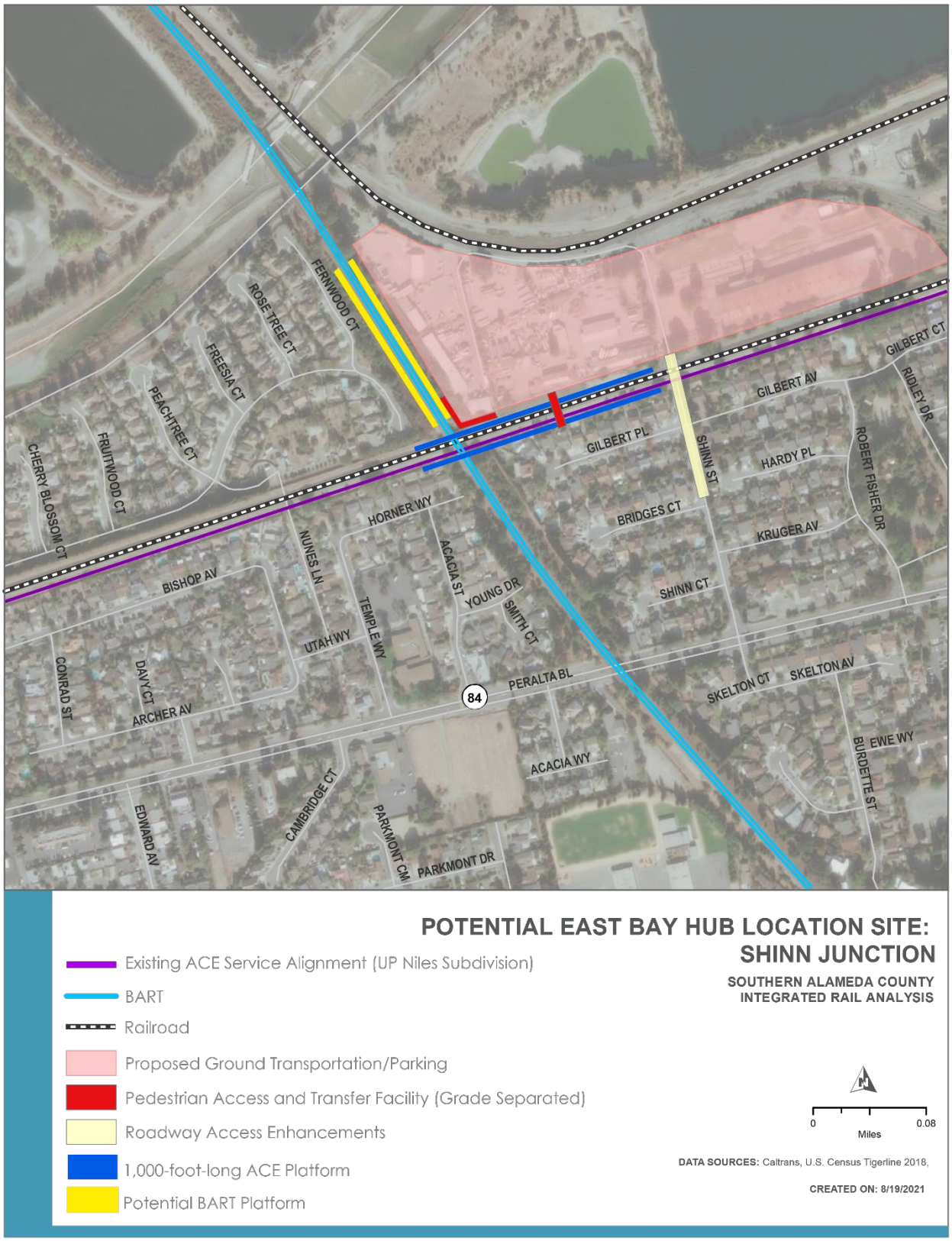


Figure 5-4. Potential East Bay Hub Location: Warm Springs BART

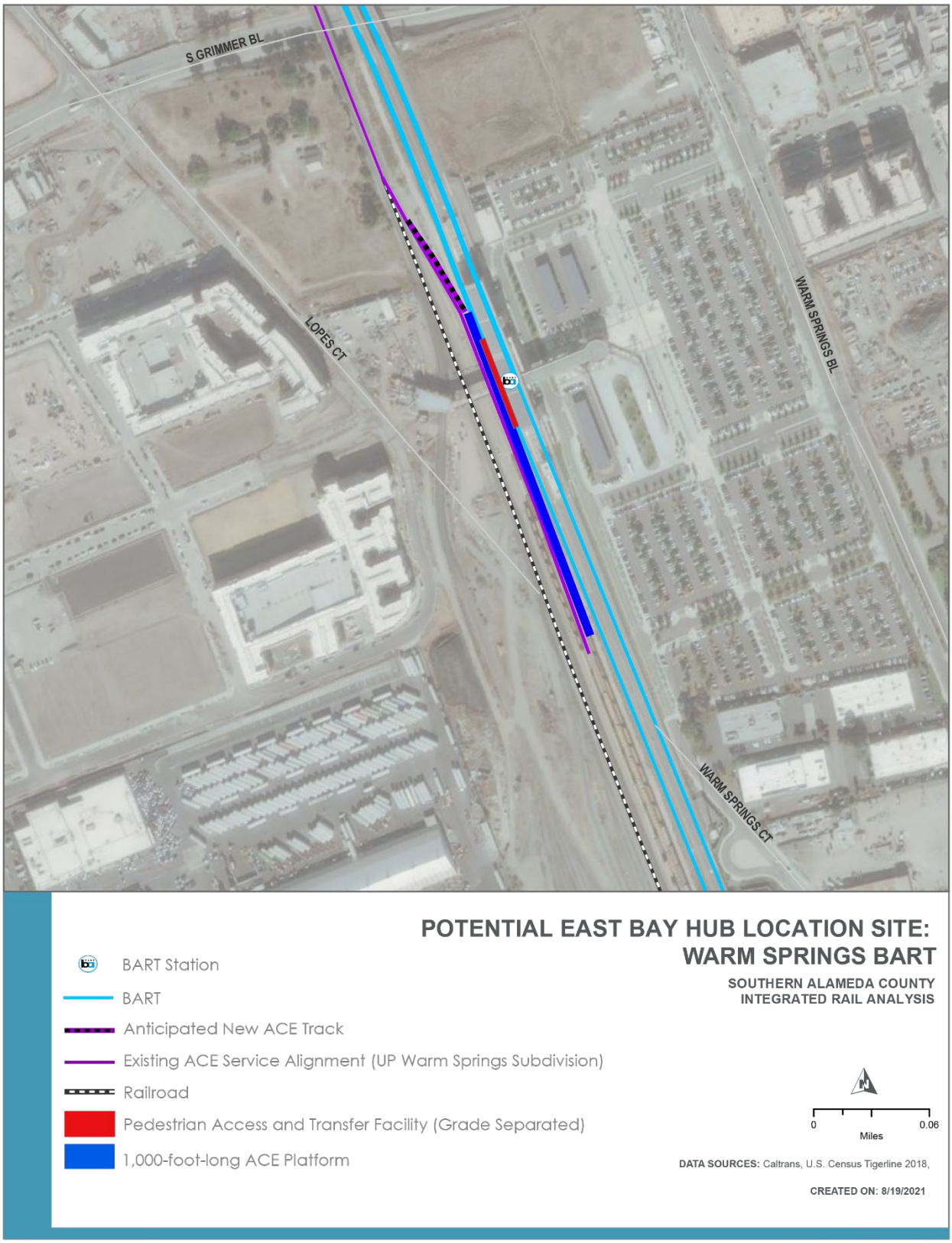
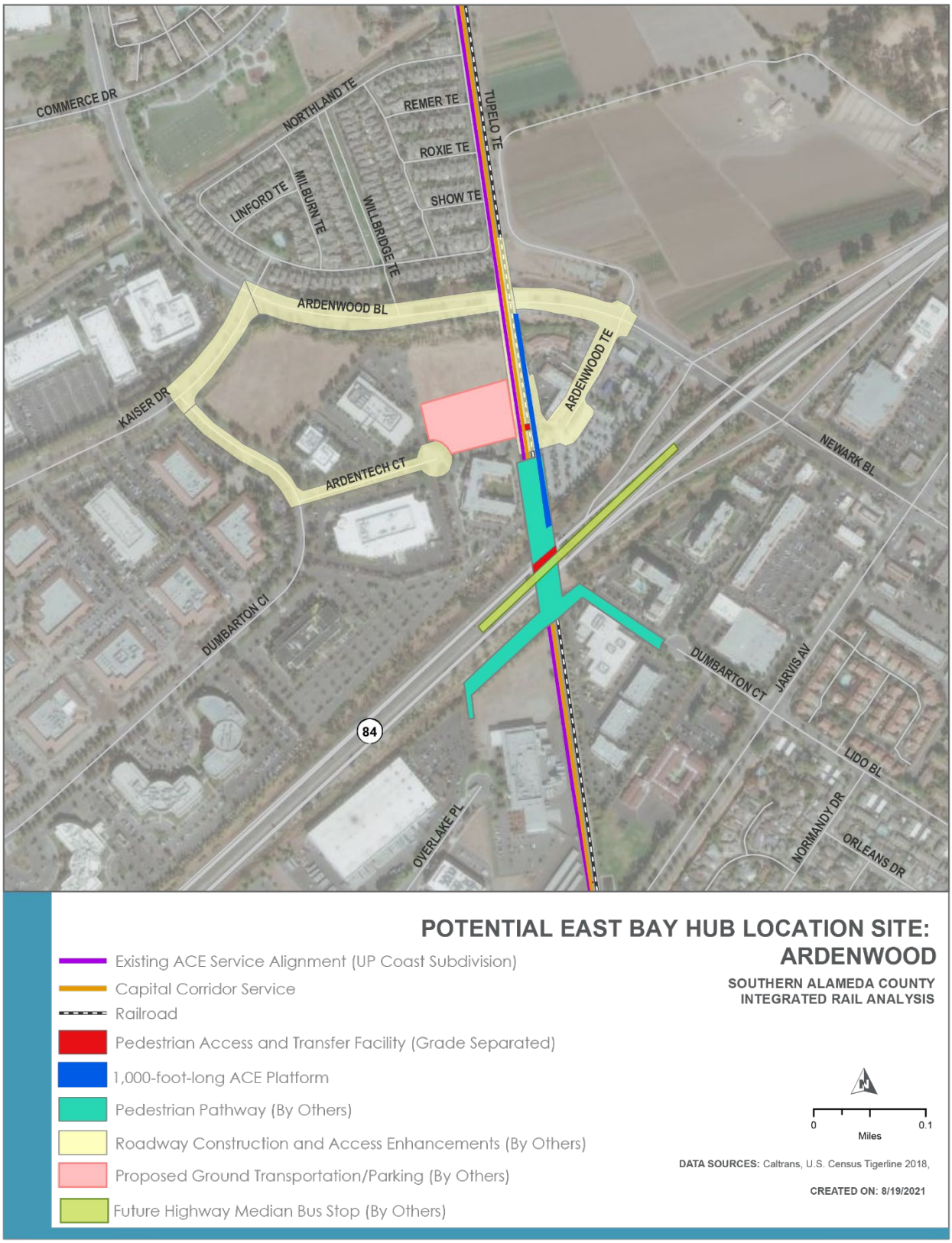


Figure 5-5. Potential East Bay Hub Location: Ardenwood



5.1.5. Newark Junction

A hub at Newark Junction along the UP Coast Subdivision would provide ACE riders with connections to Capitol Corridor trains. There are no current Transbay buses serving this location; therefore, new services or re-routing of existing lines would need to be established at this location to provide connectivity to the Peninsula.

The hub location is bounded by Thornton Avenue to the north, Sycamore Street to the east, Carter Avenue/Filbert Street to the south, and Ash Street to the west. It would include a 1,000-foot-long platform between Thornton Avenue and Carter Avenue/Filbert Street. This hub location would also necessitate roadway access enhancements to Thornton Avenue and Carter Avenue/Filbert Street. The approximate location of this hub is shown on Figure 5-6. The exact location of the platform and other elements would need to be confirmed with more detailed planning and engineering. A hub located between the northern and southern wye tracks of the Newark Junction was initially considered, but it was determined to be infeasible due to space constraints. The space between the two wye configurations is less than 1,000 feet. Due to this adjustment in the location of the Newark Junction hub evaluated, this hub would require ACE to turn north off the UP Niles Subdivision to the UP Coast Subdivision to provide a connection to Capitol Corridor trains (or possible future Dumbarton trains in a long-term scenario).

5.1.6. South of Newark Junction

A hub South of Newark Junction would provide ACE riders with connections to Capitol Corridor trains. There are no current Transbay buses serving this location; therefore, new services or re-routing of existing lines would need to be established at this location to provide connectivity to the Peninsula.

The hub location is bounded by Mowry Avenue on the north, Cherry Street to the east, Addition Road to the south, and the railroad track to the west. The hub would require a 1,000-foot-long platform south of Mowry Avenue and north of Addition Road. Roadway access will be necessary for the new station, and a potential option is to design this connectivity via an intersection with Mowry Avenue. The location of the hub is shown on Figure 5-7. The exact location of the platform and other elements would need to be confirmed with more detailed planning and engineering.

5.1.1. Fremont-Centerville

A hub at the existing Fremont-Centerville Station in Fremont would provide ACE riders with connections to bus service only. this is due to CCJPA's plans to re-route Capitol Corridor trains to the Coast Subdivision and no longer service the Fremont-Centerville station. Therefore, this hub location does not facilitate any new rail connections. Connections to Transbay buses that serve the Peninsula via the Dumbarton Bridge would be provided; Stanford Marguerite Shuttle, and AC Transit Transbay bus services currently serve the Fremont-Centerville Station, as well as local transit.

The existing station is just north of the intersection of Fremont Boulevard and Peralta Boulevard. A hub here would extend the existing 600-foot north-side station platform another 400 feet to the east. The location of this hub is shown on Figure 5-8. The exact location of the platform and other elements would need to be confirmed with more detailed planning and engineering.

Figure 5-6. Potential East Bay Hub Location: Newark Junction

Figure 5-7. Potential East Bay Hub Location: South of Newark Junction

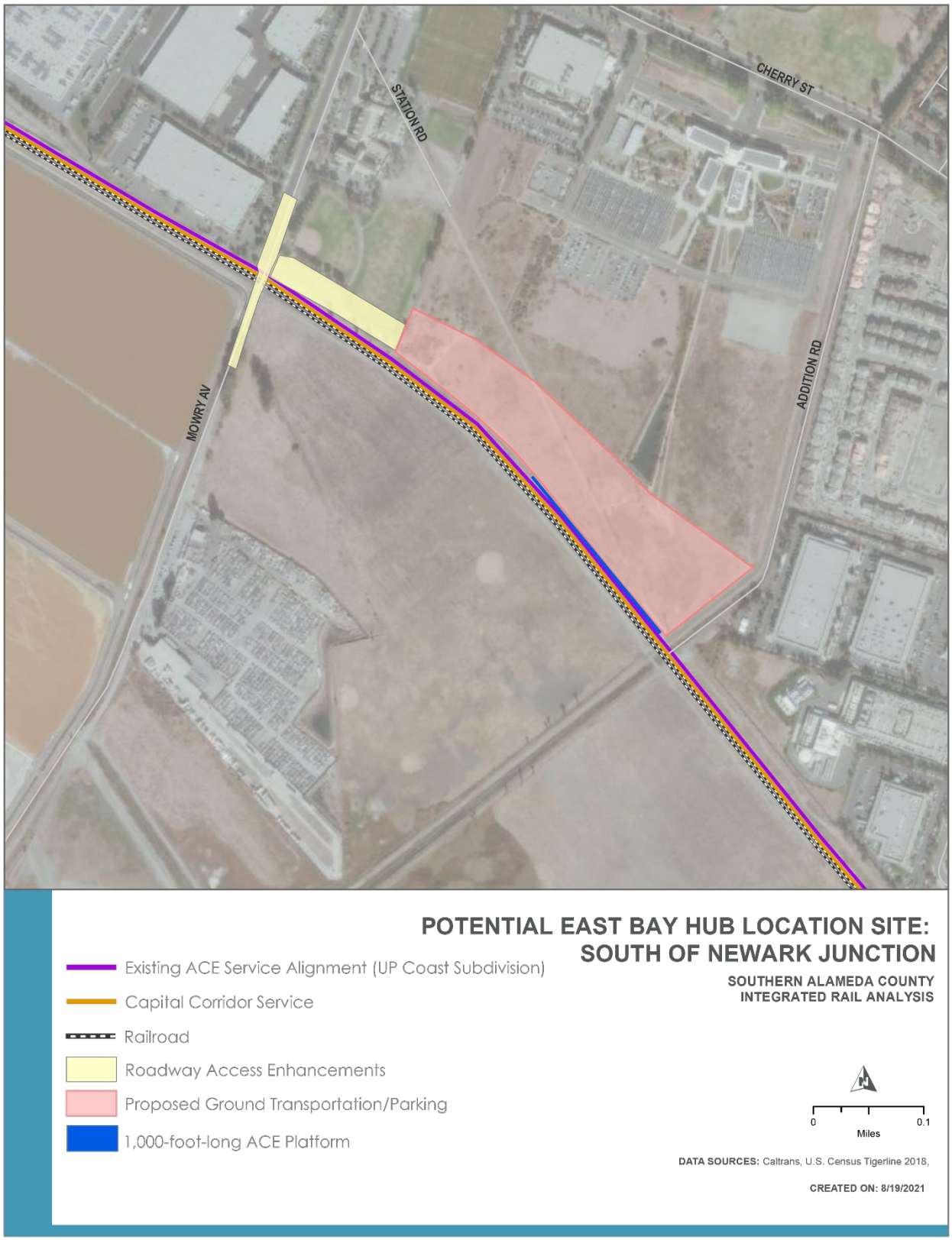
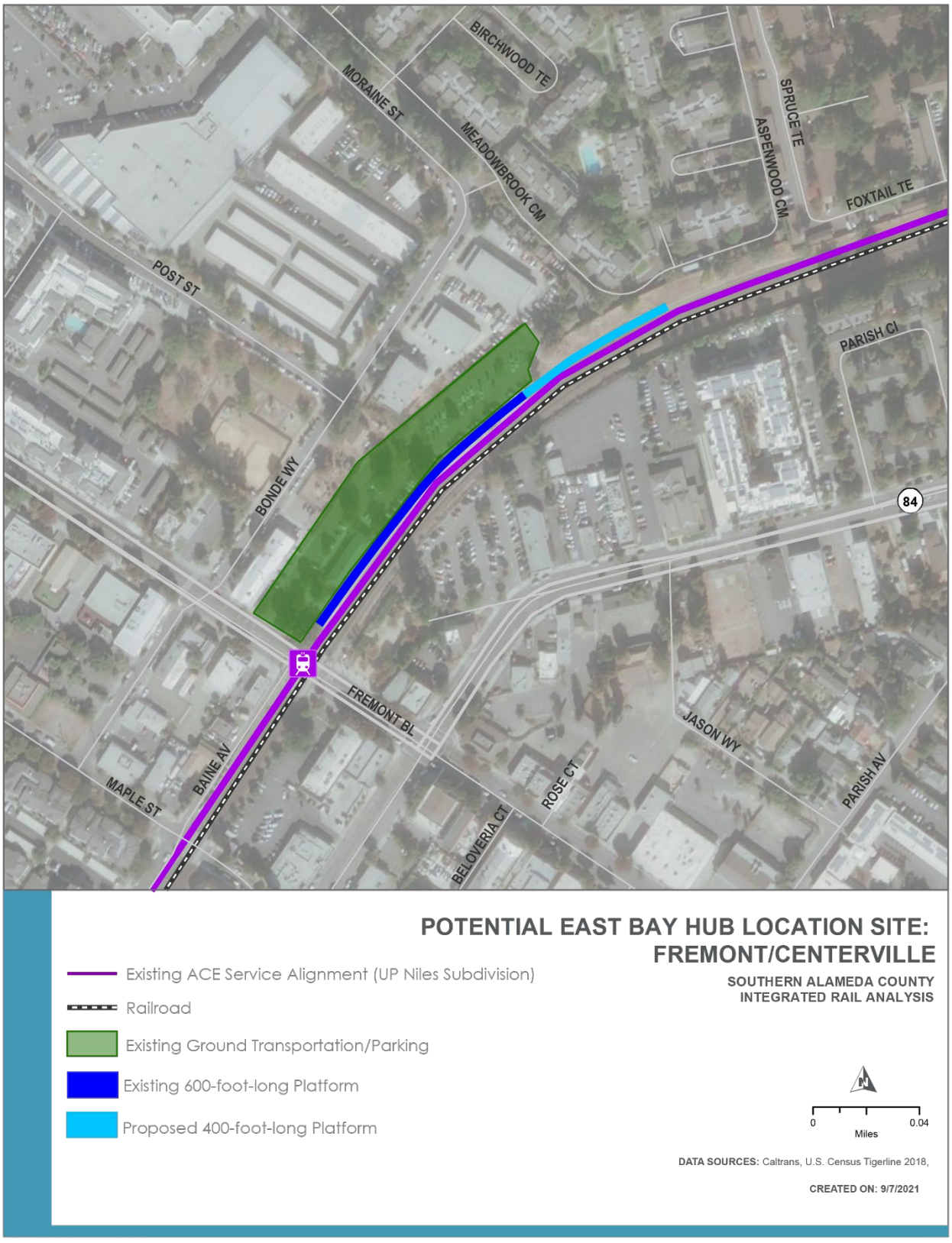


Figure 5-8. Potential East Bay Hub Location: Fremont-Centerville



5.2. Connectivity to Travel Market and Destinations

This section analyzes and compares the regional and local connectivity of the seven hub concepts. The evaluation considers regional connectivity to key travel markets and destinations within the Bay Area (Section 5.2.1), associated travel times (Section 5.2.2), and local connectivity in terms of existing and future land use (Section 5.2.3).

5.2.1. Regional Connectivity

*The goal associated with this analysis is "**Enhance Regional Connectivity and Equitable Access**"*

Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

One common approach to evaluating the connectivity of a transit facility or service is to determine which markets and destinations are accessible by a "one-seat ride" (i.e., without the need to transfer). This method recognizes that transfers typically represent a significant barrier to passenger convenience due to time loss and associated uncertainty or variability. Therefore, it is useful to group the seven hub concepts by connecting operator.[7] Under this approach, the hub concepts can be grouped as follows:

ACE–BART Hubs
- Union City BART
- Shinn Junction
- Warm Springs BART

ACE–Capitol Corridor Hubs
- Ardenwood
- Newark Junction
- South of Newark Junction

ACE-only Hubs
- Fremont-Centerville

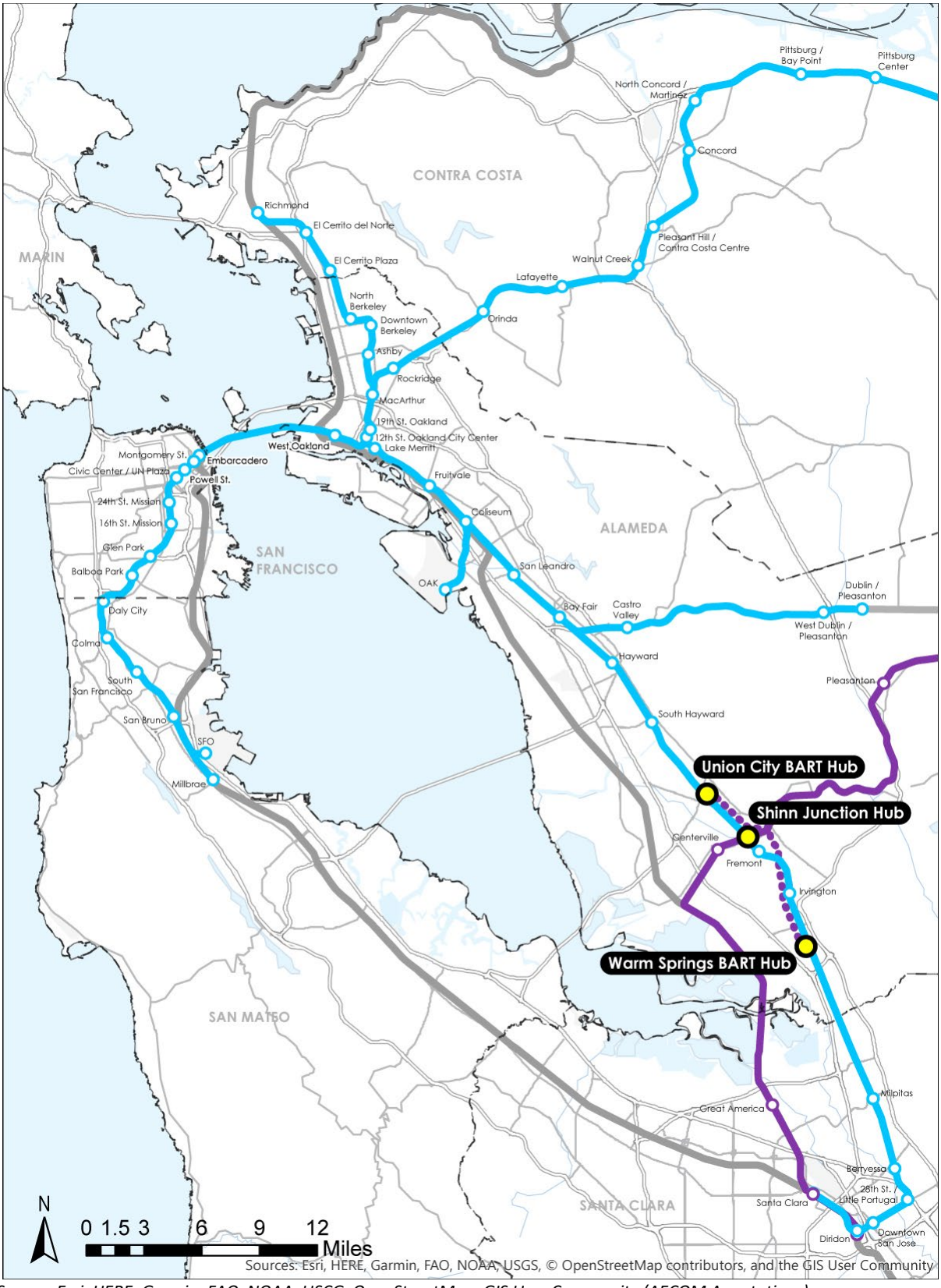
These three groups and the associated geographical extent of connecting rail services under each group are shown on Figure 5-9, Figure 5-10, and Figure 5-11, respectively.

As an ACE connection at the hub is a given in all-three groups, the potential connecting rail operators (BART and Capitol Corridor) can be compared in terms of regional coverage and other factors (e.g., service levels) to help determine which rail operator should be prioritized for a connection.

Similarly, connecting bus service in the Dumbarton Corridor to and from the Peninsula is assumed under all seven hub concepts. As the hub location will affect the route alignment for the East Bay end of Dumbarton bus services, differences in bus service among the seven hub concepts are addressed in the travel time analysis in Section 5.4.2.

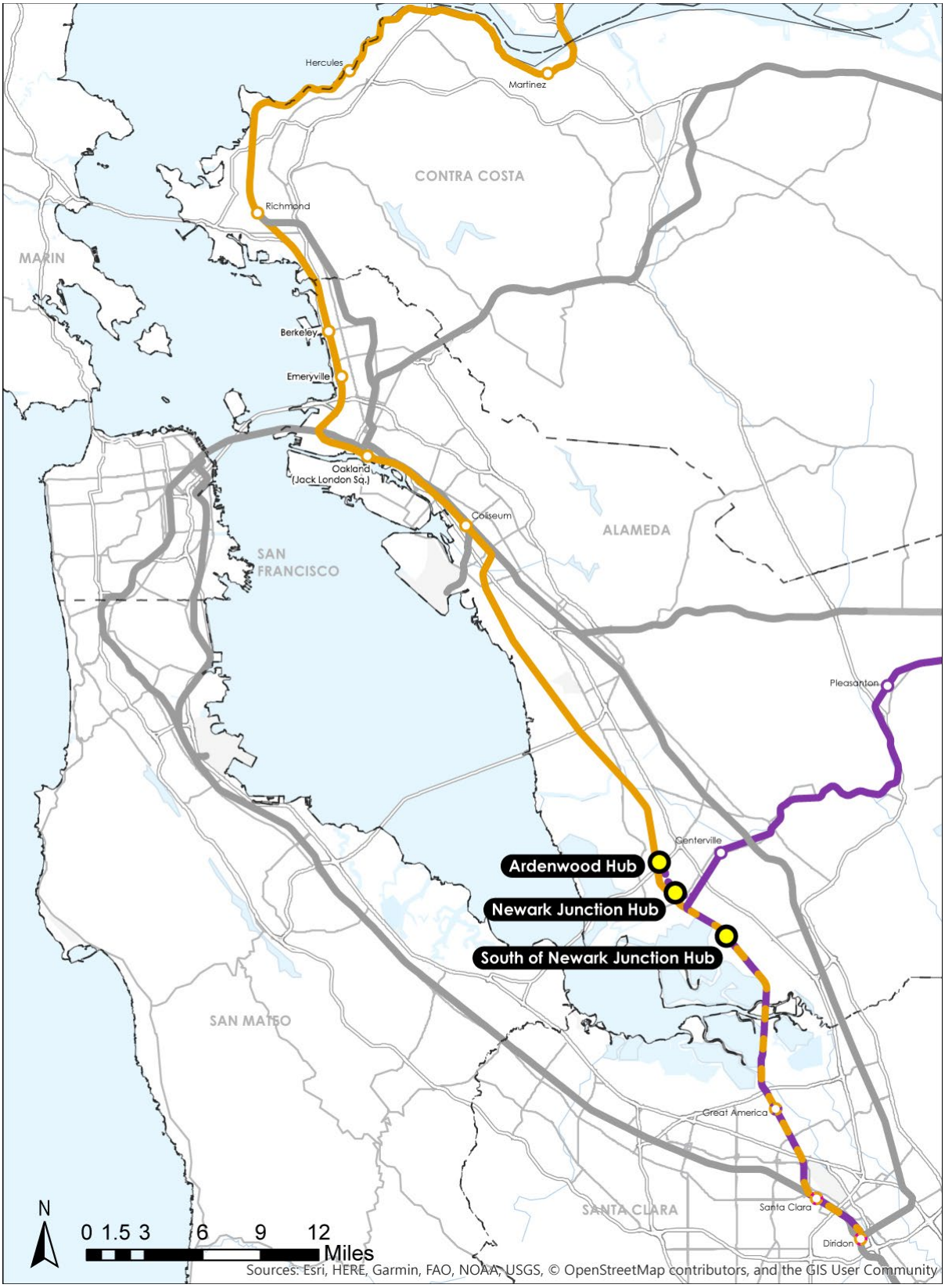
[7] For BART, this analysis considers a "one-carrier ride" in lieu of the more typical "one-seat ride." Only the Green and Orange lines would potentially serve the East Bay Hub, meaning that stations on some branches of the system would not be strictly accessible by a "one-seat ride." Even so, destinations on the Yellow line (to and from Antioch) would be accessible via cross-platform transfers at 19th Street / Oakland and MacArthur, while all remaining destinations would still be fairly accessible via in-system transfers given the high base frequency of BART service. Given that an in-system BART transfer is generally much more convenient than a system-to-system transfer (e.g., Capitol Corridor to BART), the term "one-seat ride" is still used throughout this analysis for simplicity.

Figure 5-9. Connections Associated with ACE–BART Hub Concepts



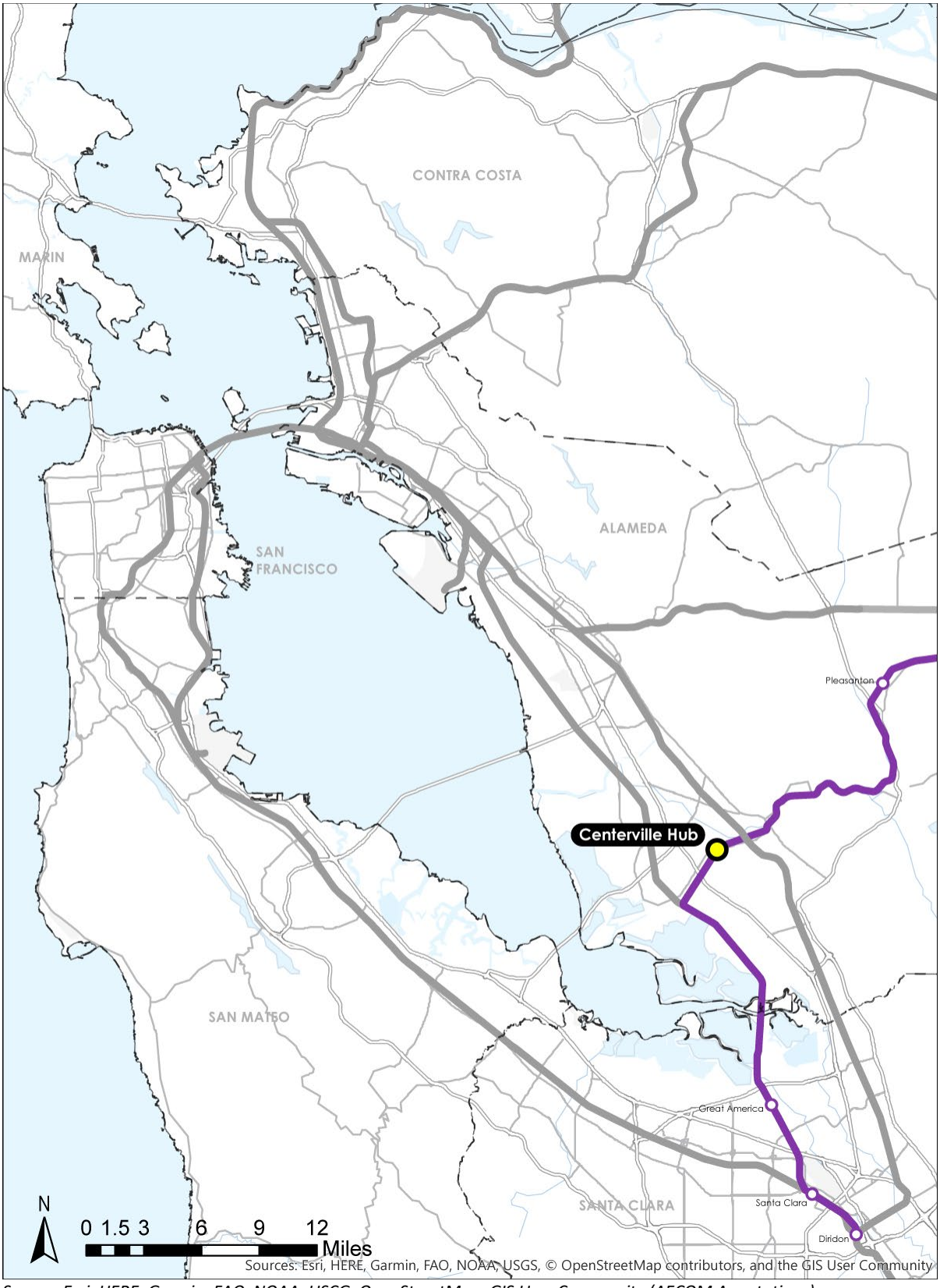
Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

Figure 5-10. Connections Associated with ACE–Capitol Corridor Hub Concepts



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

Figure 5-11. Connections Associated with ACE-only Hub Concept



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

SERVICE QUALITY AND ONE-SEAT RIDE COVERAGE

BART

BART is the backbone of the regional transit system in the Bay Area, and the region's primary rail operator. With a service area spanning most of the East Bay and extending west into San Francisco and the northern Peninsula and south into the South Bay, BART provides more one-seat connections to key markets and destinations than any other operator in the Study Area. Unlike most of the other operators, it also provides high-frequency, high-capacity, bi-directional service all day, seven days a week.

BART's East Bay spine, in particular, provides a one-seat connection between the major Alameda County cities of Richmond, Berkeley, Oakland, Hayward, and Fremont. Recently, BART added service into Santa Clara County, to Milpitas and North San Jose. A future extension (Phase 2 of the Silicon Valley Extension) will add stations at 28th Street / Little Portugal, downtown San Jose, San Jose (Diridon) Station, and Santa Clara Station. The Irvington infill station in Fremont is also being implemented. BART also provides direct connections to two of the region's three major airports (SFO and OAK), and a transit airport connection is being considered by the City of San Jose from the future San Jose Diridon BART Station.

Capitol Corridor

The Capitol Corridor provides regional and intercity passenger rail service between Auburn in Placer County and San Jose in Santa Clara County. The service operates lower service levels than BART, with a schedule of 15 daily roundtrips on weekdays and 11 daily roundtrips on weekends and holidays. While bi-directional service is provided all day, headways range anywhere from 30 minutes to 3 hours. All but one daily train operates between Sacramento and the Bay Area, with approximately half of the trains terminating at Oakland (Jack London Square) and the others continuing south to San Jose (Diridon). While Capitol Corridor's on-time performance (OTP) is quite good; it is slightly less to that of BART (89% to 92% in 2019). Additionally, BART defined OTP as within 5 minutes of arrival time while CCJPA defines OTP as within 10 minutes of arrive time, which indicates BART OTP is at a higher standard.[8] There is the potential for long Capitol Corridor delays at times due to the fact the right-of-way is at-grade and owned by UP, and tracks are shared with slower freight trains.

There is some market overlap with BART in the East Bay, but Capitol Corridor has substantially fewer stations, resulting in much lower one-seat ride coverage than BART. In addition, most Capitol Corridor stations are located in less developed areas, such as in Oakland's Jack London Square or in West Berkeley (4th Street). Emeryville is the exception, located within a sizeable cluster of biotechnology and life sciences offices. The planned future shift to the UP Coast Subdivision will result in the loss of service at existing stations at Hayward and Fremont–Centerville, in exchange for a new station at Ardenwood.

Summary: Service Quality

In terms of service quality, a BART connection is preferable to a Capitol Corridor connection for a future East Bay hub that includes ACE. BART operates high-frequency, bi-directional service all day, seven days a week, maximizing opportunities to make connections at the hub regardless of time of day, day of

[8] https://images.capitolcorridor.org/wp-content/uploads/2020/02/CCJPA_Report2019_Pages.pdf; https://www.bart.gov/sites/default/files/docs/2019%20BARTFacts2019%20FINAL.pdf; https://images.capitolcorridor.org/wp-content/uploads/2015/02/FY-16-FY-17-Biz-Plan-Workshop-Summary-1.pdf; https://www.bart.gov/kpi/performance

week, trip purpose, or trip direction. As a fully grade-separated system with no mixture with freight or other trains, BART is also preferable in terms of reliability and on-time performance. Thus, hub concepts with a BART connection rank "high" on service quality, while hub concepts with a Capitol Corridor connection would fall under a lower "medium" rank. The Fremont-Centerville hub concept would rank "low", as it would only be served by ACE, which is heavily oriented towards commute service and suffers from many of the reliability and on-time performance concerns as the Capitol Corridor.

Summary: One-Seat Ride Coverage

In terms of one-seat ride coverage, a BART connection is also preferable to a Capitol Corridor connection. BART has a large geographical reach within the Bay Area and touches more employment clusters and key destinations. Existing and planned BART service provides a one-seat ride to key markets such as downtown San Jose, downtown San Francisco, and downtown Oakland that are not or would not be well served by the Capitol Corridor. Therefore, ACE-BART hub concepts would rank "high" in one-seat ride coverage, while ACE-Capitol Corridor hub concepts would rank "medium" for one-seat ride coverage. The ACE-only hub concept (Fremont-Centerville) would rank "low" for one-seat ride coverage, as ACE would be the only rail operator serving the hub.

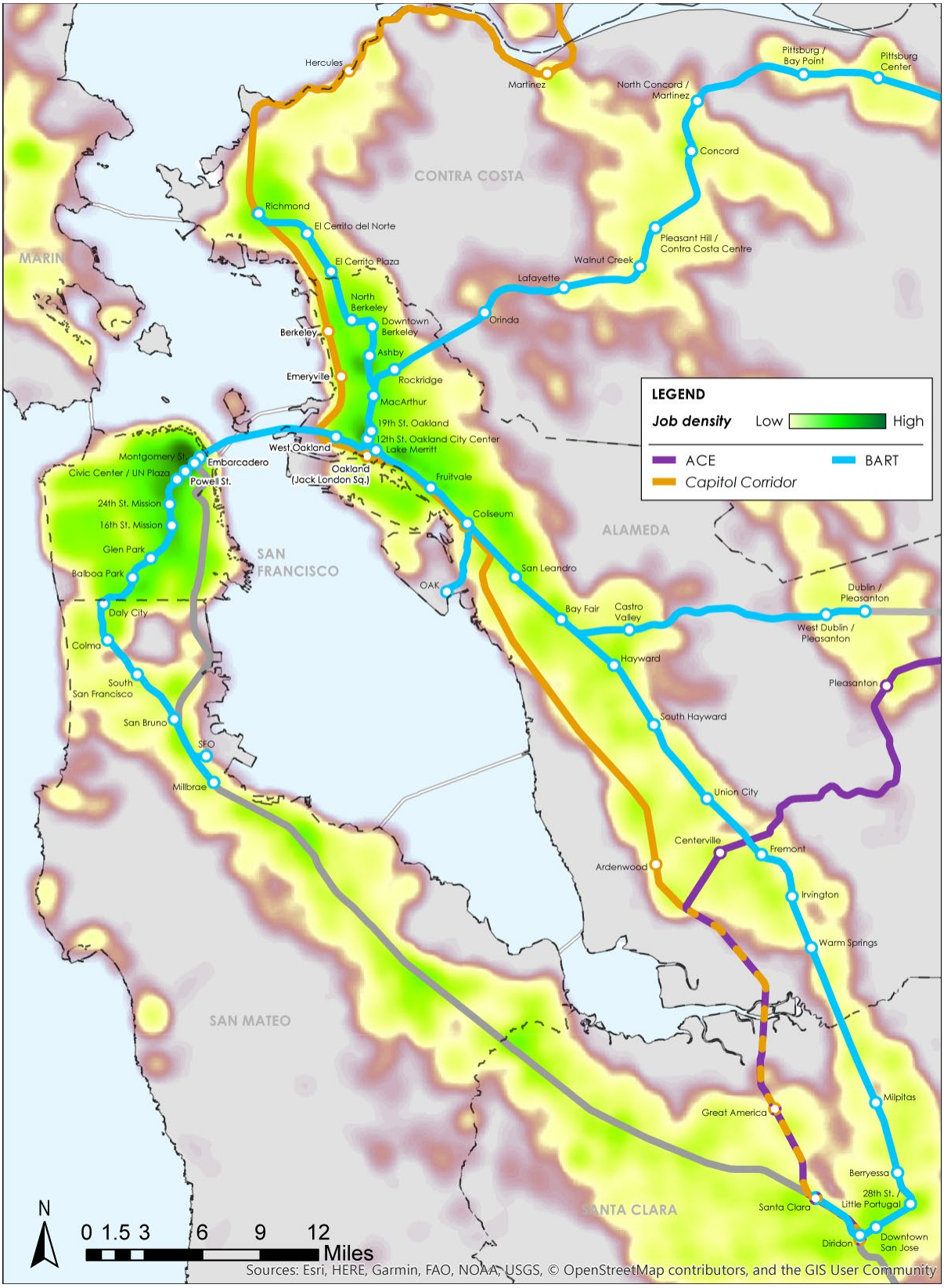
EMPLOYMENT CATCHMENT

As one of the primary travel flows for an East Bay Hub will involve ACE commuters from the Central Valley and Tri-Valley commuting into the inner Bay Area for employment and education opportunities, it is useful to consider employment areas served by BART and Capitol Corridor. For this analysis, catchment areas were drawn for each operator's stations using circles with radii of a 0.5 mile (for walking distance) and 2 miles (for biking distance). These catchment areas were then plotted on top of employment projections for the year 2035 which corresponds to the approximately 10-year Mid-Term Horizon defined by this SoCo Rail Study plus an additional five years to allow for more full realization of job growth. The jobs data are based on Census Tract information published by the Association of Bay Area Governments (ABAG) as part of its Projections 2040 forecasts.

An employment-density heat map showing BART and Capitol Corridor coverage of employment areas within the Bay Area (based on employment projections for 2035) is provided on Figure 5-12. Table 5-1 and Table 5-2 summarize employment catchment in 2035 at each operator's stations.

As indicated in Table 5-1, BART serves major Bay Area employment clusters in the inner core of the Bay Area (including downtown San Jose, downtown San Francisco, and downtown Oakland) and several key smaller-tier markets (e.g., Fremont, Santa Clara, eastern San Jose, Berkeley, Walnut Creek). BART also has multiple stations in the markets most likely to benefit from an East Bay Hub due to proximity, including southern Alameda County, central Alameda County, and the South Bay. Several stations in Phase 2 of the Silicon Valley Extension, including downtown San Jose, Diridon, and Santa Clara, would be located in substantial employment clusters.

Figure 5-12. ABAG Projections 2040 Employment Heat Map for 2035



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

Table 5-1. Employment Catchment by Station – BART

Market	Station	Employment (2035)	
		Within 0.5 mile	Within 2 miles
Southern Alameda County	Warm Springs / South Fremont	1,300	15,300
	Irvington	1,800	21,200
	Fremont	4,600	27,600
	Union City	1,800	18,300
Central Alameda County	South Hayward	2,800	25,000
	Hayward	3,400	32,900
	Bay Fair	2,300	29,100
	San Leandro	4,500	42,600
South Bay	Milpitas	5,600	88,400
	Berryessa / North San José	4,400	68,900
	28th St. / Little Portugal	3,100	70,100
	Downtown San Jose	27,800	117,900
	Diridon	17,300	122,100
	Santa Clara	9,800	117,600
Oakland	Coliseum	2,600	36,900
	Oakland International Airport	2,300	32,100
	Fruitvale	4,800	50,000
	Lake Merritt	20,400	163,600
	12th St. Oakland City Center	72,000	169,000
	19th St. Oakland	60,600	175,500
	MacArthur	8,700	165,400
	West Oakland	5,900	134,100
	Rockridge	7,000	115,900
Northern Alameda County and Western Contra Costa County	Ashby	4,400	138,600
	Downtown Berkeley	27,900	114,700
	North Berkeley	3,600	106,600
	El Cerrito Plaza	2,000	27,500
	El Cerrito del Norte	2,300	26,200
	Richmond	3,000	31,400
Central Contra Costa County	Orinda	300	5,400
	Lafayette	800	10,200
	Walnut Creek	10,800	46,600
	Pleasant Hill / Contra Costa Centre	4,000	52,800
	Concord	6,000	47,700
	North Concord / Martinez	2,700	31,000

Market	Station	Employment (2035)	
		Within 0.5 mile	Within 2 miles
	Pittsburg / Bay Point	700	6,800
	Pittsburg Center	1,500	10,800
	Antioch	500	10,800
San Francisco	Embarcadero	161,700	538,500
	Montgomery St.	200,100	571,200
	Powell St.	135,700	609,700
	Civic Center / UN Plaza	76,900	622,400
	16th St. Mission	22,000	418,200
	24th St. Mission	9,700	210,800
	Glen Park	4,400	80,500
	Balboa Park	6,300	53,400
Northern Peninsula	Daly City	2,300	36,100
	Colma	2,300	30,800
	South San Francisco	2,600	33,400
	San Bruno	4,600	44,400
	San Francisco International Airport	1,300	34,800
	Millbrae	3,400	35,900
	Total	1,337,800	1,994,800

Source: ABAG forecasts
Note: The total is less than the sum of all stations due to buffer zone overlap.

Table 5-2. Employment Catchment by Station – Capitol Corridor

Market	Station	Employment (2035)	
		Within 0.5 mile	Within 2 miles
Southern Alameda County	Ardenwood	1,500	20,200
South Bay	Santa Clara (Great America)	11,800	117,600
	Santa Clara (University)	9,800	116,600
	San Jose (Diridon)	17,200	120,800
Oakland	Oakland (Coliseum)	2,600	37,400
	Oakland (Jack London Square)	18,300	153,600
Northern Alameda County and Contra Costa County	Emeryville	11,500	66,900
	Berkeley	3,800	70,400
	Richmond	2,900	30,900
	Hercules (future)	1,000	8,800
	Martinez	4,200	18,000

Market	Station	Employment (2035)	
		Within 0.5 mile	Within 2 miles
Solano County	Suisun–Fairfield	2,300	17,300
	Fairfield–Vacaville	200	4,100
	Total	87,100	708,800

Source: ABAG forecasts, AECOM
Notes: The total is less than the sum of all stations due to buffer zone overlap. Stations north of Fairfield–Vacaville are not included because they are outside the jurisdiction of the MTC and ABAG, which only cover the nine-county Bay Area.

As indicated in Table 5-2, the largest catchments for the Capitol Corridor are at Jack London Square (Oakland) and in the South Bay (Santa Clara and Diridon in San Jose), with secondary clusters at Emeryville and Berkeley. For a 0.5-mile radius at stations, the Capitol Corridor route total (87,100) is only approximately 6.5 percent of the BART systemwide total (1,337,800), indicating a substantially lower employment base catchment potential than for BART in the immediate vicinity of stations. However, this improves significantly for a 2-mile catchment area. The Capitol Corridor will also have only one station in the southern Alameda County market (compared to four for BART) in the Mid-Term Horizon and no stations in the Central Alameda County market (compared to four for BART).

In the South Bay market, there would be overlap with BART at Santa Clara (University) and at San Jose (Diridon). While Capitol Corridor serves major office parks at Great America, BART would provide better service to and from downtown San Jose, in addition to the other stations on the Silicon Valley Extension, where numerous office parks exist in the vicinity of a BART station. Additionally, ACE current service already serves these same stations, and will continue to do so with the implementation of an East Bay Hub. Therefore, ACE connecting to Capitol Corridor service does not provide new access to other key markets in the South Bay as a connection to BART does.

Given most ACE riders use the system for traveling to and from jobs (as opposed to a more diverse set of travel purposes on the Capitol Corridor), the access provided by BART to employment centers is significant.

Summary: Employment Catchment
In terms of employment catchment, ACE-BART hub concepts would rank “high”, with the most jobs within a half-mile and two-mile radius of stations, by a wide margin. ACE-Capitol Corridor hubs would have noticeably fewer jobs within proximity to stations and would rank “medium”. The ACE-only hub concept (Fremont-Centerville) would rank “low to medium” for employment catchment, as ACE would be the only rail operator serving the hub.

CONNECTIVITY TO OTHER KEY DESTINATIONS

The following additional key destinations were also identified and mapped to provide additional context for the regional connectivity of BART and Capitol Corridor.

- Hospitals (facilities licensed as a General Acute Care Hospital) with 200 or more total beds. Data were obtained from the Office of Statewide Health Planning and Development (OSHPD).

- Colleges and universities with a total population (full- and part-time enrollment, plus employees) of 5,000 or more. Data were obtained from the United States Geological Survey (USGS) ScienceBase digital repository.
- Major international airports: San Francisco (SFO), Oakland (OAK), and San José (SJC).
- Major sports venues.[9] Data were obtained from the Homeland Infrastructure Foundation-Level Data (HIFLD) database.
- Convention centers and fairgrounds[10]. Data were obtained from the HIFLD database.

Figure 5-13 shows hospitals and colleges/universities meeting the selected criteria. Figure 5-14 shows airports, major sports venues, and convention centers and fairgrounds. Table 5-3 compares BART and Capitol Corridor catchment totals for a subset of these key destinations.

Table 5-3. Other Key Destinations

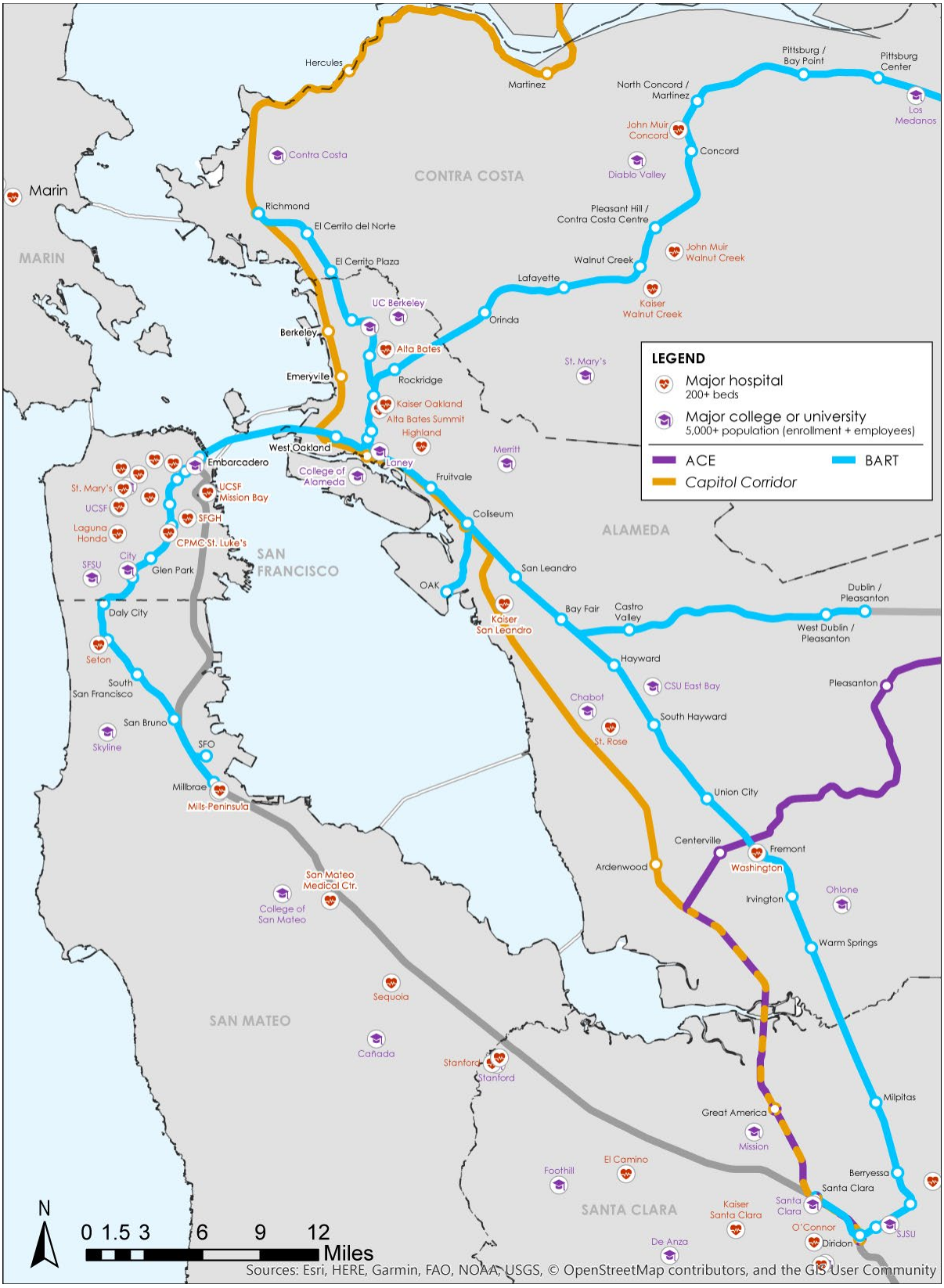
Destination	Location	BART	Capitol Corridor
Number of Hospitals (200+ beds)	Within 0.5 mile	5	0
	Within 2 miles	23	4
Number of Colleges / Universities (5,000+ population)	Within 0.5 mile	5	1
	Within 2 miles	13	8
Airports	SFO	Direct service	No service
	OAK	Direct Service (with internal connection via BART airport shuttle train)	Connection via BART airport shuttle train
	SJC	Bus connection at Santa Clara Station (future)	Bus connection at Santa Clara Station

As shown on Figure 5-13, Figure 5-14, and Table 5-3, BART's coverage within the Bay Area means that a large share of these key destinations falls within the catchment area of its stations. In contrast, Capitol Corridor has only one route, with a limited number of stations. In terms of airport connections, the Capitol Corridor requires connecting to BART services to access SFO (either at Richmond or Coliseum Stations) and to OAK via the BART airport shuttle train. Access to SJC can be accomplished via bus connection at the Santa Clara Station, with a possible rail connection in the future from Diridon Station. In contrast, BART already has direct rail service to and from SFO and a more seamless transfer to the BART shuttle train to OAK. Once BART is extended to Diridon and Santa Clara, it will have access to the same connections to SJC as the Capitol Corridor.

[9] Defined by the HIFLD database as facilities within the United States, Canada, and Mexico that host events for the National Association for Stock Car Auto Racing, Indy Racing League, Major League Soccer, Major League Baseball, National Basketball Association, Women's National Basketball Association, National Hockey League, National Football League, Professional Golfers Association Tour, National Collegiate Athletic Association (NCAA) Division 1-Football Bowl Subdivision, NCAA Division 1 Basketball, Minor League Baseball Class Triple-A, and thoroughbred horse racing.

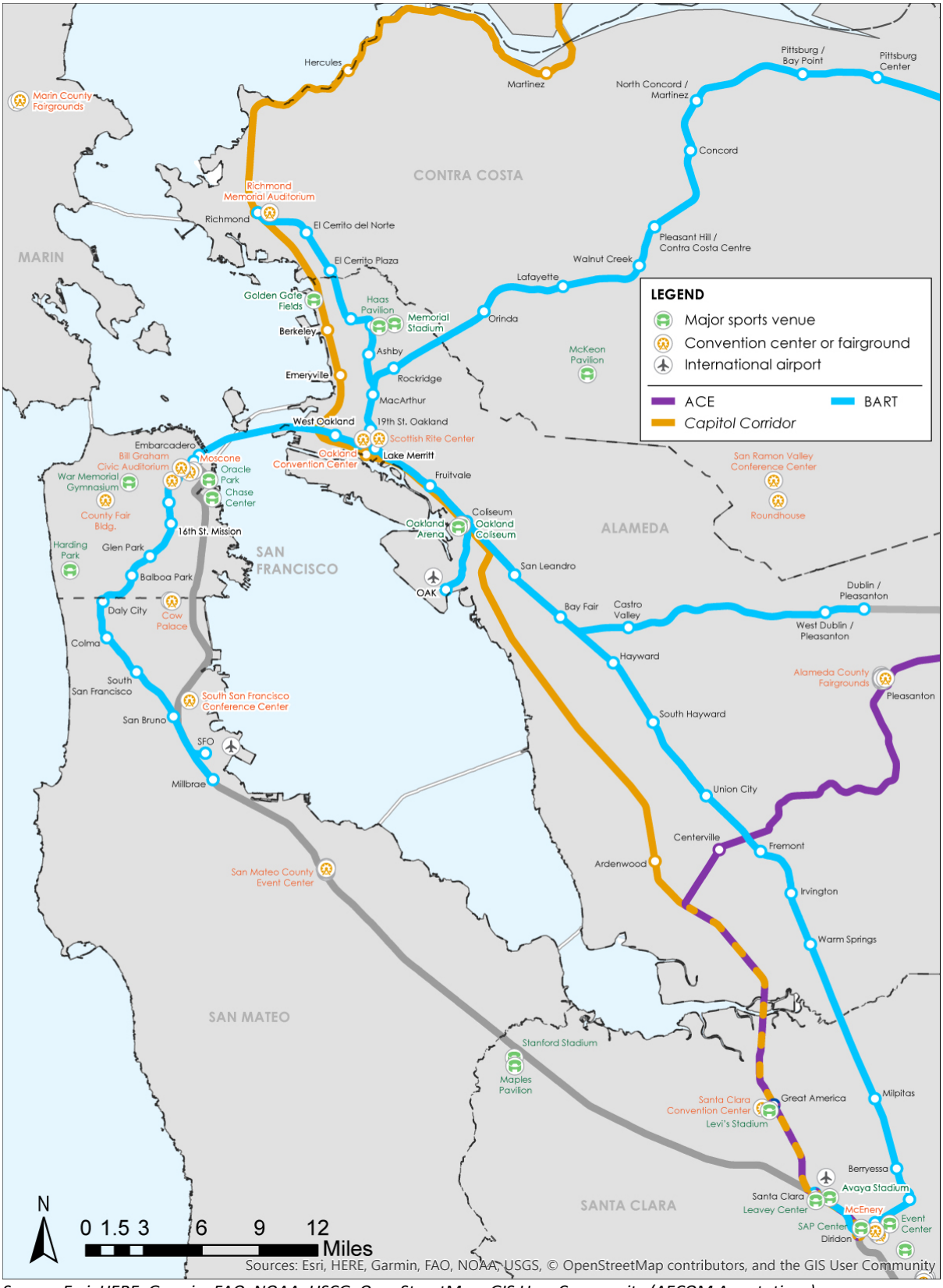
[10] Defined by the HIFLD database as locations of convention centers, conference centers, exposition centers, and fairgrounds for the 50 US States, the District of Columbia, and the territory of Puerto Rico.

Figure 5-13. Major Hospitals and Colleges/Universities



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

Figure 5-14. Airports, Major Sports Venues, and Convention Centers and Fairgrounds



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

Summary: Connectivity to Other Key Destinations

The ACE–BART hub concepts would rank "high" in connectivity to other key destinations due to BART's extensive coverage within the Bay Area. ACE–Capitol Corridor hubs would have noticeably fewer key destinations within proximity to stations and would rank "medium". The ACE-only hub concept (Fremont-Centerville) would rank "low", as ACE would be the only rail operator serving the hub.

5.2.2. Local Connectivity and Land Use

While the regional analyses above make a strong case for an ACE–BART hub, a more localized comparison of land use and connectivity can also be helpful in providing additional context, particularly between hub concepts within the same group.

Table 5-4 summarizes employment catchment within 0.5-mile and 2-mile radii of each potential hub location. As shown in Table 5-4, Union City BART and Fremont-Centerville have the highest projected employment within walking distance for 2035. At the 2-mile radius, however, Shinn Junction and Fremont-Centerville perform the best among the concepts, likely owning to their proximity to Fremont's Civic Center area.

*The goal associated with this analysis is "**Service Surrounding Communities and Shape Growth**"*

Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

Table 5-4. Employment Catchment by Hub Location

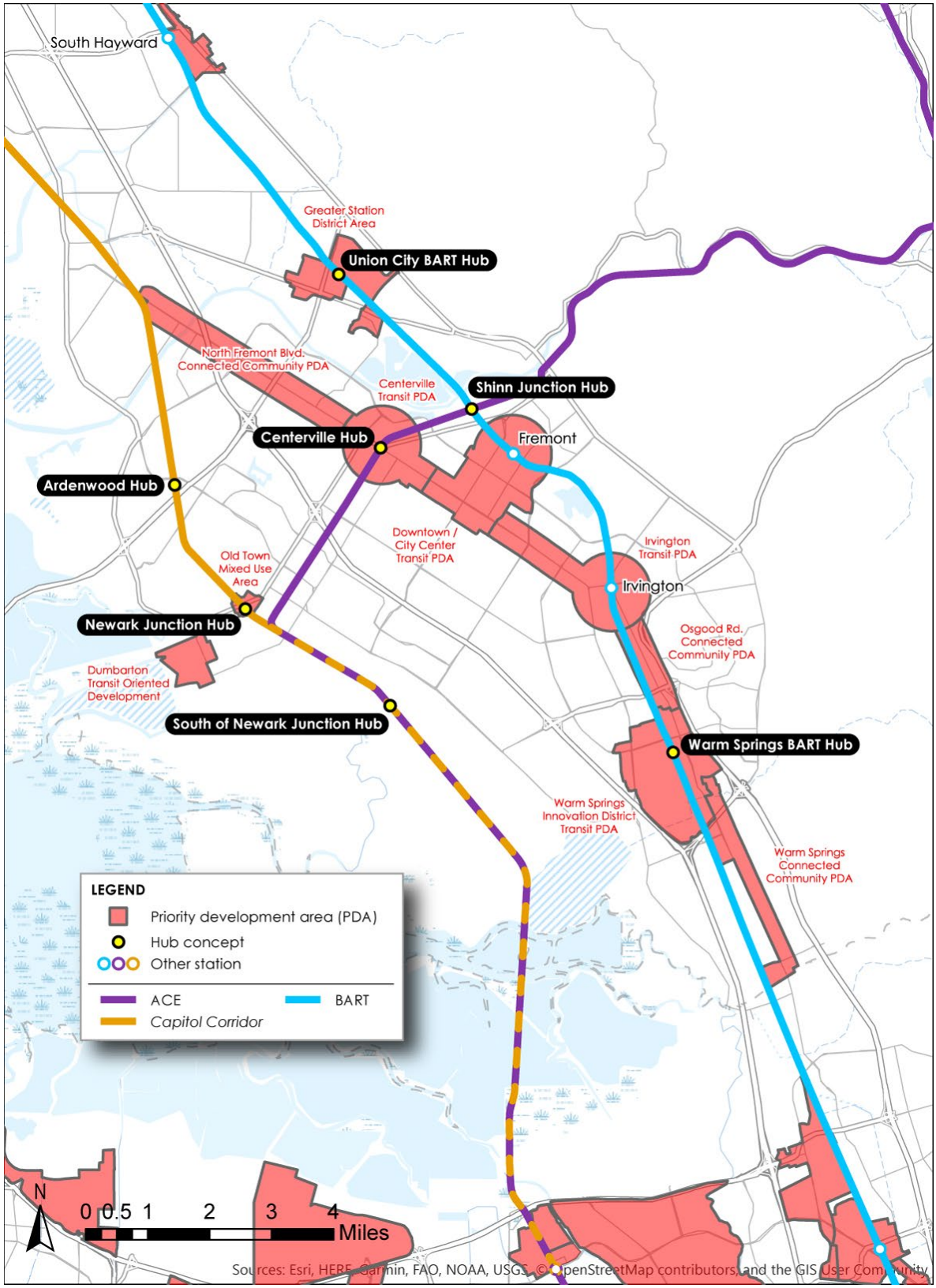
Group	Hub	Employment (2035)	
		Within 0.5 mile	Within 2 miles
ACE–BART hubs	Union City BART	1,800	18,300
	Shinn Junction	1,100	30,500
	Warm Springs BART	1,300	15,300
ACE–Capitol Corridor hubs	Ardenwood	1,500	20,200
	Newark Junction	1,200	23,100
	South of Newark Junction	1,500	23,200
ACE-only hub	Fremont-Centerville	1,800	29,400

Many of the hub locations are located in or adjacent to PDAs identified in Plan Bay Area 2050. Figure 5-15 illustrates the hub locations in relation to Plan Bay Area 2050 PDAs.

Local connectivity and land use for each hub concept are described in more detail below. The hub concepts are ranked from low to high based on a combination of factors:

- Future employment catchment (as quantified above)
- Surrounding land use and transit-oriented development (TOD) potential
- Approval or progress on a specific plan for the station area
- Location within or near identified priority development areas (PDAs)

Figure 5-15. Priority Development Areas in Southern Alameda County



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

UNION CITY BART

- Rating: High
- PDA: Greater Station District Area

The station is surrounded by a comprehensive mix of uses, including residential, retail, industrial, institutional, and recreation/open space. Sizeable vacant or under-utilized parcels are within a 0.5 mile of the station, including large surface parking lots for BART patrons and neighboring commercial strip malls. The City of Union City is currently working on a specific plan for the Station District, and 1.2 million square feet of Class A office space (part of The Union 1.2 @ BART project) is already approved and under contract adjacent to the station. Farther away from the station, there are also light industrial uses along the north side of Alvarado–Niles Road.

In addition, multiple agencies are advancing investments in the SR 84 / Decoto Road corridor to improve transit frequency, speed, and reliability, including improved operations for Transbay buses between the Union City BART Station and the Dumbarton Bridge and Peninsula. The improved transit operations would further enhance connectivity and the communities along the corridor.

SHINN JUNCTION

- Rating: Low to Medium
- PDA: Not applicable

Opportunities for transit-supportive development within a 0.5-mile radius of the proposed Shinn Junction hub are limited, as much of the land is dedicated to recreation/open space uses (e.g., Alameda Creek, Quarry Lakes Regional Recreation Area), with much of the remaining land occupied by light industrial and low-density suburban residential uses. Also, the City of Fremont currently is not planning to change the land uses around the Shinn Junction site. Farther out, however, the Shinn Junction hub would be within biking distance or extended walking distance of the Civic Center area of Fremont, which is home to a cluster of commercial/retail and institutional uses, including government offices and major medical centers. The station is also located less than 1 mile from the historic Niles District, but access is difficult due to the lack of options to get through the Quarry Lakes and Alameda Creek.

WARM SPRINGS BART

- Rating: High
- PDA: Warm Springs Innovation District Transit PDA, Warm Springs Connected Community PDA, and Osgood Road Connected Community PDA

Warm Springs is located within an area that is undergoing significant redevelopment. The City of Fremont has adopted a mixed-use specific plan for the area (the Warm Springs / South Fremont Community Plan), with a target of 10,000 to 20,000 new jobs and 2,700 to 4,000 dwelling units. The southwest corner of the community plan is anchored by a Tesla Motors factory, which has already received approvals from the City for an expansion that would double the size of the facility from 5.3 million square feet to 10 million square feet. The “Fremont Innovation District” encompasses the community plan area and extends more than 3 miles south of the station along either side of I-880 to Dixon Landing Road. The Innovation District is home to a significant cluster of industrial / research and development (R&D) uses.

ARDENWOOD

- Rating: Medium to High
- PDA: Not applicable

Ardenwood is located adjacent to Ardenwood Technology Park, a major industrial and R&D hub in North Fremont with more 2.7 million square feet of existing building space and 140 acres of remaining developable land. Additional industrial and R&D uses occupy areas immediately south of SR 84 within Newark, including 1.4 million square feet at the Pacific Research Center. Other uses in the vicinity of the station consist of low-density residential and mixed-use commercial/retail, including several large strip malls clustered around the intersection of Newark Boulevard and Jarvis Avenue. Much of the northeast quadrant of the station within walking distance is occupied by recreation/open space (Ardenwood Historic Farm) and is unlikely to be developed.

NEWARK JUNCTION

- Rating: Low
- PDA: Old Town Mixed Use Area and Dumbarton TOD

The Newark Junction hub would be located within a primarily residential area, characterized primarily by low-density, detached housing, along with some apartments. Some moderate clusters of light industrial uses are located south and east of the station. Vacant land in the vicinity of the station is limited as the surrounding neighborhoods are largely built out, thought there is a sizable parcel of UP-owned land adjacent to the hub site. Beginning at approximately 1 mile south of the station, a portion of the station's catchment consists of salt ponds and is unlikely to be developed.

SOUTH OF NEWARK JUNCTION

- Rating: Medium
- PDA: Not applicable

The South of Newark Junction concept would be located in an area characterized by a mix of uses, including light industrial, office/R&D, residential, and educational/institutional. Ohlone College's Newark Campus is located less than a 0.5 mile north of the station. Areas of vacant land are in the immediate vicinity of the proposed station site. Similar to the Newark Junction site, however, much of the area west of the station beyond a 0.5-mile distance consists of salt ponds and is unlikely to be developed.

FREMONT-CENTERVILLE

- Rating: Medium to High
- PDA: Centerville Transit PDA, North Fremont Boulevard Connected Community PDA, and Downtown/City Center Transit PDA

The existing Fremont-Centerville Station is located along the Fremont Boulevard commercial corridor, in an area consisting primarily small-scale commercial development and low- to moderate-density residential development surrounding this commercial corridor. With limited amounts of vacant land, future development potential will likely rely on infill redevelopment of surface parking and other under-utilized sites. The station is located approximately 1.5 miles northwest of the Civic Center neighborhood, which includes clusters of office, retail, and institutional (including government office and medical) uses.

SUMMARY: LOCAL CONNECTIVITY AND LAND USE

In terms of ACE–BART hubs, Union City BART performs best in terms of employment catchment within a 0.5-mile radius, but a strong case can also be made for Warm Springs BART. In terms of ACE–Capitol Corridor hubs, the Ardenwood hub generally performs best, but the South of Newark Junction concept also performs well. In general, however, employment catchment within a 0.5-mile radius is similar across the concepts. The density and diverse mix of land uses and the opportunities for transit-supportive development near the hub generally make a stronger overall case for Union City BART and Warm Springs BART, both of which have targeted station area plans recently adopted or currently in development.

5.3. Equity Considerations

This section assesses how the potential East Bay Hub locations identified in the preceding section may result in potential benefits or burdens to disadvantaged communities within the Study Area. To assist in the consideration of effects on disadvantaged communities, this section identifies barriers to transportation that these communities may face at the potential hub locations.

To provide a general overview, the demographic variables analyzed to identify equity considerations near the proposed hub locations include low-income, minority, elderly, disabled, and limited-English proficiency populations. Other variables include housing supply, rental units, rent-burdened households, zero-vehicle, and single-parent households.

5.3.1. Definitions and Data Used in This Analysis

The definitions used in identifying disadvantaged communities and the potential effects of East Bay Hub locations are described below. Eight of the ten demographic indicators used in this analysis are based on MTC's definition of "Equity Priority Communities" (EPCs). MTC's EPCs, formerly referred to as Communities of Concern, are intended to represent a diverse cross-section of populations and communities that could be considered disadvantaged or vulnerable in terms of both current conditions and potential impacts of future growth. Starting in Plan Bay Area 2013 and reaffirmed in Plan Bay Area 2040, MTC defines EPCs as Census Tracts that exhibit the following factors:

1. Low-income	And then either:		
	2. People of Color	Or **three** or more of the following:	3. Limited-English proficiency 4. Population over 75 5. Zero-vehicle households 6. Single-parent households 7. People with disability 8. Rent-burdened households

The definitions of these eight factors, and additional characteristics related to housing are described below. The thresholds to determine if a census tract is considered to be characteristic of any of these indicators are also described below.

Low-income Population: In the Bay Area, a low-income household is defined by MTC as a household with an annual income that is less than 200 percent of the federal poverty level. Outside of the Bay Area, either 100 percent or 150 percent of the federal poverty level is typically considered. MTC's threshold of significance for low-income populations is 28 percent of the households within a census geography that are considered low-income.

Minority Population / People of Color: A minority person is defined as any person who identifies as a race or ethnicity other than one race, White, and non-Hispanic[11]. MTC's threshold of significance for minority populations is 70 percent of the persons within a census geography that are considered minority. With MTC's definition of EPCs, minority populations are referred to as "people of color".

Limited-English Proficiency: A person with limited-English proficiency (LEP) is defined as any person above the age of 5 years, who does not speak English at least "well" or has a limited ability to read, speak, write, or understand English at least "well". MTC's threshold of significance for LEP populations is 12 percent of the persons within a census geography that are considered LEP.

Elderly Population: An elderly person is one who is over the age of 75. MTC's threshold of significance for elderly populations is 8 percent of the persons within a census geography that are considered elderly.

Zero-vehicle Households: A zero-vehicle household is one in which no resident of the household owns or has regular access to a personal vehicle. MTC's threshold of significance is 15 percent of the households within a census geography that are considered zero-vehicle households.

Single-parent Households: A single-parent household is one in which there is a family with one parent and at least on child. MTC's threshold of significance is 18 percent of the households within a census geography that are considered households.

People with Disability: A person with a disability is one who self-identified as having a disability[12]. MTC's threshold of significance is 12 percent of the persons within a census geography that are people with a disability.

[11] People of Color populations include persons who identify as any of the following groups as defined by the Census Bureau in accordance with guidelines provided by the U.S. Office of Management and Budget: American Indian or Alaska Native Alone (non-Hispanic/non-Latino); Asian Alone (non-Hispanic/non-Latino); Pacific Islander Alone (non-Hispanic/non-Latino); Black or African-American Alone (non-Hispanic/non-Latino); and Other (Some Other Race, Two or More Races, non-Hispanic/non-Latino); and all Hispanic/Latino persons.

[12] The U.S. Census Bureau defines disability as: Hearing difficulty (deaf or having serious difficulty hearing); Vision difficulty (blind or having serious difficulty remembering, concentrating, or making decisions); Ambulatory difficulty (having serious difficulty walking or climbing stars); Self-care difficulty (having difficulty bathing or dressing); Independent living difficulty (due to a physical, mental, or emotional problem, having difficulty doing errands alone such as visiting a doctor's office or shopping).

Rent-burdened Household: A rent-burdened household is a rental household for which the rent is more than 50 percent of the total household income. MTC's threshold of significance is 14 percent of the households within a census geography that are considered rent-burdened households.

Housing Vacancy: The housing vacancy rate in Alameda County is 5.1 percent, which indicates a constrained housing supply, and any vacancy rate below this threshold would indicate a more substantial housing constraint.

Renter-occupied Households: Renter-occupied household communities may be vulnerable to instability with community changes, such as a new transit station that may increase property values and potentially displace low-income residents. In Alameda County, 46.5 percent of all households are rentals, and any percentages greater than the county average indicate a greater risk of community instability or displacement.

The following sections provide an overview of the potential equity concerns at each hub under consideration based on the data collected to support the Existing Conditions Report in late 2019 and 2020. A summary of the findings is included in Section 5.2.5.9 of that report. The data used in the analysis were updated based on the following tables from the U.S. Census Bureau's 2015-2019 American Community Survey 5-Year Estimates:

- Low-Income Populations: Table S2503
- Minority Populations: Table B03002
- Elderly Populations and Disabled Populations: Table S0601
- Housing Supply, Rental Households, and Rent-burdened Households: Table DP04
- Zero-vehicle Households: Table B25044

For each of the equity considerations, data were collected for the Census Tract within which each potential East Bay Hub is located. If the hub spanned two Census Tracts, aggregate totals and percentages of the two tracts were used for the analysis. The MTC thresholds noted in each definition above were used to determine whether the hub location is identified as having low-income populations, people of color, LEP populations, etc.

5.3.2. Benefits and Burdens to Surrounding Disadvantaged Communities

The following assessment of equity is based on benefits and burdens on the surrounding disadvantaged populations. A summary of the demographic factors used in this analysis is shown in Table 5-5. Based on the data and the MTC criteria and thresholds for EPCs, none of the East Bay Hubs under consideration are located within an EPC. Moreover, there are no EPCs near any of these hub sites, with the nearest EPCs located in Hayward, north of Union City.

*The goal associated with this analysis is "**Enhance Regional Connectivity and Equitable Access**"*

Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

Table 5-5. Demographic Factors in Equity Analysis

Equity Considerations	Hub Concept						
	Union City BART	Shinn Junction	Warm Springs BART	Arden-wood	Newark Junction	South of Newark Junction	Fremont-Centerville
People of Color	81.0%	70.5%	91.2%	91.5%	83.3%	84.0%	74.8%
Low-Income Households	8.6%	6.9%	6.6%	5.6%	19.4%	4.5%	23.2%
Limited-English Proficiency	6.6%	4.2%	4.5%	4.2%	6.4%	4.4%	10.4%
Zero-Vehicle Households	8.8%	6.1%	1.8%	2.0%	1.9%	2.0%	8.1%
Elderly	3.0%	5.7%	2.1%	2.5%	3.8%	2.9%	3.0%
People with a Disability	3.9%	8.2%	3.7%	3.6%	6.7%	5.5%	6.5%
Single-Parent Households	10.5%	6.3%	4.4%	3.3%	13.3%	6.5%	11.9%
Rent-Burdened Households	10.6%	19.5%	14.2%	14.5%	17.7%	11.0%	11.7%
Renter-Occupied Households	43.4%	46.5%	23.0%	28.7%	53.4%	28.3%	49.6%
Housing Vacancy	7.2%	6.0%	4.0%	4.8%	3.5%	5.2%	6.2%

Percentage exceeds MTC Threshold or County Average, as per definitions in Section 5.3.1

Based on the data in Table 5-5, each hub was rated based on the benefits of improvements at the location as well as potential burdens (impacts) on the local community. A high rating indicates most benefit and little to no burden on disadvantaged populations and is generally associated with a disadvantaged community that would not experience much disruption with new construction. A low rating indicates least benefit and/or most burden on disadvantaged populations and is generally associated with communities that are not disadvantaged or construction that is most disruptive. A medium rating indicates that there would be some benefits to disadvantaged communities with little to no burdens.

UNION CITY BART

- Rating: Medium

This station serves existing BART lines to and from Berryessa in the south, Richmond in the north, and San Francisco in the northeast. The intermodal station also serves AC Transit, VTA, and Dumbarton Express buses. Based on the demographic of the area, additional transit connectivity and modal options would benefit the local communities, including the 81% people of color. The East Bay Hub at this location would be consistent with the current TOD planning advanced by Union City. The potential for

burdens on the nearby disadvantaged populations is minimal since the additional infrastructure needed to supplement the existing station is unlikely to result in major substantial impacts to communities.

SHINN JUNCTION

- Rating: Low

The potential Shinn Junction Station is located at the intersection of the existing UP Niles Subdivision/Centerville Line and existing BART tracks north of Peralta Boulevard. At this location, the BART tracks cross above the at-grade UP tracks, but there is no connection. Based on the demographic of the area, additional transit connectivity and modal options would benefit the local communities, including the 70.5% people of color. However, community burdens would be more substantial. New passenger rail service at this location would be inconsistent with current land uses and construction of the necessary infrastructure improvements would impact the community, including the rental households. With 19.5% of the rental households considered rent-burdened, a new station at this location has the potential to result in displacement of rental properties or further increased rent with potential improved property values.

WARM SPRINGS BART

- Rating: Medium

The existing Warm Springs BART Station serves BART lines to and from Berryessa in the south, Richmond in the north, and San Francisco in the northwest. As the East Bay Hub, the station would be expanded to accommodate additional passenger rail using the UP Warms Springs Subdivision that runs parallel to the BART tracks. Based on the demographic of the area, additional transit connectivity and modal options would benefit the local communities, including the 91.2% people of color and 14.2% rent-burdened households. The potential for burdens on nearby disadvantaged populations is minimal since the additional infrastructure needed to supplement the existing station is unlikely to result in major substantial impacts to communities.

ARDENWOOD

- Rating: Medium

The existing Ardenwood Park-and-Ride serves several AC Transit and Dumbarton Express Transbay bus lines, as well as private employer shuttles. CCJPA is currently advancing the South Bay Connect project, which proposes relocating its Capitol Corridor intercity passenger rail service to the UP Coast Subdivision and constructing a new rail station adjacent to the park-and-ride. Based on the demographic of the area, additional transit connectivity and modal options would benefit the local communities, including the 91.5% people of color and 14.5% rent-burdened households. The potential for burdens on the nearby disadvantaged populations is minimal since the additional infrastructure needed to supplement the existing station is unlikely to result in major substantial impacts to communities.

NEWARK JUNCTION

- Rating: Low

There is currently no rail station or other transit service at Newark Junction, which is where three rail lines connect (UP Niles Subdivision/Centerville Line, UP Coast Subdivision, and SamTrans' out-of-service Dumbarton Line). Based on the demographic of the area, additional transit connectivity and modal

options would benefit the local communities, including the 83.3% people of color and 17.7% rent-burdened households. However, community burdens would be more substantial. A new passenger rail station at this location would be inconsistent with current land uses and construction of the necessary infrastructure improvements and station requirements would impact the community, including the 53.4% rental households. A new station at this location has the potential to result in displacement of rental properties or further increased rent with potential improved property values.

SOUTH OF NEWARK JUNCTION

- Rating: Low to medium

The site of the potential hub south of Newark Junction is in the City of Newark along the UP Coast Subdivision between Addition Road and Mowry Avenue. There is no transit service at the station location. Based on the demographic of the area, additional transit connectivity and modal options would benefit the local communities, including the 84.0% people of color. However, community burdens would be more substantial. A new passenger rail station at this location would be inconsistent with current land uses and construction of the necessary infrastructure improvements and station requirements would impact the community. A new station at this location has the potential to result in displacement of rental properties or increased rent with potential improved property values. On the other hand, with a large percentage of owner-occupied households, potential increased property values may benefit people of color in the community.

FREMONT-CENTERVILLE

- Rating: Low

The existing Fremont-Centerville Station serves ACE and Capitol Corridor trains that operate along the UP Niles Subdivision/Centerville Line. Several buses stop nearby providing local connections. The AC Transit U Line provides a Transbay connection to Stanford University; it also provides a connection to the Fremont BART Station. Additional ACE service would not increase modal options for the 74.8% people of color at this location. The necessary infrastructure improvements to expand the existing station would be minimal, resulting in low risk of any burdens on the nearby disadvantaged communities.

SUMMARY: EQUITY

The high-level analysis shows that there are no hubs located in EPCs, and very few of the other equity-related indicators exceed MTC thresholds. However, every hub has a high percentage of people of color that would benefit from improved mobility provided with the East Bay Hub. Expanded transit service at the existing Union City BART Station, existing Warm Springs BART Station, and Ardenwood would provide transportation access and mobility benefits to the nearby communities with minimal community disruptions (burdens). With the location South of Newark Junction, there is a potential for longer-term benefits to minority-owned properties should property values increase with a new station at this location. Impacts associated with a new station at Shinn, Newark Junction, and South of Newark Junction would be substantial and may adversely impact local communities.

5.3.3. Regional Equity

While rail improvements associated with the SoCo Rail Study would benefit local station areas and local community mobility and access to jobs, recreation, health care services, etc., improved passenger rail connectivity with a new East Bay Hub would also provide benefits to communities outside of the immediate Hub location and outside of the Bay Area. BART, ACE, and Capitol Corridor serve communities outside of southern Alameda County that may be characterized as disadvantaged based on the indicators examined as part of the hub analysis discussed in the previous section. An East Bay Hub that increases connectivity to other transit services and provides greater access to destinations would also benefit communities elsewhere along the rail lines connecting at the hub. A complete regional equity analysis will be completed as part of the next phase of the SoCo Rail Study.

5.4. Service Reliability

This section identifies the passenger train service levels planned for the Mid-Term Horizon on mainlines in the Study Area. It also assesses the train volume capacity of these lines, assuming seven different East Bay Hub concepts, and identifies potential capacity enhancements to ensure fluid passenger and freight rail operations.

5.4.1. Service Levels from State Rail Plan and Service Planning

Goals for passenger rail service on the mainlines in the Study Area, as articulated in planning conducted by Caltrans for the 2018 CSRP and subsequently refined by the rail operators, are noted below. Based on the operators' refined service plans, assumptions of train volumes through the Study Area are noted below as well.

The 2018 CSRP[13] identified service goals for the mid-term (i.e., by 2027) for corridors that ACE, Capitol Corridor, and a future Dumbarton rail service currently run in or would run in the future These goals were:

- Hourly service connecting San Jose and the Stockton Area (with half-hourly service at peak). This corridor corresponds with ACE service.
- Half-hourly peak and at least bi-hourly off-peak services between Oakland and San Jose. This corridor corresponds with Capitol Corridor service.
- Half-hourly peak and hourly off-peak bus or rail service, with connections in the East Bay to ACE, Capitol Corridor, and BART services. This corridor currently corresponds to buses traveling across the Dumbarton Bridge, which include the Dumbarton Express. AC Transit U-Line, and the Stanford Marguerite Shuttle.

During the operational and service planning conducted as part of the SoCo Rail Study, SJRRC and CCJPA identified refined service goals for the mid-term (approximately 10 years). These goals are:

- **ACE**: 5 roundtrips between the Central Valley and San Jose; and 3 roundtrips between the Central Valley and the East Bay Hub.

[13] California State Rail Plan, California Department of Transportation (Caltrans), 2018, page 148.

- **Capitol Corridor**: Up to 15 round trips between Oakland and San Jose. This level of service in the mid-term would require improvements along the UP Coast Subdivision in the mid-term that are not anticipated to be completed in the approximately 10-year timeframe.

The Dumbarton Express bus service today operates on a half-hourly schedule between the Union City BART Station and Stanford University, essentially meeting the goals contained in the 2018 CSRP for the mid-term. AC Transit U-Line and Stanford Marguerite Shuttle Transbay bus lines also operate within the Dumbarton Corridor, though at less frequencies.

5.4.2. Travel Times to Key Destinations

The regional connectivity of the seven hub concepts can be quantitatively compared by estimating travel times going to or from key origins or destinations. For this analysis, passengers are assumed to take ACE for a commute into the Bay Area. The origin station is assumed to be Pleasanton Station (the last station in the Tri-Valley heading inbound). Six representative destinations were chosen in four different markets across the Bay Area:

*The goal associated with this analysis is "**Enhance Service Reliability and Safety**"*

Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

San Francisco
- Montgomery Street

Oakland
- Jack London Square
- 12th Street City Center

Peninsula
- Downtown Palo Alto

San Jose
- Diridon Station
- Downtown San Jose

Travel times are estimated based on existing timetables (or approximate running times for future service, as Phase II of BART to Silicon Valley), with a base penalty of 10 minutes applied for each transfer to or from another service. In the case of Capitol Corridor transfers, a 15-minute penalty has been applied (50 percent more than the base penalty) to account for reliability and on-time performance issues.

The matrix in Table 5-6 summarizes the results of the travel time analysis. The hub concepts have been grouped into three rankings ("fast", "medium", and "slow") based on their travel time performance for each of the six representative destinations.

As shown in Table 5-6, the ACE-BART hubs show faster travel times than ACE-Capitol Corridor hubs, including for downtown San Francisco, downtown Oakland, and (due to transfer penalties) downtown San Jose. The only exceptions are for Jack London Square (where ACE-BART hubs require an additional transfer to connect with AC Transit bus service) and for downtown Palo Alto (where the travel time depends on the hub's distance from the east end of the Dumbarton Bridge).

A more in-depth discussion of ACE-BART, ACE-Capitol Corridor, and ACE-only hub concepts is provided below.

Table 5-6. Travel Time Analysis Summary

Hub	Travel time (minutes) between Pleasanton (ACE) and					
	San Francisco	Oakland		Peninsula	San Jose	
	Montgomery Street	Jack London Square	12th Street City Center	Downtown Palo Alto	Diridon	Downtown
Union City BART	77	86	66	70	66	64
Shinn Junction	77	86	66	71	59	57
Warm Springs BART	90	99	79	83	58	56
Ardenwood	97	75	86	64	78	90
Newark Junction	98	76	87	70	74	86
S. of Newark Junction	102	80	91	75	72	84
Fremont-Centerville	100	109	89	68	—	—

Source: AECOM

Notes: Assumes a base travel time penalty of 10 minutes for each transfer, except in the case of transferring to and from Capitol Corridor, for which the assumed penalty is 50 percent larger (15 minutes) due to service reliability issues related to operating passenger service on freight-owned corridors.

Fastest travel times among hub concepts ("fast" rank)

Intermediate travel times among hub concepts ("medium" rank)

Slowest travel times among hub concepts ("slow" rank)

ACE–BART HUBS COMPARISON

Union City BART and Shinn Junction performs better in terms of travel times for markets to the north and west (e.g., San Francisco/Oakland, Peninsula), while Warm Springs BART performs slightly better for markets to the south (San Jose). The travel time differential between Union City and Warm Springs is 13 minutes faster for Union City (for San Francisco and Oakland), compared to only 8 minutes faster for Warm Springs BART (for San Jose).

ACE–CAPITOL CORRIDOR HUBS COMPARISON

The most substantial difference in travel time among the three Capitol Corridor concepts is for the Peninsula market (6 to 11 minutes faster for Ardenwood). The spread in other markets is only 4–6 minutes, with Ardenwood being faster for the San Francisco and Oakland markets and South of Newark Junction being faster for the San Jose market. Therefore, Ardenwood could be considered better-performing overall, as its proximity to the Dumbarton Bridge results in better travel times for the Peninsula market.

ACE-ONLY HUB

Like the ACE–Capitol Corridor hubs, the Fremont-Centerville hub concept performs worse in terms of travel times than the ACE–BART hubs for the San Francisco and Oakland markets, as an additional transfer from AC Transit bus service between Fremont-Centerville and BART (at Union City) would be required. The Fremont-Centerville concept would also perform poorly to and from Jack London Square, as there would be no connecting Capitol Corridor service at Fremont-Centerville.

The Fremont-Centerville hub performs well in the Peninsula market, with times that are at the lower end of the range among the seven hub concepts (although not substantially faster than Union City BART or Shinn Junction (for ACE–BART hubs) or Newark Junction (for ACE–Capitol Corridor hubs).

In terms of access to the South Bay market, since there is no rail-to-rail connection at the Fremont-Centerville Hub, it is assumed that passengers choosing to utilize ACE trains terminating at this hub would not be traveling to ACE stations located in the South Bay (i.e., Great America, Santa Clara, and San Jose Diridon). Some passengers could consider taking a bus or shuttle to connect with BART to the South Bay or other Bay Area destinations.

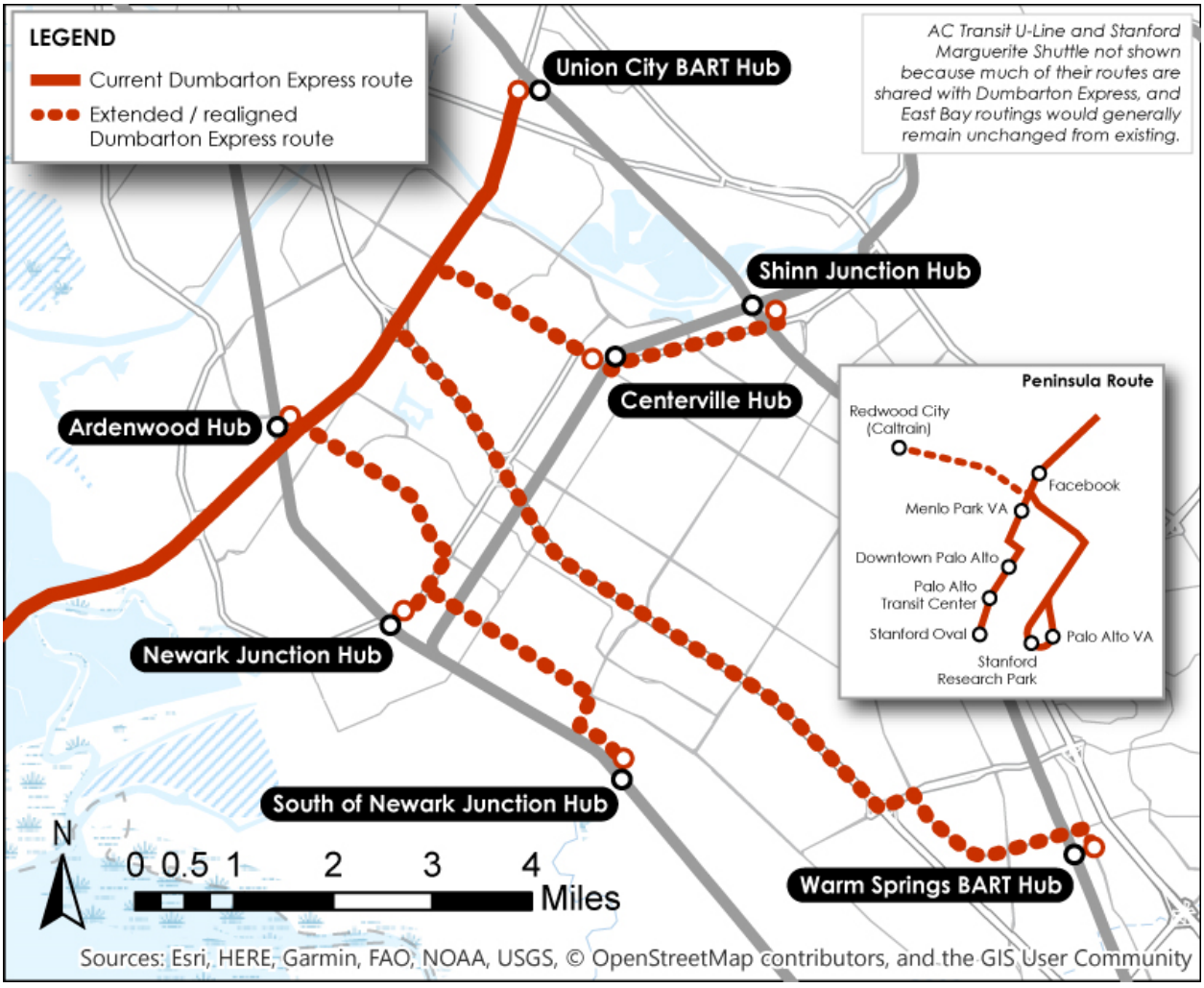
Summary: Travel Times to Key Destinations

Based on the above analysis, Union City BART is the best-performing concept in terms of travel times for markets throughout the region, owing primarily to the BART connection (for faster travel times to and from San Francisco, Oakland, and San Jose) and proximity to the Dumbarton Bridge. Shinn also performs well. Warm Springs, Ardenwood, and Fremont-Centerville perform moderately, with Newark Junction slightly worse and South of Newark Junction the worst.

POTENTIAL OPERATIONAL IMPACTS TO TRANSBAY DUMBARTON BUS SERVICES

Figure 5-16 illustrates assumed route alignments for Transbay Dumbarton bus services connecting to each of the seven hub locations. Hub concepts requiring substantial travel distance (e.g., Warm Springs BART) or use of lower-speed local streets (e.g., South of Newark Junction) would see longer travel times, as shown in Table 5-6. Potential operational impacts would likely be highest for Warm Springs BART, Newark Junction, and South of Newark Junction and moderate for Fremont-Centerville. Union City BART and Ardenwood have a low impact, as they are on the existing route, while Shinn Junction would replace Union City as the BART connection and eastern terminus of the route.

Figure 5-16. Assumed Transbay Dumbarton Bus Services Routes to East Bay Hub Locations



Source: Esri, HERE, Garmin, FAO, NOAA, USCG, OpenStreetMap, GIS User Community (AECOM Annotations)

5.4.3. Level of Difficulty in Accommodating Anticipated Service Levels and Hub Facilities

The purpose of the SoCo Rail Study is to determine the East Bay Hub that allows for anticipated service levels (based on the 2018 CSRP vision and operator goals with anticipated constraints applied) to be met. Given this, the service levels for the Mid-Term Horizon are assumed to be as follows:

- **ACE Service**: Three roundtrips per weekday to an East Bay Hub for ACE service. One additional round trip to San Jose is assumed.

*The goals associated with this analysis are "**Enhance Service Reliability and Safety**", "**Serve Surrounding Communities and Shape Growth**", and "**Develop Feasible Infrastructure Improvements**"*

Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

- **Capitol Corridor Service**: Seven roundtrips per day to an East Bay Hub. CCJPA's goal for the Mid-Term Horizon is up to 15 roundtrips per day, but the SoCo Rail Study is assuming that constraints along the UP Coast Subdivision (especially within the Alviso Wetlands) will persist through the Mid-Term Horizon), thereby limiting service. That said, if improvements were to be accelerated along the UP Coast Subdivision in the mid-term, additional service could then be provided to all passenger rail services to San Jose. However, this hub assessment does not assume this additional service.
- **Transbay Dumbarton Bus Services**: Assumed frequencies as high as every 15 minutes at peak hours along with the need to accommodate space for up to three separate Transbay bus operators.

Due to the uncertainty of how freight operations will be configured following the planning work being done as part of the South Bay Connect Project, the assessment below assumes the need to accommodate a significant level of freight service regardless of the rail corridors needed to access each of the seven hub locations.

The following factors are considered in gaining a high-level understanding of the level of difficulty in accommodating anticipated service levels:

- Track expansion: Sufficient space to accommodate new track(s) at and approaching the hub site
- Space for new station platform: Sufficient space to accommodate a passenger platform (including access facilities) at the hub site
- Space for connecting modes: Sufficient space for bus services, employer shuttles, pick-up/drop-off, and parking

UNION CITY BART

- Track expansion: Low level of difficulty
- Space for new station platform: Low level of difficulty
- Space for connecting modes: Low level of difficulty

UP train movements here consist of local trains serving nearby shippers. Though the rail right-of-way here is tight, there is sufficient room for a station track and a side platform. Additionally, this site has the advantage of having station facilities already present due to the Union City BART Station. An agreement with BART would be needed for sharing existing facilities for parking, employer shuttles, and connecting transit. TOD is planned for surface parking lots to the east of the BART station, removing parking capacity. However, BART is planning a parking garage, which could be shared by agreement.

SHINN JUNCTION

- Track expansion: Medium level of difficulty
- Space for new station platform: Low level of difficulty
- Space for connecting modes: Low level of difficulty

UP train movements here include transcontinental movements to and from Altamont Pass, some Oakland-San Jose and Coast Line trains, and local traffic. However, the double-tracked Centerville Line at this location could provide sufficient capacity for additional ACE trains. There is sufficient room for a

center platform. An agreement with BART would be needed for sharing facilities for parking, employer shuttles, and connecting transit at a new Shinn Junction hub. That station would be elevated above and just to the north of the Centerville Line, with parking and connecting transit facilities to the east of the BART line, north of the Centerville Line, and south of the UP Oakland Subdivision. While there is space to do all this, it is a very large infrastructure footprint with a neighborhood and small business nearby, which could create some difficulty to implement.

WARM SPRINGS BART

- Track expansion: Low level of difficulty
- Space for new station platform: Low level of difficulty
- Space for connecting modes: Low level of difficulty

UP trains operating in and out of the Warm Springs Yard and along the UP Warm Springs Subdivision would complicate operations here. However, there is sufficient space for a station track and a side platform. Additionally, this site has the advantage of having station facilities already present due to the Union City BART Station. An agreement with BART would be needed for sharing existing facilities for parking, employer shuttles, and connecting transit.

ARDENWOOD

- Track expansion: High level of difficulty
- Space for new station platform: Medium level of difficulty
- Space for connecting modes: Low level of difficulty

UP train movements including transcontinental movements to and from Altamont Pass and some Oakland-San Jose and Coast Line trains, plus the Amtrak *Coast Starlight*, complicate operations for future Capitol Corridor and ACE trains here. However, the tight right-of-way could allow a side platform along the existing single track. The adjacent Ardenwood Parking-and-Ride lot would provide for parking and access for local transit and employer shuttles. The new bus stop on the elevated section of SR 84 over the UP Coast Subdivision and vertical circulation to the new train station and park-and-ride would provide for connections between Capitol Corridor and ACE trains and Dumbarton Express and AC Transit U Line Transbay buses.

NEWARK JUNCTION

- Track expansion: Medium level of difficulty
- Space for new station platform: Medium level of difficulty
- Space for connecting modes: Medium level of difficulty

This location is the nexus of various UP freight movements: Oakland to San Jose trains, Coast Line trains, locals, and yard movements, which would complicate operations for future Capitol Corridor and ACE trains. The line hosts the Amtrak *Coast Starlight* as well. However, there is sufficient space for a center platform inside a future double track section. Also, a new station area could be built to the east of the platform to provide for parking and access for local transit and employer shuttles. However, there may be challenges related to accessing these station facilities due to short blocks and numerous grade crossings.

SOUTH OF NEWARK JUNCTION

- Track expansion: Medium level of difficulty
- Space for new station platform: Low level of difficulty
- Space for connecting modes: Low level of difficulty

UP train movements in and out of the Newark Yard along with Oakland-San Jose and Coast Line trains, plus the Amtrak *Coast Starlight*, would complicate operations for future Capitol Corridor and ACE trains at this location. However, sufficient room exists for a station track and side platform. Also, a station area could be built to the east of the platform to provide for parking and access for local transit and employer shuttles.

FREMONT-CENTERVILLE

- Track expansion: Medium level of difficulty
- Space for new station platform: Low level of difficulty
- Space for connecting modes: High level of difficulty

UP train movements here include transcontinental movements to and from Altamont Pass, some Oakland-San Jose and Coast Line trains, and local trains. However, the double tracks at this location provide sufficient capacity for additional ACE trains. There is sufficient room to extend the existing side platform here, though space for new parking, local transit, and employer shuttles is very constrained at and around the station.

5.5. Potential Capital Improvement Cost

This section assesses the likely range in capital costs for implementing an East Bay Hub at the seven station locations considered in this report. Costs are considered in a range from low to high as follows:

- Low being less than $25 million
- Medium being $25 million to $100 million
- High being greater than $100 million

*The goal associated with this analysis is "**Develop Feasible Infrastructure Improvements**"*

Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

The following analysis includes high-level costs only for development of station locations. Other improvements for more ACE, Capitol Corridor, and BART services, such as line capacity improvements required for higher service levels on the lines in the Study Area, are not part of this analysis. The results are summarized at the end of this section.

UNION CITY BART

- Rating: Medium

As noted in Section 5.1, an East Bay Hub at the Union City BART Station would require a 1,000-foot-long at-grade platform. Depending on UP operations, it may also require a station track to separate freight traffic from ACE trains stopping at the station. The resulting double track at the station would trigger a need for a grade-separated transfer walkway for riders going from the ACE platform to BART.

SHINN JUNCTION

- Rating: High

Connections between ACE and BART trains at Shinn Junction would include two side platforms of 1,000 feet each for ACE trains (given trains would not terminate at this hub location) and an elevated station for BART, inclusive of parking. Grade-separated transfer pathways would be needed for access between parking and the ACE platforms and for transfers between ACE and BART trains. Access improvements via Shinn Street would also be needed.

WARM SPRINGS BART

- Rating: Medium

A 1,000-foot-long platform would be included along the UP Warm Springs Subdivision, which runs at-grade parallel to BART. The platform would be between the BART station structure to the east and the Warm Springs Subdivision main line and Warm Springs Yard to the west. A station track may be required by UP. Access between the ACE platform and the BART station would be via a grade-separated transfer pathway.

ARDENWOOD

- Rating: Medium

ACE trains at an East Bay Hub here could share a 1,000-footlong platform along the UP Coast Subdivision with the Capitol Corridor service. However, the South Bay Connect Project selected a preferred single-side platform[14], which could pose challenges for transferring between northbound ACE trains and southbound Capitol Corridor trains. Other improvements needed at this location, such a station track (if required by UP), grade separated transfer pathways to a parking structure, an elevated bus stop on SR 84, and access improvements could be shared with Capitol Corridor and other entities, which are already envisioning a new station and a bus-rail transfer facility here.

NEWARK JUNCTION

- Rating: Medium

An East Bay Hub here would include a 1,000-foot-long platform along the Coast Subdivision. Also required would be access improvements (potentially one or two grade separations) and parking, as this location would also be a new Capitol Corridor stop. A station track may also be required by UP.

SOUTH OF NEWARK JUNCTION

- Rating: Medium

An East Bay Hub here would include a 1,000-foot-long platform along the Coast Subdivision and access improvements via Mowry Avenue. Also required would be parking, as this location would also be a Capitol Corridor stop. A station track may also be required by UP.

[14] CCJPA. 2019. *South Bay Connect Project Definition Report*. https://www.southbayconnect.com/resources/SBC_ProjectDefinitionReport.pdf

FREMONT-CENTERVILLE

- Rating: Low

In order to host new ACE trains at the Fremont-Centerville Station, a 400-foot eastward extension of the existing northside platform would be needed. No other improvements are envisioned given there would be no connections to other rail services.

SUMMARY: CAPITAL COSTS

Table 5-7 shows a summary of likely capital cost ranges. Station tracks are assumed for Union City BART, Ardenwood, Newark Junction, South of Newark Junction, and Warm Springs BART as a means of separating freight and passenger trains. The addition of station tracks will trigger the need for grade-separated transfer pathways. Costs for an East Bay Hub at Ardenwood could leverage existing plans for a Capitol Corridor station and an elevated bus stop on SR 84, and thus they could be less. Also, capital costs at Fremont-Centerville would be less, as the sole improvement there would be for a siding extension. Costs would be highest for Shinn Junction, as that station would require a BART facility as well as platforms for ACE trains along the UP Niles Subdivision/Centerville Line.

Table 5-7. Likely Capital Costs for East Bay Hub Improvements

Station Component	Hub Concept						
	Union City BART	Shinn Junction	Warm Springs BART	Arden-wood	Newark Junction	South of Newark Junction	Fremont-Center-ville
Platform Extension	No	No	No	No	No	No	Yes
1,000-foot Platform	Yes	Yes	Yes	Yes	Yes	Yes	No
Two 1,000-foot Platforms	No	No	No	Yes	No	No	Yes
Access Improvements	No	Yes	No	No	Yes [a]	Yes	No
Station Track	Yes	No	Yes	Yes	Yes	Yes	No
Parking	No	Yes	No	Yes	Yes	Yes	No
Transfer Pathways	Yes	Yes	Yes	Yes	Yes	No	No
BART Station	No	Yes	No	No	No	No	No
Capital Costs	**Medium**	**High**	**Medium**	**Medium[b]**	**Medium**	**Medium**	**Low**

[a] *Access improvements could include one or two grade separations.*
[b] *Costs could be shared with Capitol Corridor and other entities.*

5.6. Consistency with Operator Plans for the Mid-Term Horizon

This section analyzes the seven East Bay Hub concepts in terms of their consistency with the mid-term service plans of rail operators SJRRC, CCJPA, and BART. Each hub concept is ranked based on its overall mid-term consistency for the three rail operators.

*The goal associated with this analysis is **"Enhance Service Reliability and Safety"***
Specific objectives linked to this analysis are shown on Appendix C (Comparison Matrix).

SJRRC is planning to seek funding to environmentally clear and implement the improvements that would

allow for up to four additional trains to run to the Bay Area, with one of these additional trains going to San Jose and the other three going to a new East Bay Hub.

CCJPA has embarked on the South Bay Connect Project, which reroutes Capitol Corridor service to the UP Coast Line between North Elmhurst in Oakland and Newark Junction. A new rail station at Ardenwood is planned as part of this project. This project will decrease travel times and reduced conflicts with freight rail operations.

BART is planning for a 6-mile service extension from Berryessa/North San Jose to Diridon Station in downtown San Jose and ultimately to Santa Clara in the mid-term (projected opening is around 2030). The project is being managed by VTA. Trains will operate with typical BART headways of every 15 minutes on weekdays and 20 minutes on weekends.

UNION CITY BART

- Rating: High Consistency

An East Bay Hub in Union City is consistent with SJRRC's plans for new service to an East Bay Hub. It would provide ACE riders with a connection to BART. CCJPA, on the other hand, is rerouting service to the UP Coast Line between North Elmhurst in Oakland and Newark Junction. Accordingly, an East Bay Hub in Union City is inconsistent with CCJPA's plans.

BART has partnered on access improvements and TOD development at the Union City BART Station, indicating an East Bay Hub at this location supports BART's plans.

SHINN JUNCTION

- Rating: Low to Medium Consistency

An East Bay Hub here would be consistent with SJRRC's plans to provide a new station terminal in southern Alameda County and more service to San Jose. It would also provide SJRRC a connection to BART. However, aa hub at Shinn Junction is not consistent with BART's current plans, as it would present operating challenges for BART given its very close proximity to the Fremont BART Station.

A Shinn Junction Station would be inconsistent with CCJPA's plans to move service to the UP Coast Subdivision.

WARM SPRINGS BART

- Rating: High Consistency

An East Bay Hub here would be consistent with SJRRC's plans to provide a new station terminal in southern Alameda County. It would also provide SJRRC a connection to BART.

However, Warm Springs BART is far from the Coast Line, and therefore a stop here would be inconsistent with CCJPA's mid-term service plans.

Given BART already has a station here, an East Bay Hub here is consistent with current BART operations. BART has partnered on access improvements to Tesla and new TOD to the east and west of the station, indicating an East Bay Hub at this location supports BART's plans.

ARDENWOOD

- Rating: High Consistency

An East Bay Hub at Ardenwood would be consistent with SJRRC's plans to provide a new station terminal in southern Alameda County. However, this location would eliminate the opportunity for an ACE-BART connection.

An Ardenwood East Bay Hub would be consistent with CCJPA's plans to construct a new Capitol Corridor station there as part of the South Bay Connect Project.

NEWARK JUNCTION

- Rating: Low Consistency

An East Bay Hub at Newark Junction would be consistent with SJRRC's plans to provide a new station terminal in southern Alameda County and more service to San Jose. However, this location would eliminate the opportunity for an ACE-BART connection.

CCJPA has no plans for a new station at Newark Junction as the decision was made to implement a station at Ardenwood just to the north on the Coast Subdivision. An East Bay Hub at Newark Junction would amount to an extra stop for CCJPA, lengthening trip time between Oakland and San Jose. Increased travel time is not consistent with the South Bay Connect Project, as one of the key goals of the project is to reduce travel times to San Jose.

SOUTH OF NEWARK JUNCTION

- Rating: Low consistency

An East Bay Hub at a location south of Newark Junction would be consistent with SJRRC's plans to provide a new station terminal in southern Alameda County and more service to San Jose, as trains could stop at a south of Newark station and continue south on the UP Coast Subdivision. However, this location would eliminate the opportunity for an ACE-BART connection.

CCJPA has no plans for a new station at Newark Junction as the decision was made to implement a station at Ardenwood just to the north on the UP Coast Subdivision. An East Bay Hub at Newark Junction would amount to an extra stop for CCJPA, lengthening trip time between Oakland and San Jose. Increased travel time is not consistent with the South Bay Connect Project, as one of the key goals of the project is to reduce travel times to San Jose.

FREMONT-CENTERVILLE

- Rating: Low consistency

An East Bay Hub here would be consistent with SJRRC's plans to provide a new station terminal in southern Alameda County and more service to San Jose. However, this location would eliminate the opportunity for an ACE-BART connection. Additionally, given a Dumbarton rail service is not assumed for the mid-term, there would be no other rail services to connect to. This absence of connections is inconsistent with SJRRC's goal of having a high-level of connectivity at an East Bay Hub.

As CCJPA plans for a reroute of Capitol Corridor service to the UP Coast Subdivision between North Elmhurst and Newark Junction, eliminating service along the Nile Subdivision, an East Bay Hub at the Fremont-Centerville Station is inconsistent with CCJPA plans.

SUMMARY: MID-TERM CONSISTENCY

Of the seven potential locations for an East Bay Hub considered in this report, only Ardenwood is consistent with both SJRRC and CCJPA mid-term plans. However, SJRRC would have no connection to BART there, as it would have at Union City BART, Shinn Junction, and Warm Springs BART. Additionally, only the Union City BART and Warm Springs BART Station locations are consistent with BART's operations as BART has no plans for an infill station at Shinn Junction. These conclusions are summarized in Appendix C.

5.7. Long-Term Horizon Considerations

With multiple long-term projects and plans in the study area, consideration of the seven hub concepts' consistency with these future changes to the local, regional, and intercity rail network is important. Several key considerations for the long-term planning horizon are discussed in further detail below.

5.7.1. ACE Rail Service Expansion

While three round trip ACE trains per day are assumed for Mid-Term in the SoCo Rail Study, SJRRC is exploring the possibility of running additional trains in the long-term to the East Bay Hub. The number of additional trains would be determined in future Long-Term scenario studies.

SJRRC is also exploring additional options for service expansion along the existing route and other routes:

- Additional service to / from San Jose: As noted earlier, this would require significant investment in upgrades to the UP Coast Subdivision between Newark and Santa Clara, including addressing the critical capacity constraints imposed by the single-track section through the Alviso Wetlands and the single-track platform at Great America Station.
- Extensions to more Bay Area destinations: As mentioned in Section 4.3.2, ACE service in the Long-Term Horizon (20+ years) could be extended along new routes via the UP Coast Subdivision to the north, the Dumbarton Line, and the Caltrain corridor to provide direct (one-seat) service to many more destinations within the Bay Area, including Oakland, San Francisco, and the Peninsula. This builds off of the vision established in the 2018 State Rail Plan and would be facilitated by the Dumbarton Line improvements (see Section 5.7.2) and the Link21 program (see Appendix B).
- Altamont Corridor Vision: As discussed in Appendix B, the long-term vision for service in the Altamont Corridor is for one-seat rides at the megaregional level through integration and interlining with HSR, Valley Link, the Dumbarton Line, and other services. Service would be as frequent as every 15–30 minutes during peak periods.

5.7.2. Dumbarton Rail Project

SamTrans is continuing to study concepts for a high-capacity transit option in the Dumbarton Corridor connecting Union City and Redwood City via the Dumbarton Rail Bridge. In one rail option, in the East

Bay, trains would stop at a new station at Willow Street in Newark and then use the UP Niles Subdivision/Centerville Line and UP Oakland Subdivision, stopping at the existing Fremont-Centerville Station and a new station at the Union City BART. A second rail option is a mid-line branch that would extend north on the UP Coast Subdivision to a rail station at Ardenwood.

An alternative option using light rail transit (LRT) or another mass transit technology such as bus rapid transit (BRT) or autonomous vehicle transit (AVT) would head north after serving Willow Street in Newark and follow much of the same route as the existing Dumbarton Express bus service along Decoto Road, with stops at Ardenwood and Union City BART. Additional alignment variants could add stations at Dumbarton Circle, Fremont Boulevard, and Quarry Lakes.

Of the seven hub concepts, Union City and Ardenwood are best positioned to accommodate all of the potential options for the future Dumbarton Rail Project as currently envisioned by SamTrans, whether commuter rail, LRT, or another technology. The Fremont-Centerville and Shinn Junction hub concepts would also provide improved connectivity should Dumbarton advance with an alignment that uses the UP Niles Subdivision / Centerville Line for access to and from Union City.

The South of Newark Junction and Warm Springs concepts would not work well for a Dumbarton connection due to the lack of a connection with BART (a key market for any Dumbarton service) and/or distance from the Dumbarton Rail Bridge (resulting in substantial out-of-direction movement and unattractive travel times).

It should be noted that SJRRC has expressed a long-term interest in operating some ACE trains directly to and from the Peninsula via the Dumbarton Rail Bridge. The Shinn Junction, Fremont-Centerville, and Newark Junction concepts could work well under this scenario, as they have minimum or no out-of-direction movement to and from the Dumbarton Rail Bridge.

5.7.3. BART

Because BART and ACE serve mostly different travel markets, there is great value in connecting BART to ACE to improve regional rail mobility in the Bay Area. Maintaining a connection to BART in southern Alameda County would be useful, even with additional direct ACE service to Diridon Station in San Jose in the long-term. Given the growing employment areas around the numerous BART stations in southern Alameda County and northern Santa Clara County, maintaining an ACE-BART connection will be useful in the Study Area in the long-term. Additionally, connectivity to BART stations to the north of the Study Area would continue to be valuable.

As both Union City and Warm Springs are existing stations on the BART system, these two hub concepts would perform very well in terms of long-term consistency with BART, as impacts to BART operations and service can be kept to a minimum. At Union City, for example, BART has already partnered on access improvements and TOD development, indicating that an East Bay Hub in the long-term at this location supports BART's plans.

The Shinn Junction hub concept, however, would involve a new infill station on the BART system, at a location not previously considered for an infill station by BART. A new regional transit hub at Shinn

Junction would therefore require substantive re-evaluation and changes to BART's operating parameters. BART is planning an infill station at Irvington, between the Fremont and Warm Springs Stations and an additional station at Shinn Junction, just 4,000 feet north of Fremont Street, would likely have substantial impact on BART operations.

5.7.4. Capitol Corridor

The South Bay Connect Project adds a new rail station along the UP Coast Subdivision at the Ardenwood Park-and-Ride, and in a separate future long-term project, CCJPA is planning an intermodal bus transfer facility within the median of SR 84, just above the rail line, to provide more convenient bus-to-rail transfers. The potential for transfers to future Dumbarton trains at this location would increase network connectivity, should SamTrans advance Dumbarton service to this location.

In the long-term, CCJPA plans to increase service to San Jose and hub options along the UP Coast Subdivision – Ardenwood, Newark Junction, and South of Newark – would benefit from any additional Capitol Corridor trains. However, any additional stops along the route would conflict with a major goal of the CCJPA Vision Plan to reduce travel times between Oakland and San Jose. Other hub options near where CCJPA will not operate in the long term – Union City BART, Shinn Junction, Fremont-Centerville, and Warm Springs BART – would not provide a connection to Capitol Corridor trains.

It should be noted that a Capitol Corridor–ACE connection is not critical; ACE and Capitol Corridor trains both serve the same corridor south of Newark Junction to San Jose. CCJPA is considering direct service to the Peninsula via a new Transbay crossing, possibly eliminating the need for a connection to another rail service at an East Bay Hub in the long-term. However, bus connections would still be valuable at an East Bay Hub served by Capitol Corridor. In addition, SJRRC has long-term plans to increase ACE service to San Jose (in conjunction with improvements along the UP Coast Subdivision), making connections via Capitol Corridor for destinations to the south less critical in the long-term.

6.0 Conclusions

A summary of the analysis presented in Chapter 5 to assess the seven hubs under consideration is summarized in Table 6-1. How to provide additional ACE service to the Bay Area by exploring concepts for an East Bay Hub that would provide a "rail-to-rail" connection in the mid-term became fundamental to the Phase 1 SoCo Rail Study. Initially the Shinn Junction hub concept was explored ahead of other East Bay Hub concepts due to its location at the intersection of the ACE and BART alignments. However, initial analysis of the Shinn Junction hub concept identified considerable cost and operational impacts to the BART system. Based on this determination, it was decided that additional hub concepts should be identified and evaluated alongside the Shinn Junction hub concept.

While each of the seven hubs studied has distinct strengths and weaknesses and presents unique opportunities and constraints, a broad evaluation of the hub concepts across regional and local connectivity, land use compatibility, equity, travel times, and other factors generally shows the three BART hub concepts performing better overall in the mid-term horizon.

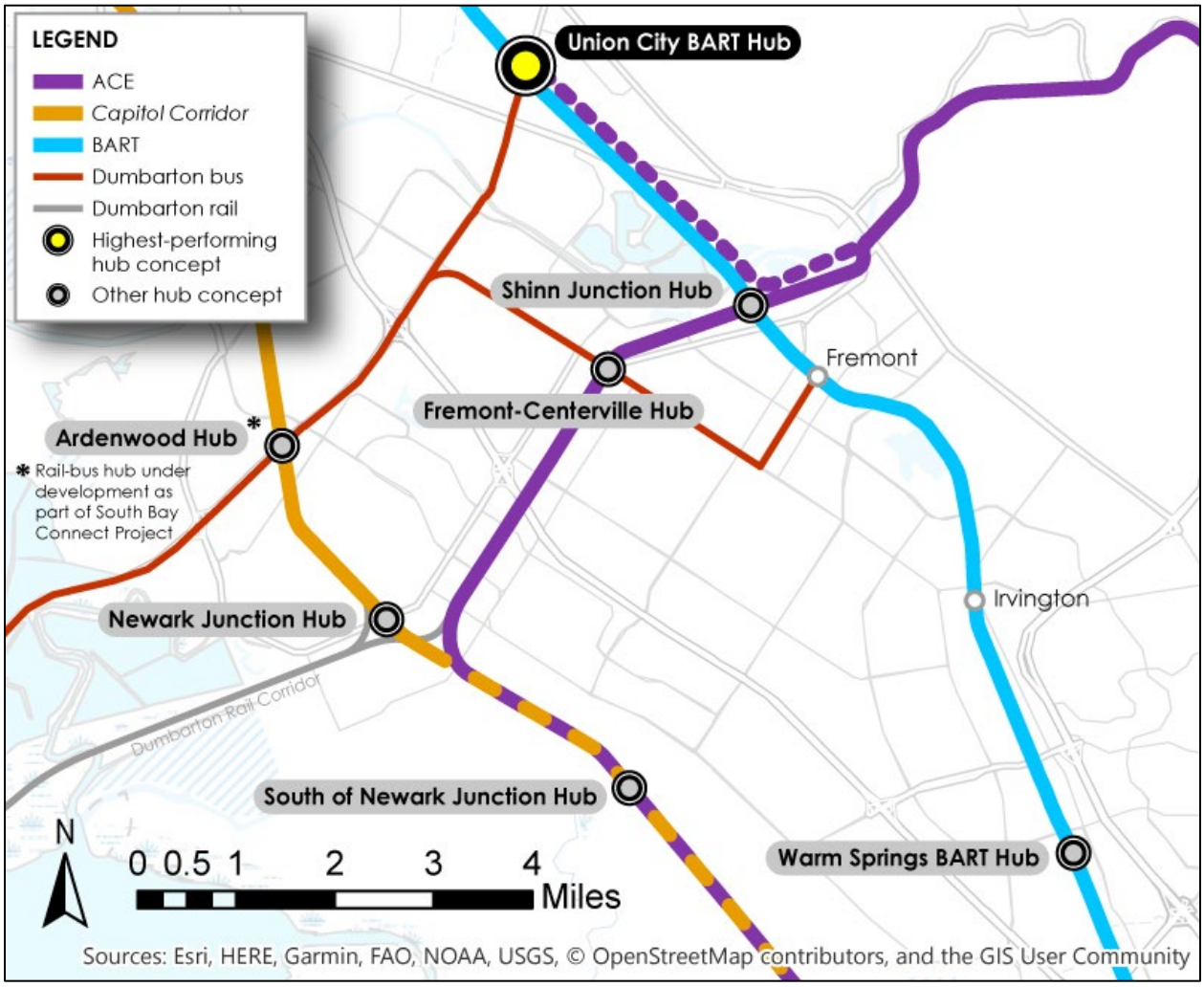
The comparison analysis of the three BART Station hub concepts studied for the Mid-Term Horizon, including Shinn Junction, reveals that Union City performs the highest given its location at an existing BART Station (unlike Shinn Junction), its convenient access to northern destinations (unlike Warm Springs), and potential to connect with future Dumbarton rail service (unlike Warm Springs). Therefore, the Union City BART East Bay Hub concept is determined to be the highest performing East Bay Hub location overall for the Mid-Term Horizon and is recommended for detailed planning and initial project development as part of Phase 2 of the SoCo Rail Study. For the Long-Term Horizon, more studies would be needed to determine the performance of a Shinn Junction connection.

While there is no connection to Capitol Corridor at the Union City BART hub, CCJPA is currently pursuing a robust "rail-bus" hub at the planned Ardenwood Station as part of the South Bay Connect project that will complement the East Bay Hub at Union City BART. Given that Capitol Corridor service already connects to BART at two locations and provides direct service to San Jose with more robust service levels that ACE, improving access to the Peninsula is the priority related to connectivity for the mid-term.

Table 6-1. East Bay Hub Concepts Assessment Matrix

	ACE–BART Hubs			ACE–Capitol Corridor Hubs			ACE-only Hub
	Union City BART	Shinn	Warm Springs BART	Ardenwood	Newark Junction	South of Newark Junction	Fremont Centerville
Connecting Regional Services							
Operators Serving Hub	High	Medium	Medium	High	Medium	Medium	Low
Connectivity to Key Travel Markets and Destinations							
Regional Connectivity	High	High	High	Medium	Medium	Medium	Low
Local Connectivity and Land Use	High	Low to Medium	High	Medium to High	Low	Medium	Medium to High
Equity Considerations							
Benefits to Surrounding Disadvantaged Populations	Medium	Low	Medium	Medium	Low	Low to Medium	Low
Service Reliability							
Travel time to key destinations	Medium to Fast	Medium to Fast	Medium	Medium	Slow to Medium	Slow	Medium
Level of Difficulty Accommodating Service Levels and Hub Facilities	Low	Low to Medium	Low	Medium	Medium	Low to Medium	Medium
Potential Capital Improvement Cost							
Potential Cost	Medium	High	Medium	Medium	Medium	Medium	Low
Consistency with Operator Plans for Mid-term Horizon							
Consistency with Mid-Term Operator Plans	High	Medium	High	High	Low	Low	Low

Figure 6-1. Highest Performing East Bay Hub Concepts and Associated Connections



Source: Esri, HERE, Garmin, FAO, NOAA, USGS, OpenStreetMap, GIS User Community (AECOM Annotations)

7.0 Recommendations and Next Steps

Recommendations based on the initial planning, service planning, and hub assessment conducted during Phase 1 of the SoCo Rail Study are discussed below. The recommendations consist of progressing the Union City BART East Bay Hub concept into project development. Next steps for Phase 2 (detailed planning and initial project development) are discussed in this section as well.

7.1. Phase 1 Recommendations

The Phase 1 recommendations based on the SoCo Rail Study analysis are outlined below.

PHASE 1 RECOMMENDATIONS

1. Based on analysis conduced during Phase 1 of the SoCo Rail Study, the Union City BART East Bay Hub is recommended as the only "rail-to-rail" hub concept for the Mid-Term Horizon (approximately 10 years) in order to allow for additional ACE service into the Bay Area, to provide an ACE-BART connection, and to ensure the highest level of connectivity to key travel markets throughout the Bay Area.

2. To begin project implementation of the Union City BART East Bay Hub, immediately pursue detailed planning and initial project development as part of Phase 2 of the SoCo Rail Study.

3. The other East Bay Hub concepts studied during Phase 1 of the SoCo Rail Study for the Mid-Term Horizon – which include the Ardenwood*, Fremont-Centerville, Newark Junction, South of Newark, Shinn Junction and Warm Springs BART concepts – are not recommended for further study as part of Phase 2 of the SoCo Rail Study.

**While the Ardenwood East Bay Hub concept is not recommended for further study under the purview of the SoCo Rail Study as the "rail-to-rail" hub, it is noted that a "rail-bus" hub is currently being pursued by CCJPA as part of the South Bay Connect Project. Along with a new Capitol Corridor station at Ardenwood, high-quality transfer facilities are being studied that would speed travel times between Ardenwood and the Peninsula, thereby enhancing the connection this future rail-bus connection and helping implement and meet goals contained in the 2018 State Rail Plan.*

7.2. Phase 2 Next Steps

The next steps for Phase 2 of the SoCo Rail Study are outlined below and focus on preparing the Mid-Term East Bay Hub concept for environmental documentation and preliminary engineering, as well as conceptualizing the Long-Term Vision for the East Bay Hub(s). Expanding the stakeholder outreach and conducting community engagement will be a key part of Phase 2.

PHASE 2 NEXT STEPS

1. Develop the Union City East Bay Hub concept for the Mid-Term Horizon to a sufficient level to begin environmental documentation and preliminary engineering, including:
   - ❑ Development of a conceptual operations plan (service characteristics, number and length of trains, capacity, etc.)
   - ❑ Model the estimated ridership for the increase in ACE trains to the Union City East Bay Hub concept
   - ❑ Conduct an Equity analysis
   - ❑ Identification and conceptual design of infrastructure improvements (hub / station, track, layover facility, etc.)
   - ❑ Develop rough order of magnitude capital and operating cost estimates
   - ❑ Establish a conceptual level funding and financing plan
   - ❑ Create an implementation plan outlining steps for project development and opening service
2. Continue coordination with stakeholders and conduct community outreach for the SoCo Rail Study throughout Phase 2.
3. Prepare documentation required for and in support of inclusion into regional transportation plans.
4. Develop a high-level understanding of potential East Bay Hub(s) for the Long-Term Horizon, that includes Dumbarton Rail Service, Link21, and improvements along UP Coast Subdivision between Newark and San Jose including additional capacity through the Alviso Wetlands.

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Appendix A: Existing Conditions Report

Appendix B: Relevant Projects and Plans

Appendix C: Summary Matrix