



Existing Conditions Report

Southern Alameda County Integrated Rail Analysis

November 4, 2021

In partnership with:



Contents

1.0	Introduction	1
1.1.	Study Overview	1
1.2.	Purpose of This Report.....	1
2.0	Project Study Area and Context.....	1
3.0	Community and Land Use Characteristics	4
3.1.	Demographic Characteristics	4
3.2.	Housing Supply and Costs	6
3.3.	Population Growth and Income Disparity	6
3.4.	Vehicle Ownership	7
3.5.	Land Use and Development.....	7
4.0	Transportation Network Overview	10
4.1.	Highways.....	10
	Highway Network.....	10
	Highway Travel Time.....	10
4.2.	Freight Movement	12
4.3.	Passenger Rail	13
4.4.	Bus Transit.....	14
4.5.	Grade Crossings.....	14
4.6.	Station Area Local Roadway Access.....	15
5.0	Existing Travel Patterns.....	15
5.1.	Overview	16
5.2.	Megaregional Travel Patterns.....	16
5.3.	Rail System Ridership.....	18
5.4.	Transit Ridership Patterns.....	19
5.5.	Opportunities for Mode Shift.....	21
5.6.	Socioeconomic Considerations in Regional Commute Patterns.....	24
6.0	Conclusions	25

1.0 Introduction

1.1. Study Overview

Passenger rail is an essential element of the Bay Area’s and California’s surface transportation system. As highway congestion within the San Francisco Bay Area and surrounding regions has grown, so has rail’s role – especially Altamont Corridor Express (ACE), Bay Area Rapid Transit (BART), Capitol Corridor, and CalTrain – as an alternative to driving. Increased rail service also fosters transit-oriented development (TOD) in areas served by passenger rail stations, which stimulates the local economy while promoting walkable communities and energy-efficient lifestyles.

Understanding that passenger rail is an integral part of the Bay Area’s overall transportation network, the Metropolitan Transportation Commission (MTC) has partnered with the California State Transportation Agency (CalSTA), Caltrans, Alameda County Transportation Commission (CTC), Capitol Corridor Joint Powers Authority (CCJPA), and San Joaquin Regional Rail Commission (SJRR) to conduct the Southern Alameda County Integrated Rail Analysis (SoCo Rail) Study. This study evaluates passenger rail needs in southern Alameda County and opportunities for more seamless rail service connectivity with a goal of identifying and developing specific local and regional passenger rail improvements.

In order to achieve this objective, 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. The planning phase includes a needs analysis, travel market assessment, and alternatives development and evaluation. The conceptual design phase prepares the study’s recommendation(s) for the next phase and includes implementation plan development and refinement of alternatives.

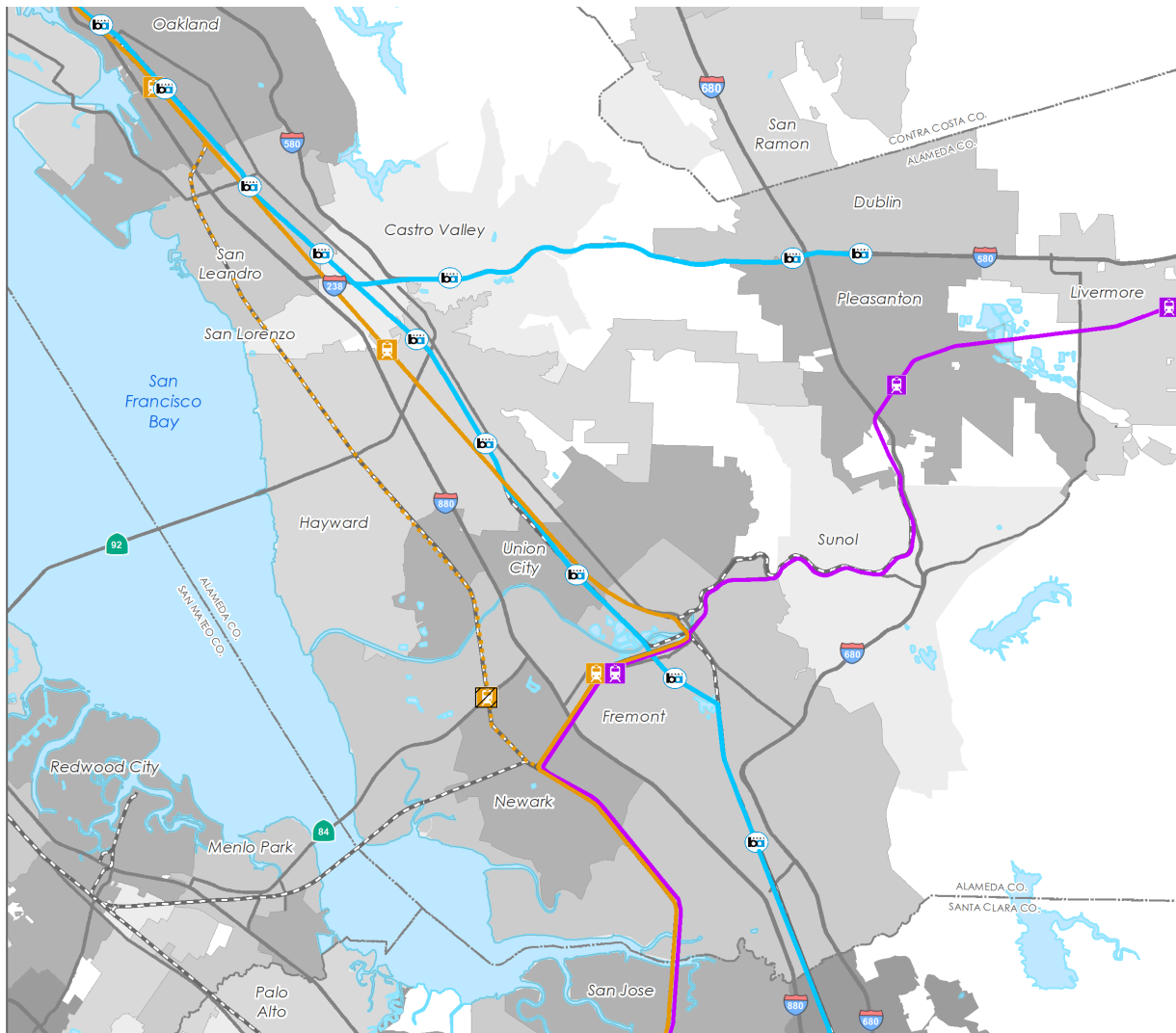
1.2. Purpose of This Report

The purpose of this report is to summarize the existing conditions of the region and proposed Study Area. This report provides background on the demographics, land use, and travel patterns that describe Southern Alameda County. This information provides a basis for developing alternatives and solutions to improve overall connectivity for the regional rail network.

2.0 Project Study Area and Context

The project Study Area, consistent with Alameda CTC’s description of the South County Planning Area, includes the cities of Union City, Fremont, and Newark, and a small portion of unincorporated Alameda County as shown in **Figure 1**.

Figure 1. SoCo Rail Study Area



- BART
- Existing Capitol Corridor
- Planned Capitol Corridor
- ACE

- Railroad
- Highway
- County Boundary
- City Boundary

SOUTHERN ALAMEDA COUNTY

SOUTHERN ALAMEDA COUNTY
INTEGRATED RAIL ANALYSIS



DATA SOURCES: Caltrans, U.S. Census Tigerline 2018,

MAP CREATED BY HDR SEPTEMBER 2021

The Study Area’s regional rail network is part of a larger, integrated rail system serving several parts of Northern California. This megaregion provides context for the rail services within and related to Southern Alameda County. A megaregion is a large network of metropolitan regions that share environmental systems and topography, infrastructure systems, economic linkages, and settlement and land use patterns. For the SoCo Rail Study, the megaregion is defined as the 21 counties within the Bay Area, Central Coast, Northern San Joaquin Valley, and Sacramento Area (see **Figure 2**).

Figure 2. 21-County Megaregion



3.0 Community and Land Use Characteristics

Based on the data and analysis presented in Appendices A and B, the following findings have been identified as relevant to the SoCo Rail Study and it is suggested that they be considered in future phases of the study:

- Most of Alameda County’s Communities of Concern¹ are located in Oakland, San Leandro, and Hayward; however, in 2018 there was a clustering in Union City and Newark. This data would guide the analysis of East Bay Hub options to consider how improvements associated with the SoCo Rail Study would benefit these communities while minimizing burdens.
- Across the study area, many households are considered “rent-burdened” which indicates they may be subject to a higher risk of displacement with the construction of an East Bay Rail Hub that would be considered an attractive transit service that may, in turn, increase property values and raise rents near the station.
- 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 have seen the sharpest decline over the period. Economic development with the implementation of rail improvements in the study area may provide opportunities for middle-income households for access to better-paying jobs.
- Driving is significantly more expensive than transit or active transportation on a per-trip basis. Improved transit in the study area would provide another mode option for many commuters.
- The majority of planned developments in the study area are in the vicinity of regional rail and rail transit stations, prioritizing accessibility to transit and encouraging active transportation. Leveraging this trend, East Bay Hub considerations would include local and regional planned developments.

3.1. Demographic Characteristics

The demographic characteristics of the Study Area include 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 Communities of Concern (CoCs), or Equity Priority Communities (EPCs) as they are named now. According to the MTC, CoCs and EPCs represent a diverse cross-section of populations and communities that could be considered disadvantaged or vulnerable

¹ Note that at the initial time of the preparation of this report, MTC used the term “Communities of Concern” to identify census tracts that have a significant concentration of underserved populations. In 2021, MTC introduced the term “Equity Priority Communities” and redefined the thresholds across eight demographic and social indicators to create a framework to guide MTC decisions on investments that meaningfully reverse the disparities in access to transportation, housing, and other community services.

today, as well as susceptible to impacts of future growth. In 2018, MTC defined CoCs as census tracts that exhibit the following factors²:

- | | | |
|---|--|---|
| <p>1. Low-income households³ (30 percent threshold)</p> | <p><i>And then either:</i></p> <p>2. Minority households (70 percent threshold)</p> | <p><i>Or three or more of the following:</i></p> <p>3. Limited English Proficiency (12 percent threshold)</p> <p>4. Population over 75 (10 percent threshold)</p> <p>5. Zero-vehicle households (10 percent threshold)</p> <p>6. Single-parent households (20 percent threshold)</p> <p>7. Disabled population (12 percent threshold)</p> <p>8. Rent-burdened households⁴ (15 percent threshold)</p> |
|---|--|---|

In 2021, MTC defined EPCs similarly, with adjustments to the thresholds and some of the terminology:

- | | | |
|---|--|--|
| <p>1. Low-income households (28 percent threshold)</p> | <p><i>And then either:</i></p> <p>2. People of Color (70 percent threshold)</p> | <p><i>Or three or more of the following:</i></p> <p>3. Limited English Proficiency (12 percent threshold)</p> <p>4. Seniors 75 Years and Over (8 percent threshold)</p> <p>5. Zero-vehicle households (15 percent threshold)</p> <p>6. Single-parent Families (18 percent threshold)</p> <p>7. People with a Disability (12 percent threshold)</p> <p>8. Rent-burdened Households (14 percent threshold)</p> |
|---|--|--|

Figure 3. MTC Communities of Concern (2018)

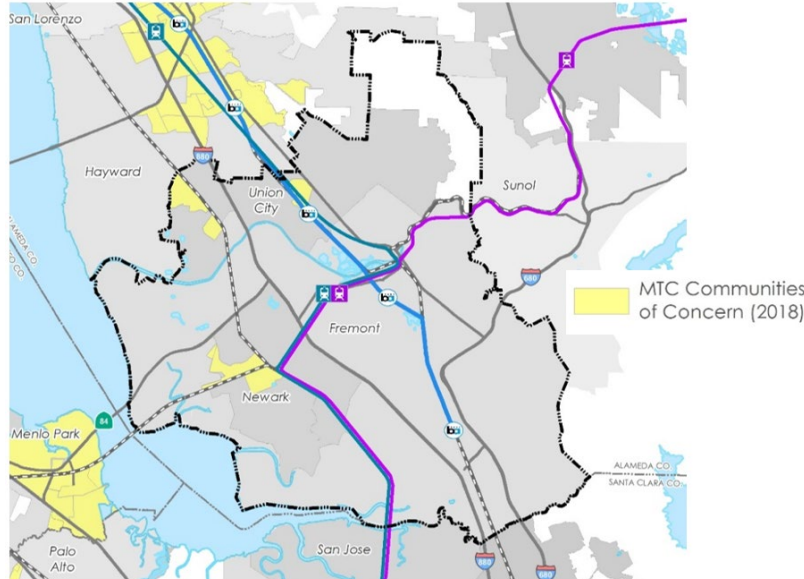


Figure 3 shows the locations of the 2018 CoCs within the Study Area. Most of the CoCs are located in Oakland and San Leandro; however, there is a clustering in Hayward, Union City, and Newark. Across the Bay, Menlo Park, East Palo Alto, and Redwood City also contain CoCs.

² http://opendata.mtc.ca.gov/datasets/1501fe1552414d569ca747e0e23628ff_0?geometry=-128.766%2C36.643%2C-107.859%2C39.666

³ MTC defines low-income as below 200% of the Federal Poverty Level to account for the high cost of living in the Bay Area.

⁴ Rent-burdened is defined as paying more than 30% of household income on rent.

3.2. *Housing Supply and Costs*

Much of the Bay Area’s housing crisis stems from its limited housing supply. In 2018, the regional vacancy rate (ratio of available housing stock to total housing stock) was reported as 5.6 percent, and within Alameda County it was 4.7 percent. Note that a 7 to 8 percent vacancy rate is considered sufficient to accommodate growth without displacing existing communities. This outcome is a consequence of limited availability, with newer developments “pricing out” renters. As a result of this demand, and population growth, already high housing costs are rising.

Renters fare very poorly when it comes to bearing the burden of housing costs. Renters are far more likely to overspend on housing than homeowners and are also more susceptible to displacement spurred by rising rents. Rent-burdened communities are present in and around the Study Area, most notably in South Hayward, San Leandro, Union City, and Newark. Transit improvements, most notably new stations with rapid transit options, are often attractive to new residents. There is the potential for property values to increase in station areas that experience transit-oriented development, which, in turn, increases rents. This may risk residents who are already rent-burdened to be displaced from their communities. In the evaluation of potential East Bay Hub options, the consideration of lower-income and rent-burdened households would be important in the analysis.

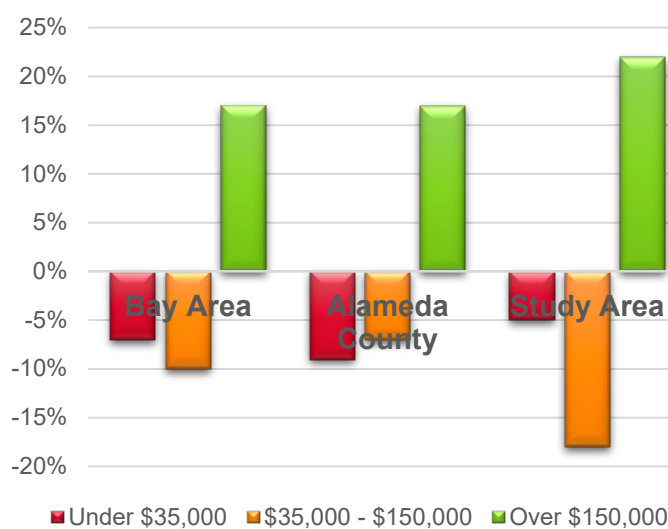
3.3. *Population Growth and Income Disparity*

In Alameda County, population increased by 10.3 percent from 2010 to 2017; however, South Fremont and West Hayward have experienced population growth over twice this rate. Small tracts in Oakland located close to BART stations also spiked in population, signaling the importance of BART as a regional connector and catalyst for housing and economic development.

Population growth has not been evenly distributed among income levels.

Between 2000 and 2017, the Bay Area, Alameda County, and Study Area have all experienced an increase in households earning more than \$150,000, and decreases in households earning less than \$35,000 a year and between \$35,000 and \$150,000 a year (see **Figure 4**). In the Study Area, the income disparity is greater than in the county and region overall, which should be considered when planning for transportation improvements within these communities.

Figure 4. Change in Percentage of Households within Income Levels from 2000 to 2017



3.4. *Vehicle Ownership*

Driving is significantly more expensive than transit or active transportation on a per-trip basis, and it can be more expensive than shared mobility services once the costs of owning a car are considered.

Although driving is more expensive than other modes of transportation, use of private vehicles can be the preferred choice for many residents within the Study Area. Transit coverage and operating hours are limited in areas outside of the urban core, and active transportation alone is typically not a viable option for most commuters. In areas with limited transit service, private vehicles also are critical for connecting low-income travelers to jobs.

Portions of the Study Area, most notably near BART stations, have a high share of zero-vehicle and single-vehicle households, using the MTC threshold of 10 percent for the former and the Alameda County 32.2 percent for the latter. Similarly, transit ridership is highest in the Study Area near BART stations, particularly in Downtown Fremont. For people who live outside of the immediate vicinity of BART, transit ridership is below the County percentage of 14.6 percent.

This is an important consideration for the evaluation of East Bay Hubs locations, as increased transit service and connectivity may provide a lesser expensive travel mode for more commuters.

3.5. *Land Use and Development*

There are three city governments in the Study Area: City of Fremont, primarily zoned for low-density residential, industrial technology, commercial, and medical uses; City of Union City, primarily zoned for single-family residential, light industrial, and regional commercial uses; and City of Newark, primarily zoned for low-density residential and general industrial uses. All cities have plans for denser, mixed-use transit-oriented developments (TODs) in their jurisdictions.

Fremont has three TOD overlays along the BART line – at two existing BART stations (Fremont and Warm Springs) and at a future BART station at Irvington. A fourth TOD overlay is located at the ACE/Capitol Corridor Fremont-Centerville Station. The areas in which these plans focus development are depicted in **Figure 5**. Union City has a major TOD overlay at the Union City BART Station. **Figure 6** illustrates the vision for this station area, as per the Union Station District Specific Plan which is currently undergoing CEQA environmental review⁵.

⁵ <https://files.ceqanet.opr.ca.gov/267257-2/attachment/gx7Nly2mNh8pnmzbY0HH0NvPbzkzbPZBikrYNrWIPj3rxOt7e0ypPpQwzdAkWDFxrmEFSLpUPLcojAzi0>

Figure 5. Study Area Development Plans

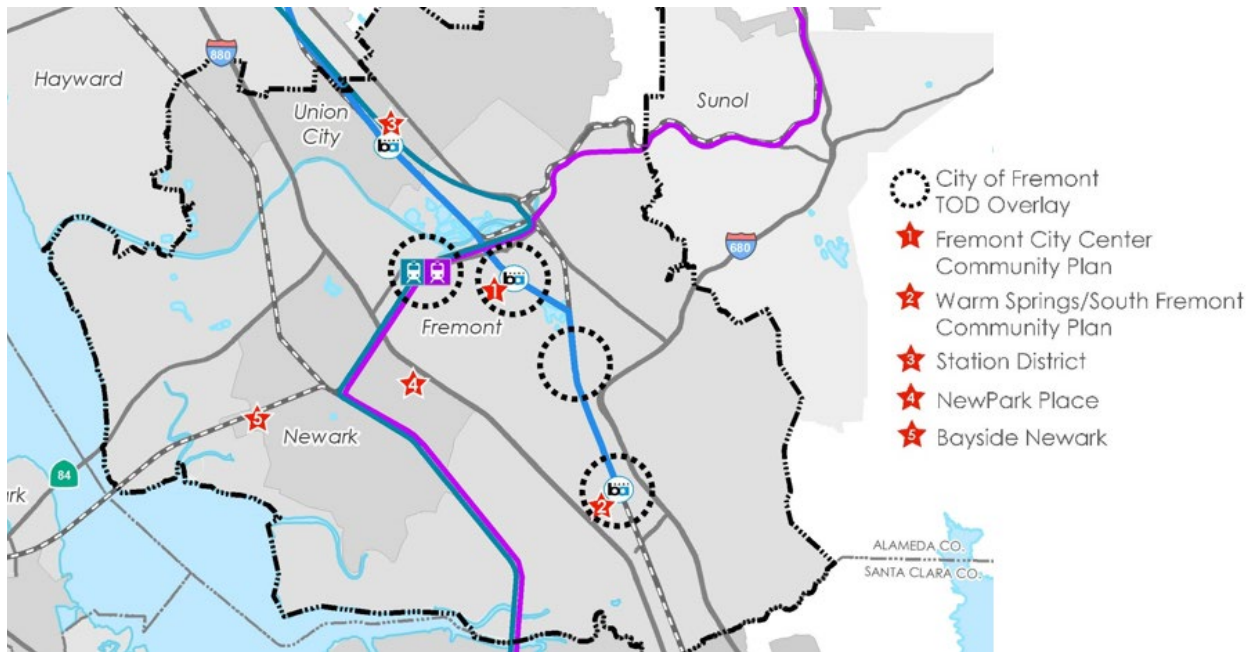
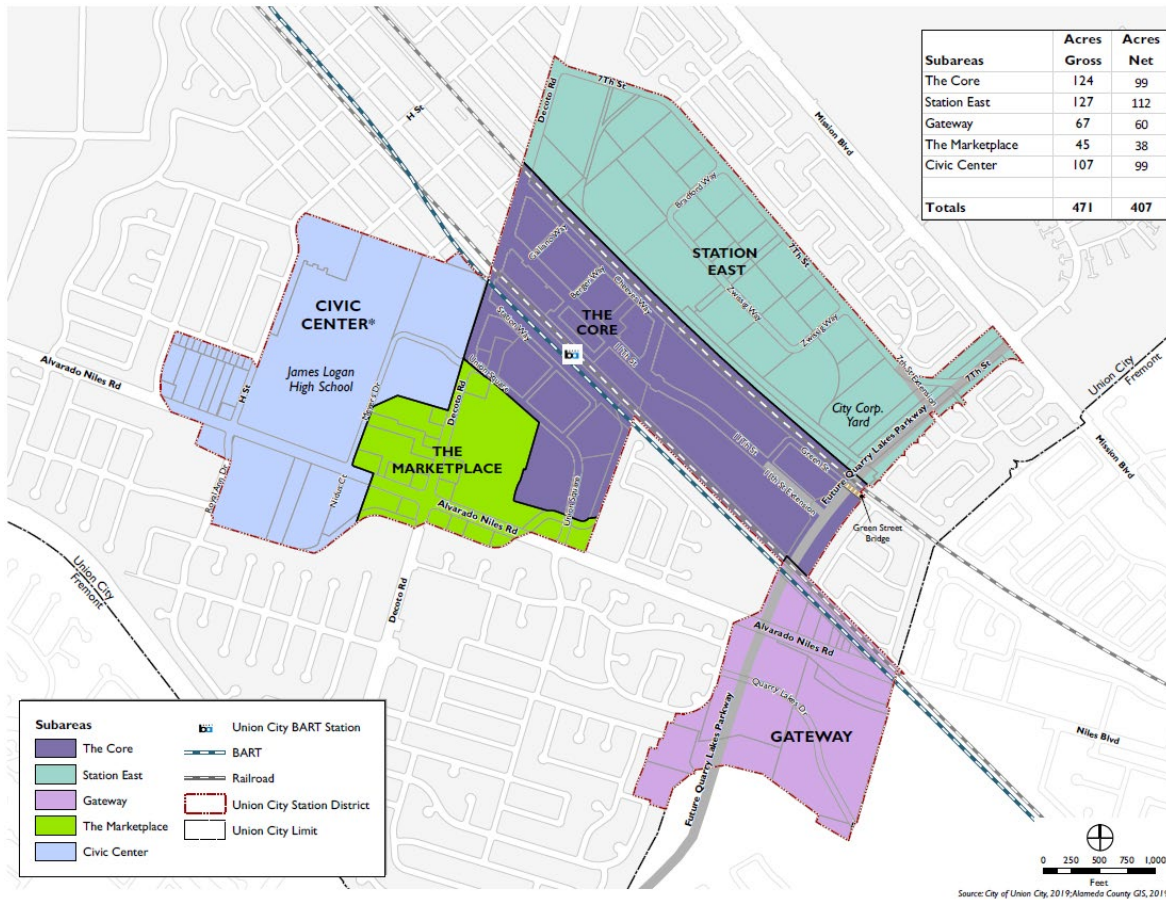
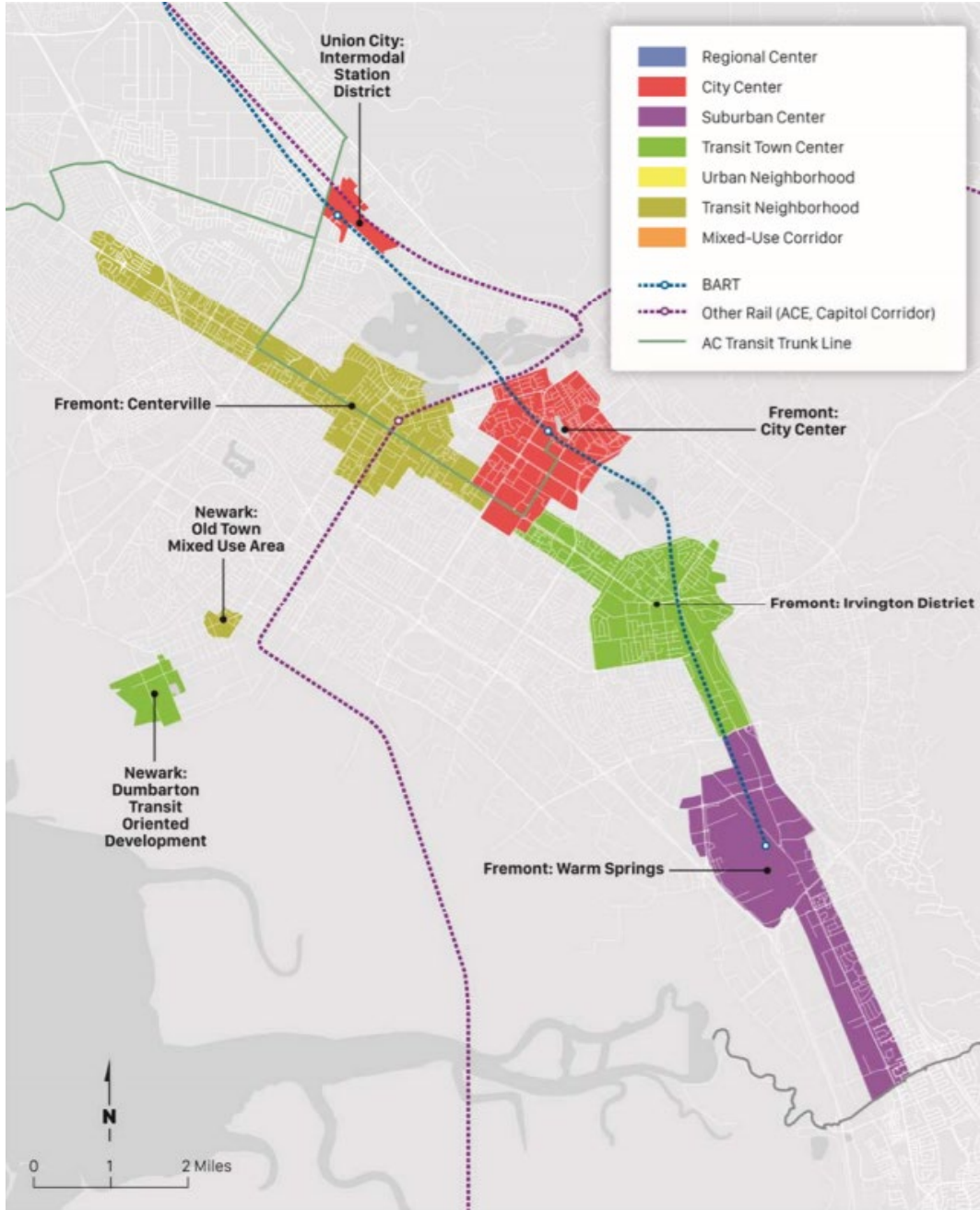


Figure 6. Union City Station District Specific Plan



Priority Development Areas (PDAs) are areas that local jurisdictions have identified as priority areas for focused housing and commercial growth. The areas are required to have good access to existing or planned high-quality transit (such as rail stations or high-capacity bus routes), and are often located within existing communities, thus supporting infill development, rather than at the edges and outskirts of communities. Through 2040, PDAs are planned to accommodate 78 percent of new housing production in the Bay Area, along with 62 percent of employment growth. There are seven PDAs within the Study Area, as shown in **Figure 7**.

Figure 7. South Alameda County PDAs



Source: Alameda CTC, [Alameda County Priority Development Area Investment and Growth Strategy](#)

4.0 Transportation Network Overview

Based on a review of the existing transportation network, the following key findings have been identified:

- 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, providing a solid foundation for rail in the Study Area.
- AC Transit, the primary bus transit service operator in the Study Area, has bus connections at every BART station and provides service along major arterials as well as Transbay services across the bridges in the Study Area.
- 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.

4.1. Highways

Highway Network

Several major freeways and state highways present an interconnected roadway network within the southern portion of Alameda County. **Figure 8** shows the existing roadway network, and future planned, programmed, and funded roadway network facilities and operational strategies, some of which are already under construction. The figure shows that there is significant recent investment in high-occupancy vehicle (HOV), express lanes, and other strategies that focus on congestion management and mode shift away from driving alone.

Highway Travel Time

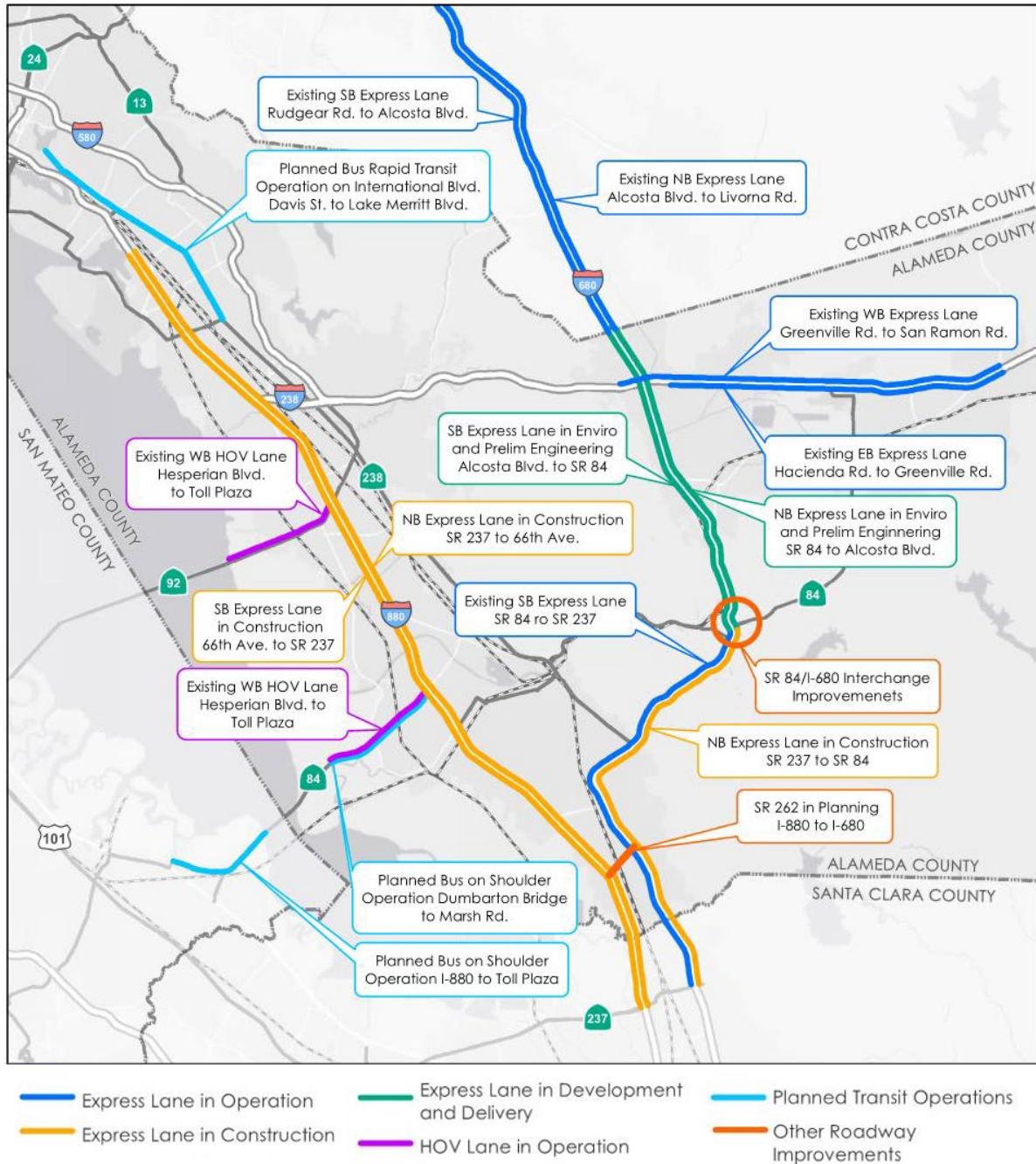
INRIX mobile device travel time data⁶ for 12 regional state routes (primarily freeways) in Alameda, Contra Costa, Solano, Santa Clara, San Mateo and San Francisco Counties, and nine major arterials in Southern Alameda County, identify several corridors experiencing high levels of unreliability in travel times⁷:

- Both directions of I-580 in Oakland and in the Dublin and Livermore areas
- Both directions of I-880, particularly between southern Oakland and Fremont, as well as in central San Jose
- Both directions of I-238 and SR 238, along the entire length of the route
- Both directions of US 101 between San Jose and San Francisco

⁶ INRIX travel time speed data is generated based on anonymously tracking mobile devices such as smartphones and in-vehicle navigation systems. The data is anonymized and aggregated at the roadway segment level, with average travel speed as a typical output.

⁷ High levels of unreliability in travel times are defined as when the buffer time index on a segment exceeds 30 percent

Figure 8. Major Current and Planned Roadway Projects in Study Area



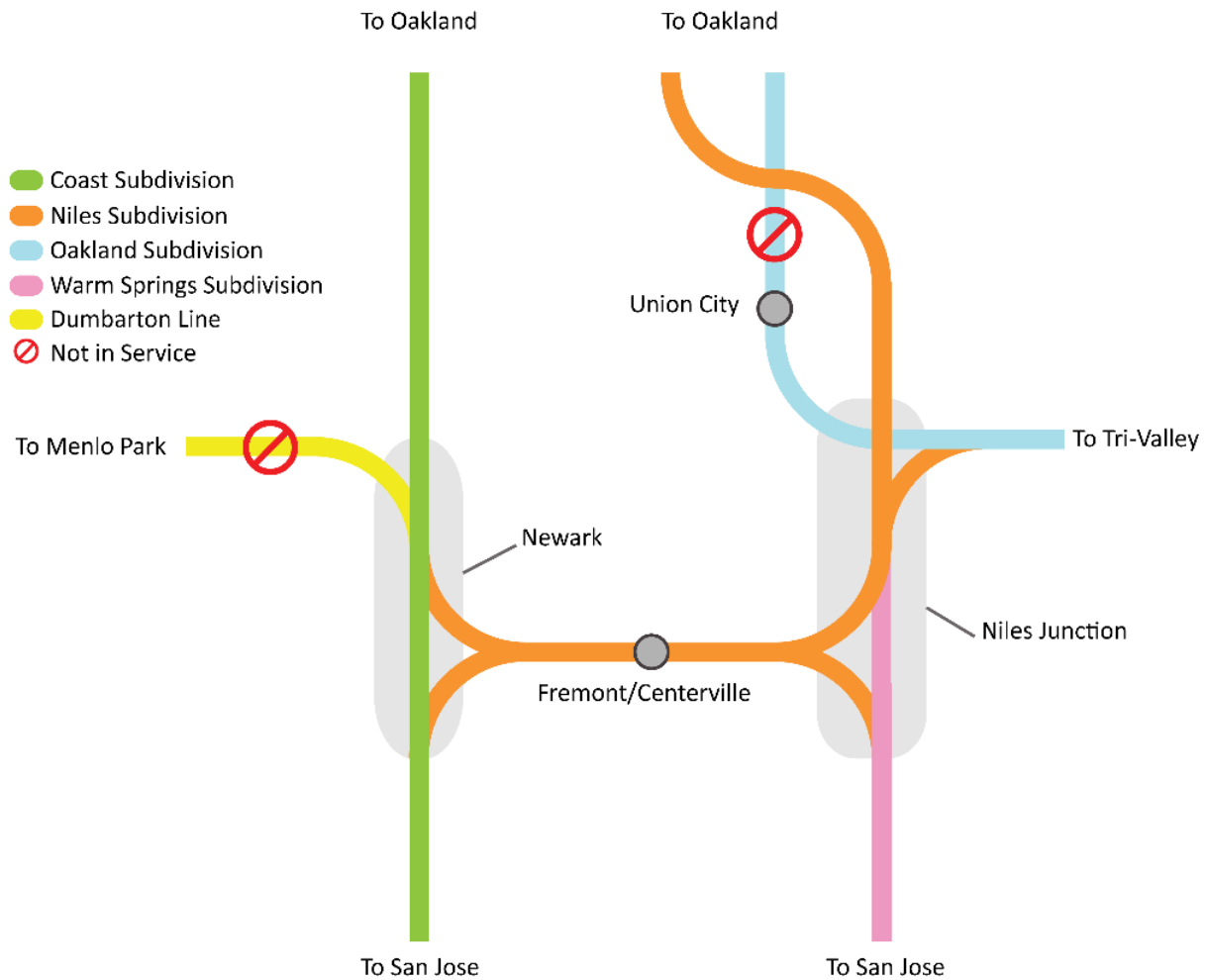
Some of these corridors experience buffer time indices over 75 percent, indicating particularly severe unreliability in travel time. Segments along the noted corridors also frequently experience unreliable travel times during the midday period, indicating that congestion is not confined to the traditional commute am/pm peak periods. The roadway corridors noted above are generally paralleled by high frequency rail transit (BART, Caltrain) as well as intercity rail (Capitol Corridor, ACE), indicating that other travel options are available.

4.2. Freight Movement

One freight railroad operates in the Study Area, the Union Pacific Railroad (UP) which is categorized as a Class I railroad based on operating revenue. The Port of Oakland is a major generator of freight rail traffic in the Bay Area – in fact, it is the eighth busiest container port in the U.S. – and port-related rail traffic traverses southern Alameda County on its way to and from the Midwest, the Gulf Coast, and Southern California.

UP is the owner of all the rail trackage in the Study Area, with the exception of the out-of-service Dumbarton line west of Newark. The rail lines are comprised of subdivisions, which are designated sections of the main track. **Figure 9** represents a schematic of the relationship among the UP subdivisions.

Figure 9. UP Rail Subdivisions in the Study Area



4.3. *Passenger Rail*

Four passenger rail services have operations in the Study Area. The Capitol Corridor operates between Sacramento and San Jose (with less frequent service to Auburn), and the Altamont Corridor Express (ACE) operates between Stockton and San Jose by way of the Altamont Pass in eastern Alameda County. BART operates a high-frequency service that covers much of San Francisco, Alameda, and Contra Costa Counties, with service extending into Santa Clara and San Mateo counties. The limited-frequency intercity / inter-state Coast Starlight provides service between southern California and Seattle.

- **Capitol Corridor.** Operated by the Capitol Corridor Joint Powers Authority (CCJPA), the Capitol Corridor service runs along the UP's Oakland Subdivision, Niles Subdivision, and Coast Subdivision, and makes seven weekday round trips between Oakland and San Jose. Within the Study Area it makes stops at the Hayward and Fremont/Centerville stations. The Oakland/Coliseum station north of the Study Area facilitates transfers with BART, and the Hayward station is within a one-mile walk⁸ of the Hayward BART station.
- **ACE.** ACE is a commuter rail service governed by the San Joaquin Regional Rail Commission (SJRR). It runs four round trips on weekdays between Stockton through Fremont to San Jose by way of the Altamont Pass. In the Study Area, ACE runs on the UP Oakland, Niles, and Coast Subdivisions. ACE has one station in the Study Area at Fremont/Centerville, which it shares with the Capitol Corridor service.
- **BART.** BART is an electrified heavy rail system that can accommodate a large volume of passengers with frequent headways. Through the Study Area, BART's Green Line/Orange Line provides high-capacity, frequent rail service along the corridor, serving stations in Hayward, South Hayward, Union City, Fremont, and Warm Springs/South Fremont. These are intermodal stations where commuters can transfer to and from bus services. The Fremont Station is the most heavily trafficked BART station in the study corridor area, with 28.5 percent of all rides that occur in the Study Area originating and ending there. Just outside the Study Area, South Hayward is the least trafficked BART station in the area, accounting for 13.4 percent of all rides in the Study Area originating or terminating there.
- **Coast Starlight.** Amtrak operates the *Coast Starlight* service along the Coast Subdivision between Oakland and San Jose. This service consists of one daily round trip between the Jack London-Oakland station and San Jose Diridon Station; however, the train does not stop within the Study Area.

The currently non-operational Dumbarton Rail Corridor is under evaluation for new Transbay rail service utilizing the existing Dumbarton Rail Bridge for transit operations. Presently, Cross Bay Transit Partners, a joint venture between Facebook and the Plenary Group, is studying the corridor as a private venture, and it is anticipated that rail service on the corridor would operate high-frequency, bi-directional trains.

⁸ According to the FHWA, most people are willing to walk approximately ¼- to ½-mile to a transit stop. Research has shown that people may be willing to walk considerably longer distances when accessing heavy rail services.

The potential route would link the Redwood City Caltrain Station, Facebook Campus in Menlo Park, and the East Bay (specific locations to be determined).

4.4. Bus Transit

Several bus services within the Study Area provide local and regional connectivity, including AC Transit, Dumbarton Express, Union City Transit, VTA, East Bay Paratransit, and private and corporate services.

- **AC Transit.** Serving the western portions of Alameda and Contra Costa counties in the East Bay of the San Francisco Bay Area, AC Transit is the primary bus transit service operator in the Study Area, with bus connections at every BART station. AC Transit provides extensive coverage in the area and offers a variety of services, including: Transbay services across the Dumbarton Bridge, San Mateo Bridge, and San Francisco-Oakland Bay Bridge; an All-Nighter; local services; and services to schools.
- **Dumbarton Express.** The Dumbarton Express operates weekday-only bus services across the Dumbarton Bridge. The service consists of two routes, the DB and the DB1, managed by MV Transportation (formerly by AC Transit) and partnered with BART, SamTrans, Union City Transit, AC Transit, and the Santa Clara Valley Transportation Authority (VTA). The two main hubs for the service are at the Palo Alto Caltrain station and Union City BART station, serving the cities of Menlo Park, Palo Alto, Newark, and Union City.
- **Union City Transit.** Union City Transit has eight bus routes that operate within the borders of Union City, all of which connect with the Union City BART station and make local connections to Union Landing shopping center and Kaiser Permanente Hospital.
- **VTA Express.** VTA provides four express route connections to the South Bay and Silicon Valley from the Warm Springs and Fremont BART stations. Each operates on weekdays, and one also offers reduced weekend service spans but increased route coverage.
- **East Bay Paratransit.** Established by AC Transit and BART to meet requirements of the Americans with Disabilities Act, East Bay Paratransit provides on-demand service for those with special mobility needs.
- **Private and Corporate Bus Services.** There are several private bus services in the Study Area, including intercity buses (Greyhound, FlixBus), university shuttles (California State University Eastbay, Stanford Marguerite), and employer shuttles.

4.5. Grade Crossings

Frequent train crossing events at at-grade crossings may result in automobile congestion, especially if a mix of high-frequency commuter rail service and/or long freight trains are present at a crossing. Moreover, at-grade crossings may present safety hazards to communities – for drivers, bicyclists, and pedestrians that may experience accidents in these crossings.

The section of the existing rail network between Newark Junction and Shinn Junction (passing through the Centerville district of Fremont) serves both passenger rail (ACE and Capitol Corridor) as well as freight service between the Coast Subdivision, the Niles Subdivision, and the Oakland Subdivision through Niles Canyon. Most of the public roadway crossings in this Centerville section of the rail corridor are at-grade and experience heavy traffic volumes associated with commuter trips. Analysis of AM peak hour, PM peak hour, and daily LOS at the seven at-grade crossings along the Centerville Line (Sycamore Street, Cherry Street, Cedar Boulevard, Blacow Road, Dusterberry Way, Maple Street, and Fremont Boulevard) indicates that all grade crossings operate acceptably (at the roadway segment level) with respect to the LOS D standard set by the cities of Fremont and Newark. However, these grade crossings are located near intersections, and grade crossing events could impact adjacent intersection operations, especially if grade crossing events result in signal preemption. If additional service is proposed on these lines, then additional evaluation of the intersections is recommended to evaluate operation with increased service.

4.6. Station Area Local Roadway Access

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. Since station auto access is a key factor in a traveler's choice to use transit, stations proposed in auto congested areas of the Study Area may not be attractive to travelers, especially to those who need to drive to access transit at the station. With this in mind, a high-level scan of potential roadway capacity issues in and around existing and future rail station areas was completed. For this analysis, roadways near the following existing and future rail stations were considered: Union City BART, Centerville Station, Fremont BART, Ardenwood Park and Ride (at State Route [SR] 84), Newark Junction, and a station at SR 92 in Hayward. It is recommended that future station siting work involve the collection of new traffic count data and new forecasts to better account for rapidly evolving transportation conditions and land use development.

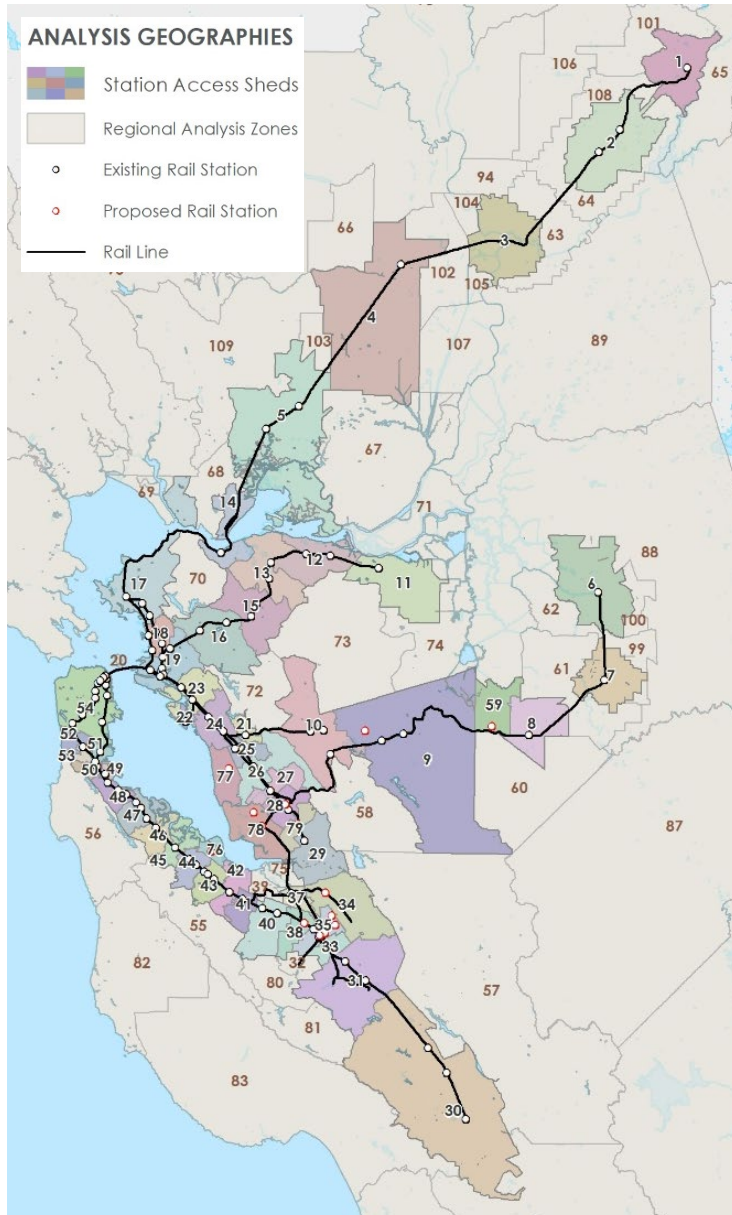
5.0 Existing Travel Patterns

Based on the data and analysis presented in Appendices C and E, the following key findings have been identified:

- Travel patterns across the Megaregion are highly skewed toward trips less than about five miles – approximately 85 percent of the 52.5 million trips that occur in the Megaregion on a typical day
- 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.
- Annual system ridership of Capitol Corridor, ACE, and Amtrak's Coast Starlight services are 1.67 million, 1.36 million, and 412,500 boardings and alightings, respectively. In the Study Area, ACE and Capitol Corridor account for 530 and 80 daily boardings, respectively.

- BART has a systemwide annual ridership of 120.6 million, although transit serves a small share of regional travel associated with the Study Area.
- Transit mode share is highest for trips to San Francisco/Daly City; transit mode share is lower for connections between the Study Area and more suburban population and employment hubs, accounting for no more than 3 percent of travel to most other locations in the Northern, Eastern, South Bay, and Peninsula markets.

Figure 10. Travel Market Analysis Zones



5.1. Overview

Analysis of origin-destination patterns presented in this section is based on the travel activity within and between regional analysis zones within the megaregion, as well as station half-mile access sheds around each existing and planned rail station, intended to allow for the likelihood of increased transit use to and from destinations and origins most proximate to transit. The regional analysis zones and station access sheds are shown in **Figure 10** and are collectively referred to as “zones” in the discussion that follows.

5.2. Megaregional Travel Patterns

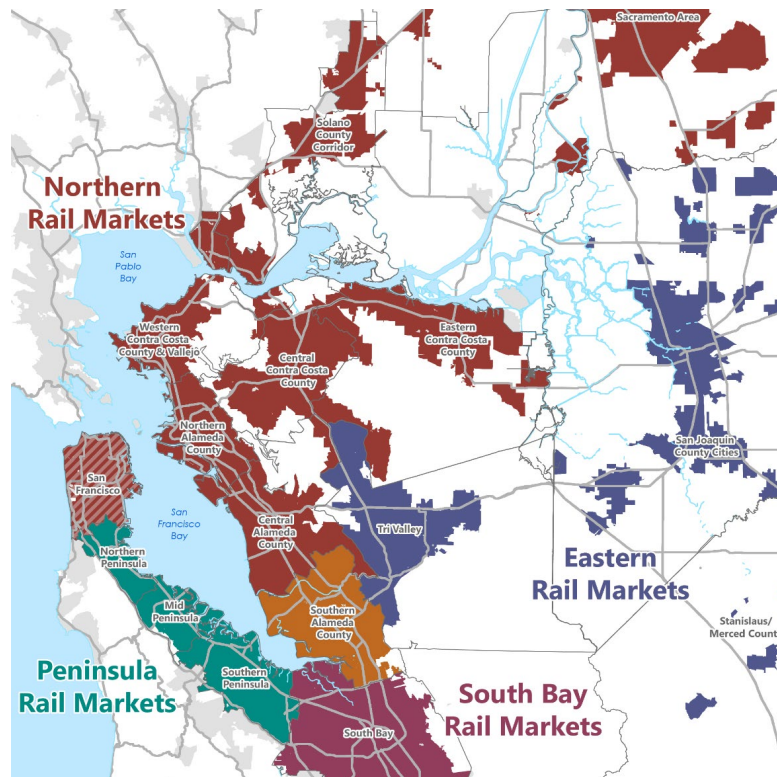
Travel patterns across the Megaregion are highly skewed toward short trips, which are defined as trips with an origin and destination within the same zone. Of the estimated 52.5 million trips that occurred in the Megaregion on a typical day, and estimated 44.9 million trips (85 percent) were short trips occurring within a single zone, while 7.6 million (15 percent)

occurred between multiple zones⁹. Of these multi-zone trips, approximately 770,000 trips (10 percent) traveled to or from the Study Area, while 310,000 trips (four percent) likely passed through the Study Area based on typical suggested routings in Google Maps. Approximately 900,000 trips (54 percent) of the 1.67 million trips with an origin or destination in the Study Area were internal to the same zone.

To facilitate the analysis of origin-destination flows within and through the Study Area, the Megaregion is divided into Northern, Eastern, South and Peninsula Rail Markets, as depicted in **Figure 11**. The Northern Markets encompass areas north of the Study Area with access to BART or Capitol Corridor service and include northern and central Alameda County, much of Contra Costa County, Solano County, and the Sacramento area. The “Eastern Markets” encompass areas with access to ACE and BART service, and include the Tri-Valley (Pleasanton, Livermore, Dublin, San Ramon, and Danville) and San Joaquin Valley. Job centers in the western and southern areas of the region are grouped by San Francisco/Daly City (“San Francisco Rail Market”), Northern, Mid-Peninsula, and Southern Peninsula (“Peninsula Rail Markets”), and South Bay (“South Bay Rail Market”). Approximately 778,000 trips (10 percent of total regional travel) flow between the comparatively housing-focused Northern and Eastern Markets and jobs-focused San Francisco, Peninsula, and South Bay markets each day.

Trips to or from the northern and southern edges of the Megaregion (Marin, Sonoma, and Napa Counties, as well as southern Santa Clara County, Santa Cruz, Monterey, and San Benito Counties) account for a very small proportion of trips; there are approximately 16,000 trips (2 percent) to or from the Study Area and 15,000 trips (5 percent) passing through the Study Area to or from these areas on the periphery of the region.

Figure 11. Study Area Rail Markets



⁹ StreetLight does not account for nearly all of the 250,000 BART trips via the Transbay Tube, so these totals are not included in this discussion.

5.3. Rail System Ridership

ACE’s annual systemwide ridership is approximately 1,360,000¹⁰ boardings and alightings (FY 2017/2018), and trains operate with an hourly frequency. Capitol Corridor has an annual system ridership of 1,670,400¹¹ boardings and alightings (FY 2018), produces over 112 million passenger miles, and operates with an hourly frequency. **Table 1** represents various operational information for both ACE and Capitol Corridor at the Fremont-Centerville Station, along the UP Niles Subdivision / Centerville Line in the Study Area.

Table 1. ACE and Capitol Corridor Service Profiles at Fremont-Centerville Station

Rail Service	Weekday Hours		Ridership (Annual)	Parking	Transit Connections	Trains per Day	Daily Boardings
	WB	EB					
ACE	5:55 AM – 8:40 AM	4:05 PM – 7:08 PM	197,000	170	AC Transit (99, 210, 801, U), Marguerite AE-F	8	530
Capitol Corridor	6:55 AM – 8:20 PM	7:10 AM – 7:45 PM	44,559	170	AC Transit (99, 210, 801, U), Marguerite AE-F	14	80

Amtrak’s Coast Starlight service has annual system wide ridership of 412,500¹² (FY 2018) boardings and alightings – a 6 percent decrease from the previous year – with an average trip of nearly 470 miles.

BART has a system wide annual ridership of 120,554,337¹³ (FY 2018, exits only). **Table 2** shows BART’s station profiles for the Study Area.

Table 2. BART Station Profiles for the Study Area

Weekday Hours		Annual Ridership (000s)	Parking	Transit Connections	Trains Per Week Day
NB	SB				
Hayward					
5:05 AM – 12:17 AM	6:09 AM – 1:15 AM	2,064.5	1,473	AC Transit (M, 10, 28, 34, 41, 56, 60, 83, 86, 93, 94, 99, 801), Greyhound, CSU Eastbay Shuttle	244
South Hayward					
5:01 AM – 12:13 AM	6:14 AM – 1:19 AM	1,333.7	1,207	AC Transit (41, 83, 86, 99, 801)	244
Union City					
5:08 AM – 12:08 AM	6:18 AM – 1:24 AM	2,073.6	1,197	AC Transit (97, 99, 200, 216, 232, 275 Flex, 801), Dumbarton Express (DB, DB1), Union City Transit (1, 2, 3, 4, 5, 7, 8, 9), Marguerite EB	244
Fremont					
5:03 AM – 12:03 AM	6:23 AM – 1:29 AM	2,843.7	2,030	AC Transit (U, 99, 200, 212, 215, 216, 217, 232, 239, 251, 707, 710, 801), VTA (120, 140), Marguerite (AE-F, EB)	244
Warm Springs					
4:57 AM – 11:57 AM	n/a	1,632.2	2,082	AC Transit (215, 217, 239), VTA (180, 181)	244

¹⁰ [SJRC 2018/2019 Work Program and Budget](#)

¹¹ [CCJPA Business Plan FY 2018-19 – FY2019-20](#)

¹² [Amtrak Fact Sheet: Coast Starlight Service](#)

¹³ [BART Ridership Reports](#)

5.4. Transit Ridership Patterns

Transit serves a small share of regional travel associated with the Study Area. **Table 3** shows regional transit ridership patterns across the Bay Area and **Figure 12** and **Figure 13** illustrate ridership for trips to, from, and through the Study Area (both exclude local-serving transit). Approximately 93 percent of transit ridership in the Study Area, Northern, and Eastern markets has an origin and/or destination in San Francisco (246,600) or Northern Alameda County (78,400), while all other origin-destination pairs (Eastern, Peninsula and South Bay) account for 7 percent. Overall, transit accounts for less than 5 percent (33,200 of 767,600 weekday trips) of total travel to or from the Study Area; however, transit mode share varies widely depending on origin-destination pair.

Transit mode share is low for connections between the Study Area and more suburban population and employment hubs outside of San Francisco. Transit accounts for no more than 3 percent of travel to most other locations in the Northern, Eastern, South Bay, and Peninsula markets. This disparity reflects the relative ease of driving and parking for these trips, the lack of cost- and time-competitiveness of transit, as well as more dispersed land use patterns that are difficult to serve via transit. While transit serves a relatively low mode share, its absolute numbers are above 1,000 weekday trips across the Dumbarton Bridge (1,700 weekday trips), to the South Bay (2,500 weekday trips), to Central Alameda County (2,700 weekday trips), and within the Study Area (1,700 weekday trips).

Transit similarly accounts for less than 2 percent of all trips passing through the Study Area. A majority of these trips occurs via ACE, which serves about 4,300 pass-through trips per day. Capitol Corridor also serves 1,600 trips per day. There is insufficient data available to measure pass-through transfer activity between BART and VTA or Dumbarton Express, but it is likely that these account for about 1,000 to 2,000 trips per day based on boarding activity at the Fremont BART station.

Table 3. Origin-Destination Patterns for Transit Trips

Origin Market	Destination Market						Total Transit Ridership
	San Francisco	North / Mid-Peninsula	Southern Peninsula	South Bay	Northern	Eastern	
Southern Alameda County	17,400	200	1,700	2,500	10,300	1,100	33,200
Northern Rail Markets	212,200	9,400	N/A	1,600	62,700	5,400	291,300
Eastern Rail Markets	16,800	500	N/A	4,300	5,400	200	27,200
Total	246,400	10,100	1,700	8,400	78,400	6,700	351,700

Figure 12. Weekday Transit Ridership to/from Study Area

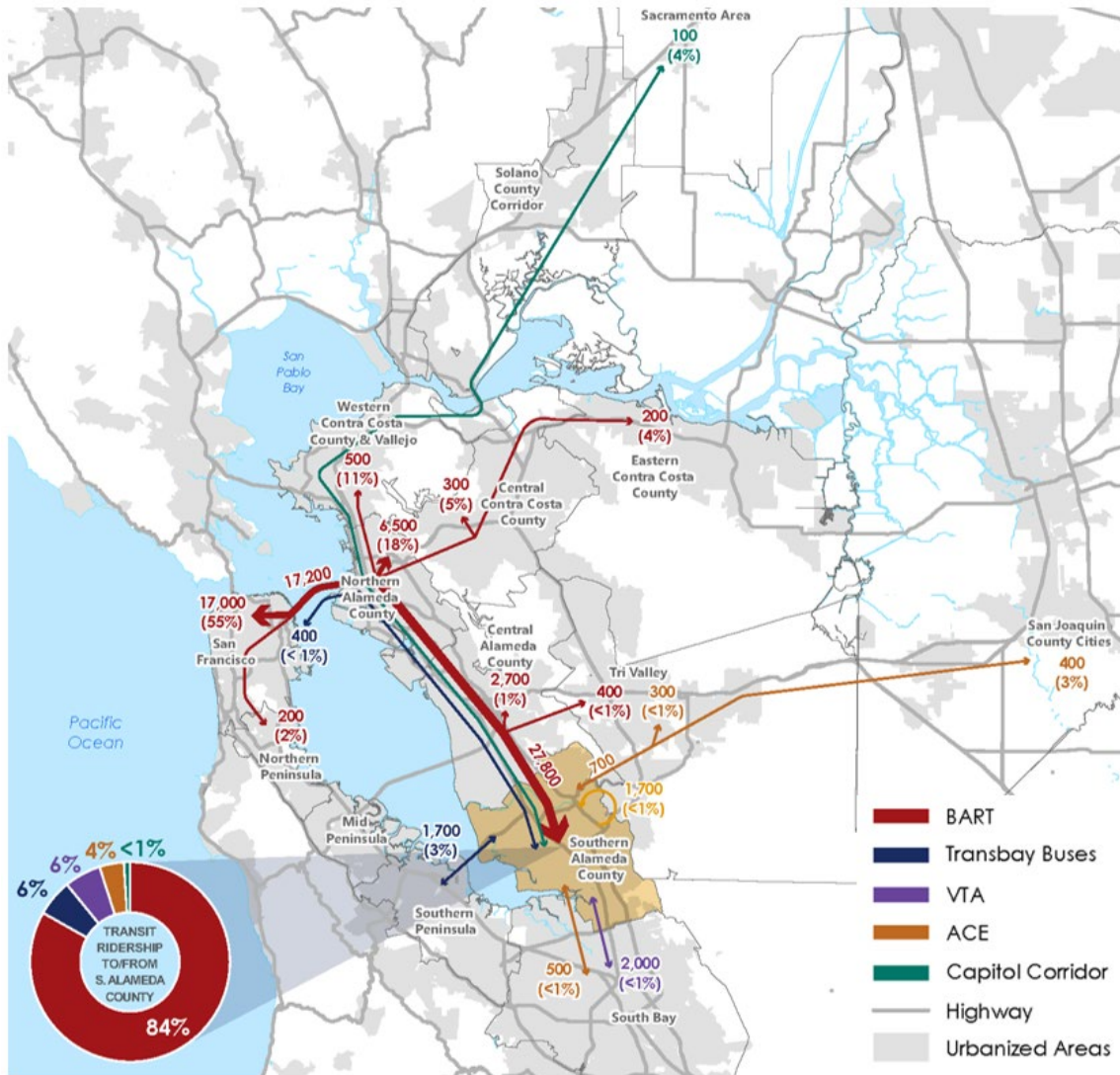
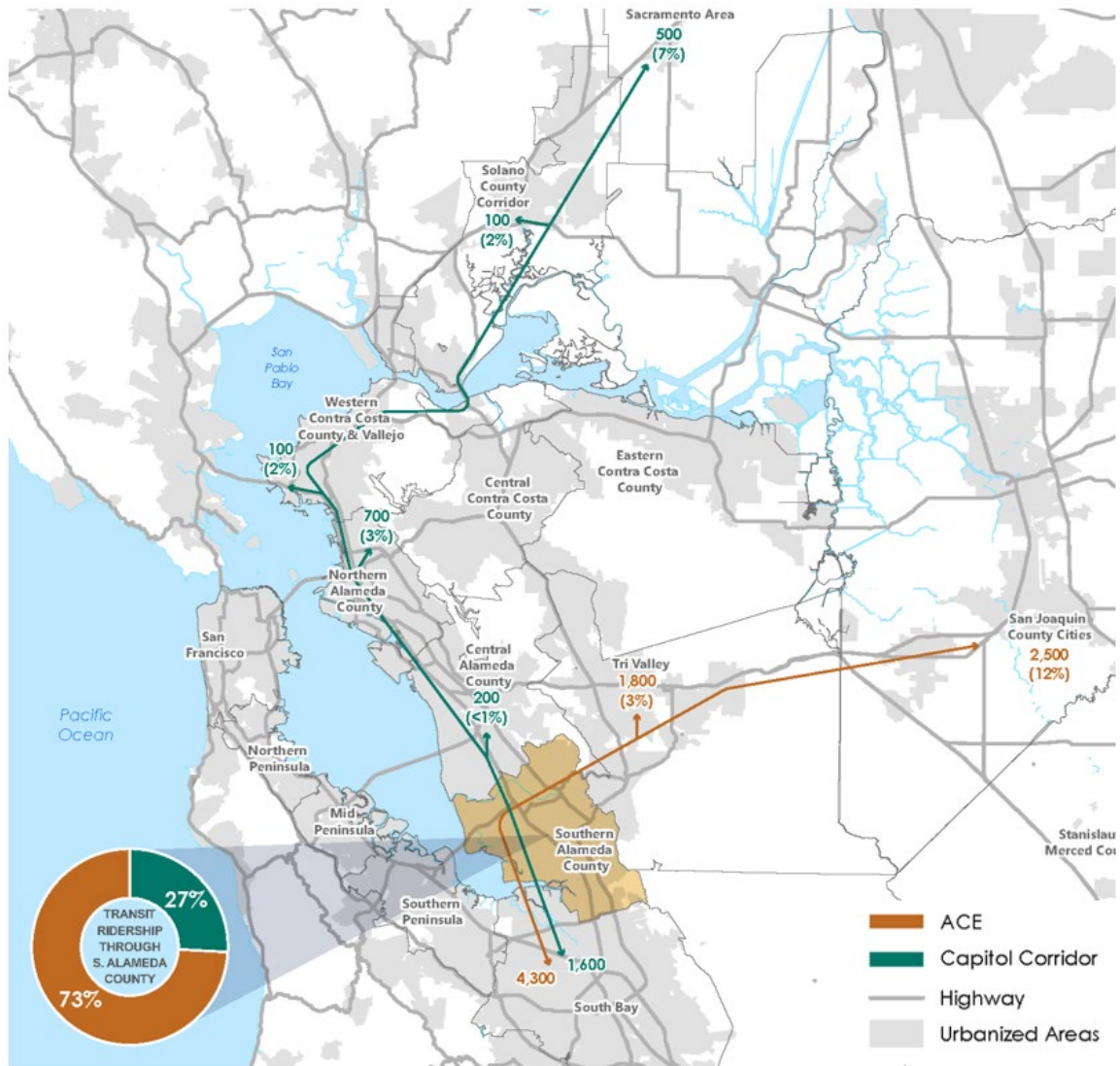


Figure 13. Weekday Transit Ridership to South Bay via Study Area



5.5. Opportunities for Mode Shift

For trips to or from the Study Area, the South Bay accounts for approximately 277,000 weekday trips (36 percent of all interzonal trips), while Central Alameda County accounts for 249,000 weekday trips (32 percent). While the Tri Valley and Peninsula are somewhat near the Study Area, they represent about six and eight percent of trips, respectively to and from the Study Area. The Northern and Eastern Markets account for 48 percent of trips to and from the Study Area, while the South Bay and Peninsula account for 46 percent of all trips to and from the Study Area. **Table 5** summarizes the daily trips to and from the Study Area that provide opportunities for mode shift to transit with improved connectivity and enhanced service options. **Figure 14** shows the origin-destination patterns for weekday trips through the Study Area and **Figure 15** shows the origin-destination patterns for weekday trips starting and ending in the Study Area.

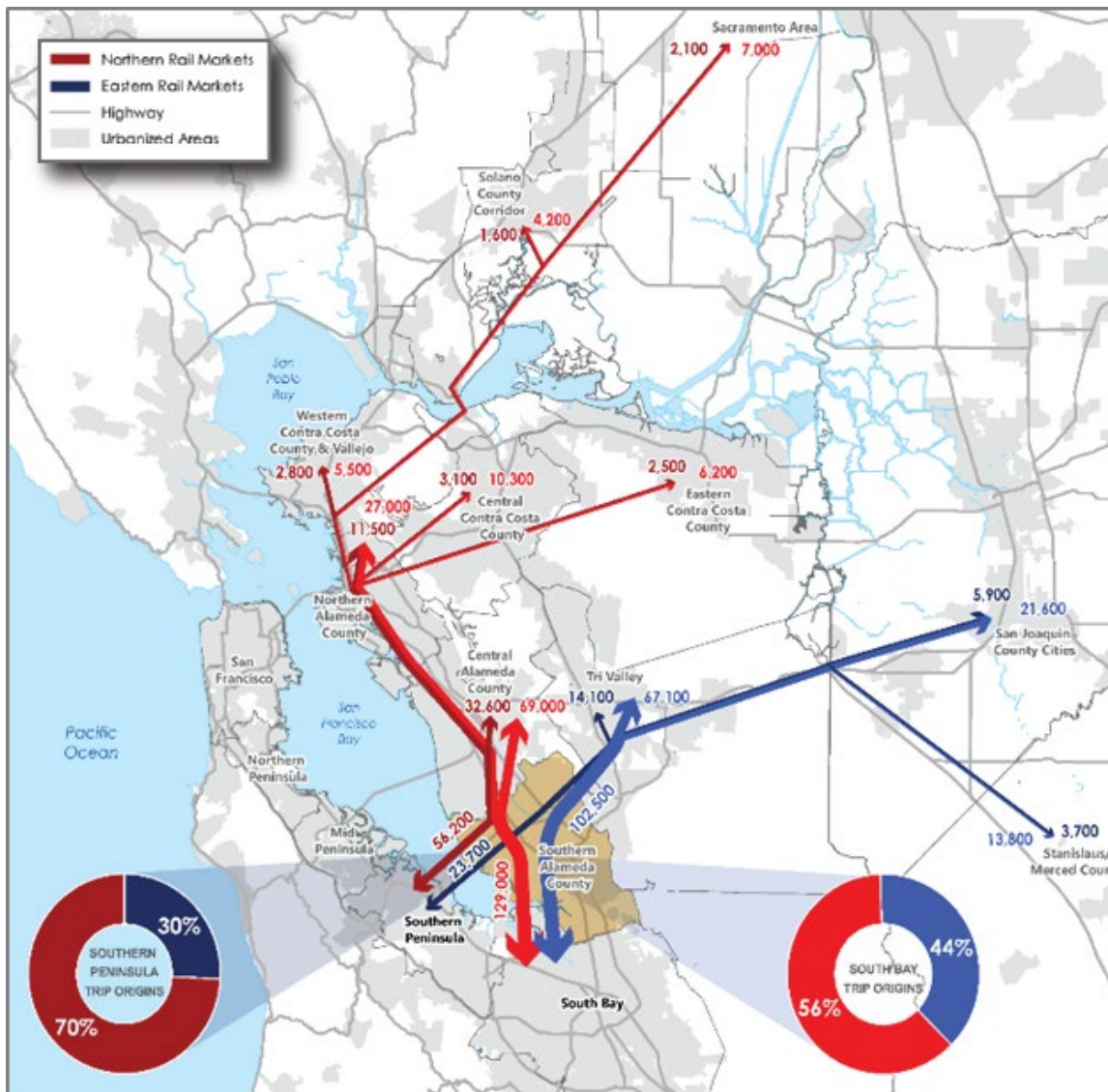
Table 5: Origin-Destination Patterns for to/from Trips

Market	San Francisco	North/ Mid-Peninsula	Southern Peninsula	South Bay	Northern (excluding SF)	Eastern	Other ¹
Southern Alameda County (Study Area)	31,200	22,400	61,400	276,900	305,200 ²	71,000	16,600

Note:

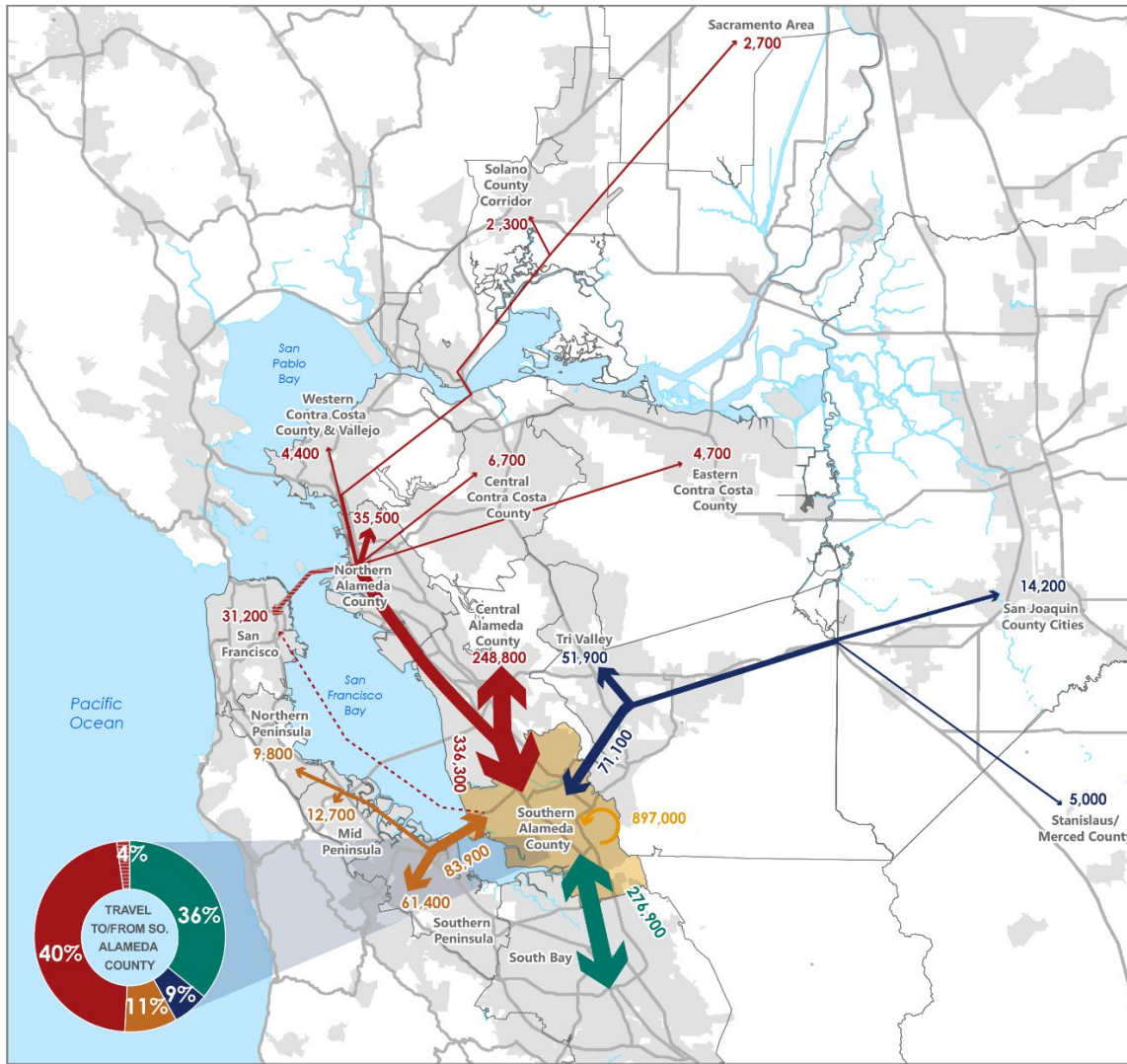
1. Other markets consist of regions beyond the rail markets, such as Marin, Napa, and Yolo counties to the north and Santa Cruz, Monterey, and San Benito Counties to the south.
2. 249,000 (82%) of Northern market trips begin or end in Central Alameda County

Figure 14: Weekday Trips to/from the 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 15: Weekday Trips to/from the 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.

5.6. *Socioeconomic Considerations in Regional Commute Patterns*

Workers living and/or employed in major urban employment hubs (San Francisco, Peninsula, South Bay), are more likely to earn annual household incomes of \$150,000 or more compared to the Megaregional average household income. Forty-five percent of Study Area residents earn an annual household income of over \$150,000. In contrast, less than 20 percent of Sacramento and Central Valley residents earn incomes of over \$150,000. For example, over 50 percent of Study Area residents who commute outside of Alameda County earn annual household incomes of over \$150,000, and less than 15 percent earn less than \$75,000 annually. In comparison, nearly one quarter of Study Area residents working jobs in Alameda County earn less than \$75,000 annually. Similarly, about two thirds of San Joaquin Valley residents commuting to the Peninsula or to South Bay earn annual household incomes over \$75,000; in contrast, only half of those who both live and work in the San Joaquin Valley make more than \$75,000 annually.

Rider surveys by Caltrain, Capitol Corridor, BART, SamTrans, and AC Transit suggest that higher-income riders making commute trips to office-based employment tend to use regional commuter rail services, whereas lower-income riders making both commute and non-commute trips to a wider range of destinations tend to use local bus services¹⁴.

While BART does not publish the median household income of its riders, its survey data indicates 54 percent of riders earn household incomes of less than \$100,000 per year, and 46 percent of riders earn greater than \$100,000 per year. The median household income for AC Transit riders is \$36,000. Differences in service area, time period of service, and fares are key drivers of these different usage patterns among income levels.

While rail improvements under consideration in this study may be more similar to a traditional American commuter rail market of higher income professionals, designing a service around these specific markets does not align with regional objectives to achieve more equitable and affordable mobility options. As the high cost of living and insufficient housing production of the Bay Area continues to push middle-income workers farther north and east, providing high quality, high capacity transit options will be critical to the region and state achieving emissions and quality of life goals, and providing equitable travel options. Strategies such as integrated, affordable fares and means-based fare programs should be considered as we consider future rail services.

¹⁴ Caltrain, 2016; Capitol Corridor, 2018; SamTrans, 2015; BART, 2018; AC Transit, 2018.

<http://www.caltrain.com/Assets/MarketDevelopment/pdf/Caltrain+2016+Triennial+Summary+Report.pdf>

<https://images.capitolcorridor.org/wp-content/uploads/2018/08/cc-usage-2018-overview-one-pager.pdf>

<http://www.samtrans.com/Assets/MarketDevelopment/pdf/SamTrans+Triennial+Customer+Survey+2015.pdf>

https://www.bart.gov/sites/default/files/docs/CS2018_FinalReport_082919.pdf

http://www.actransit.org/wp-content/uploads/board_memos/17-231a%20Rider%20Survey%20Atch%20-Red%20Folder.pdf

6.0 Conclusions

Transportation patterns within and through the Study Area are dominated by movements towards major job centers in San Francisco, northern Alameda County, the South Bay, and the Peninsula. This transportation pattern within the region is primarily handled through a system of interstate freeways and state highways that, due to heavy volumes and congestion, have become increasingly unreliable. These delays and systemic unreliability that have traditionally impacted commute hours are beginning to spill into non-commute hours.

As alternatives to automobile travel, rail and bus transit are important components of a multimodal transportation network within the ethnically and economically diverse Bay Area region and Study Area. BART provides a significant alternative to highway travel along its route and is heavily used. While current bus services dominate transit ridership within the Study Area and provide access to both BART and Intercity Passenger Rail stations, services between the Study Area and regional job centers have experienced a relatively small ridership. Intercity rail ridership has been modest compared to the roadway system and to BART, but continue to grow.

In light of the physical constraints, costs, and environmental and social impacts associated with further development of the freeway and roadway system, the current intercity rail services provide an opportunity for growth and additional access for the Study Area within key transportation corridors in the region. Intercity passenger rail routes and infrastructure exist and already serve corridors within the Study Area and connect the area with key nodes throughout the region. Investment in facilities and rolling stock, with improved connectivity between rail and bus services, can provide a solid foundation for new services and passenger growth as an alternative to automobiles.