City of San José

Automated Guideway Transit Study

Final Report

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1 Executive Summary

1.1 Introduction

In 2012, the City of San José (City) and funding partner Santa Clara Valley Transportation Authority (VTA) completed a feasibility study for an Automated Transit Network. The primary study goal was to fulfill the 2000 Measure A ballot measure to build an Automated People Mover connecting the San José Mineta International Airport (Airport) with the Santa Clara Caltrain/future BART station west of the Airport, and VTA's Light Rail line east of the Airport. Given the conclusions presented in the 2012 study, the City decided not to pursue construction of an Automated Transit Network at that time.

Following the 2012 study, the City identified the Airport to Diridon Station corridor as a candidate for analysis because of the high ridership and variety and quality of transit services at Diridon as well as the potential to share complementary car rental and parking uses between the Airport and future high-speed rail service at Diridon.

This study, the San José Automated Guideway Transit (AGT) Feasibility Study, is revisiting the possibility of serving the Airport via a different alignment and a broader set of destinations. It is also considering a wider array of automated transit technology as described below. The purpose of the study is to provide a high level assessment of the viability of constructing an AGT system connecting the Airport to Diridon Station. The primary goal of a potential AGT system is to provide an enhanced transit connection to the Airport that, by extension, improves the capacity, inter-connectivity, and effectiveness of the region's transportation system. It accomplishes this in part by:

- Establishing a connection between the regional transit network and the Airport,
- Connecting the Airport to the proposed California High-Speed Rail system,
- Facilitating travel within the Airport, and
- Sharing facilities and amenities (including parking and rental car facilities) jointly for passengers at the Airport and Diridon Station.

This study also considers some aspects of travel demand beyond the Airport and Diridon Station corridor to include Downtown San José, North San José, and Santa Clara Caltrain / Santa Clara University.

1.2 AGT Technologies Considered

A wide range of automated transit systems are in operation today or are in some phase of development for future implementation. Each type of system has key advantages and disadvantages but can generally be ordered by its passenger capacity. Automated metro systems offer the greatest capacity, carrying up to 30,000 passengers per hour per direction, but accordingly come with the greatest infrastructure costs. Conversely, Personal Rapid Transit (PRT) (one version of an Automated Transit Network) has a lower capacity (1,000 – 2,500 passengers per hour per direction) and may be a better match for lower demand markets. Automated transit technologies considered include:

- **Automated Metro:** Automated metro systems require robust guideways and station infrastructure but offer the greatest capacity of automated transit technologies. Automated metros operate on fixed schedules as long trains (typically consisting of four or more cars), stop at all stations, and are most appropriate to serve major urban corridors, similar to traditional heavy rail or light rail. Pictured: Vancouver Skytrain automated metro.

- **Automated People Mover (APM):** Automated people mover systems operate similarly as automated metros, on fixed schedules, stopping at all stations, but with shorter trains (typically consisting of one to three cars). These shorter train lengths, combined with reduced station and guideway requirements, gives the technology the flexibility to serve medium-sized markets, such as to/within airports or within resort complexes. Pictured: San Francisco Airport APM.

- **Automated Transit Network (ATN):** Automated transit networks use relatively small vehicles that can operate only when needed (on-demand) and provide non-stop, point-to-point service between origin and destination stations. The term ATN generally includes two subtypes, although the technology has not yet been standardized. Group Rapid Transit features larger vehicles (10-25 passengers) that may operate on-demand or may also operate on a fixed schedule like an APM. Personal Rapid Transit operates with single small vehicles serving one to six passengers each as an on-demand service. Pictured: London "Heathrow Pod" PRT.

A detailed comparison of automated guideway transit technologies is presented in Chapter 4.

1.3 Potential Demand

The estimate of passenger demand for an AGT system is based on the analysis of different trip types, broadly including San José Airport-related trips and high-speed rail-related trips. Airport-related trips include air passengers and employees traveling to and within the Airport, including trips to long-term parking and the rental car facility. Several high-speed rail trip types are analyzed because high-speed rail passengers may benefit from an AGT system linking Diridon

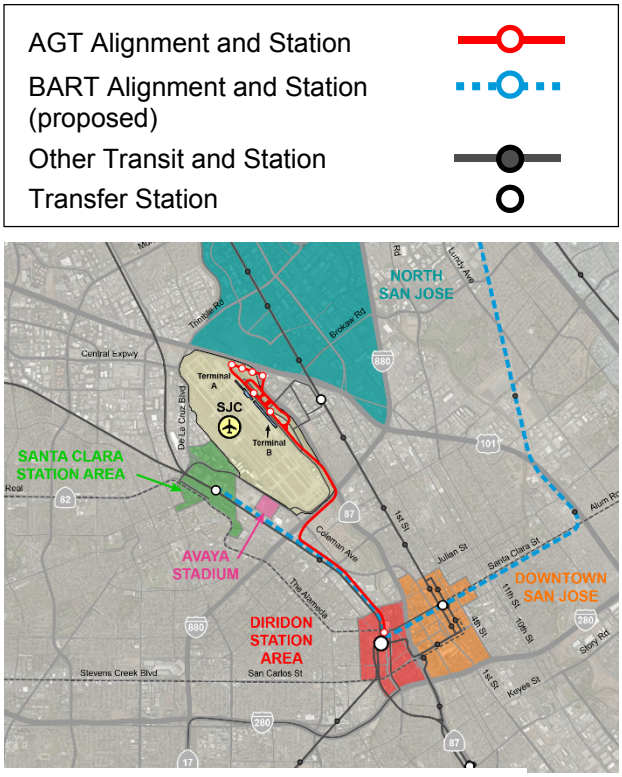
Station and the Airport for several reasons: to transfer from a train to a long-haul flight (and vice versa); to park at the Airport; and to rent a car from the Airport.

The potential demand for two sample AGT networks is summarized in Table 1. (Demand for non-airport travel trips between project activity centers and locations outside the study area was not considered.) The Base AGT Network would connect the Airport to Diridon Station, as shown in Table 1. The Expanded AGT Network, shown in Figure 2, would connect the Airport to Diridon as well as to North San José, Santa Clara, and Downtown San José.

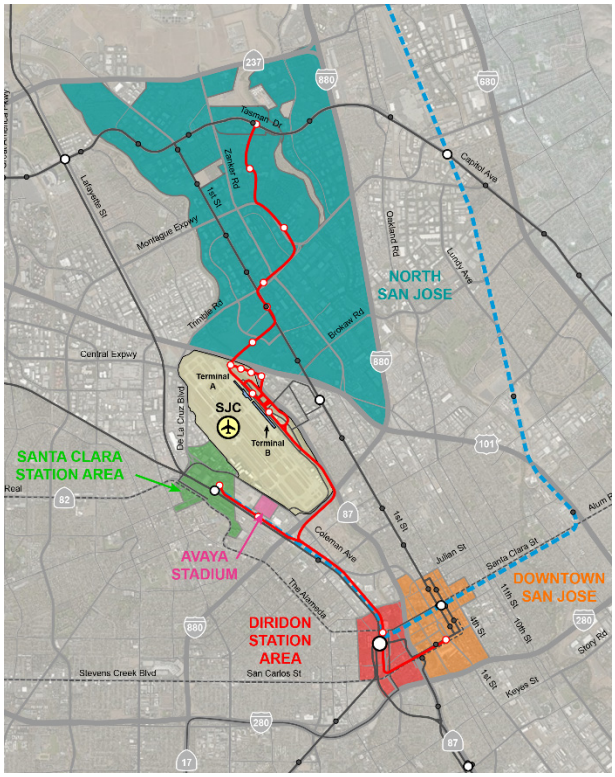
Table 1: 2030 Daily Demand, Base and Expanded AGT Network

Potential Daily AGT Demand	Base AGT Network	Expanded AGT Network
Airport Passengers + Employees, and HSR	6,700 – 11,800	6,700 – 11,800
Additional Airport Passengers + Employees with Expanded AGT Network	-	350
Intra-Airport Trips	11,100 – 12,300	11,100 – 12,300
Non-Airport Transit Trips within Expanded AGT Network	-	1,280
Non-Airport Transit Trips beyond Expanded AGT Network	-	?
Total Daily AGT Trips *without* Intra-Airport Trips	**6,700 – 11,800**	**8,300 – 13,400**
Total Daily AGT Trips *with* Intra-Airport Trips	**17,800 – 24,100**	**19,400 – 25,700**

Figure 1: Base AGT Network and Expanded AGT Network



Base AGT Network



Expanded AGT Network

To determine the appropriate automated transit technology for the demand on the Base AGT and Expanded AGT networks, the peak hourly passenger demand is defined for each link of the network. In this case, the peak ranges from 560 to 730 passengers for the Base AGT network and 700 to 800 passengers for the Expanded AGT network.

In both cases, the **Automated Transit Network technology would be the most appropriate choice** because it would offer sufficient capacity to meet demand while its on-demand and point-to-point characteristics would result in a high-quality service with minimal wait time and travel time compared to fixed-schedule, all-stop service.

1.4 Cost Comparisons

The cost performance of both the Base AGT and the Expanded AGT networks, each assuming ATN technology, is shown in Table 2 below and compared with two recent APM projects. The overall capital cost is compared in the top of the table, while the cost per new daily trip is compared in the bottom portion of the table. Note that as the ATN industry is still in the development phase, the AGT cost estimates include large contingencies for risk.

Table 2: Capital Cost per Trip, by Network

Alternative	Base AGT Network*	Expanded AGT Network*	BART Oakland Airport Connector	Phoenix Airport People Mover
Single Track Miles (miles)	9.6	20.9	6.4	4.8
Approx. Capital Cost ($ m)	$ 380	$ 830	$484	$884
Cost per Track Mile ($ m / mi)	$ 40	$ 40	$76	$184
Total Daily Trips (without intra-airport trips)	6,700 – 11,800	8,300 – 13,400 †	3,300 ‡	
Total Daily Trips (with intra-airport trips)	17,800 – 24,100	19,400 – 25,700 †		13,000 §
Average Capital Cost per Trip (without intra-airport trips)	$ 32,000 - 57,000	$ 62,000 – 100,000	$147,000	
Average Capital Cost per Trip (with intra-airport trips)	$ 16,000 – 22,000	$ 32,000 – 43,000		$68,000

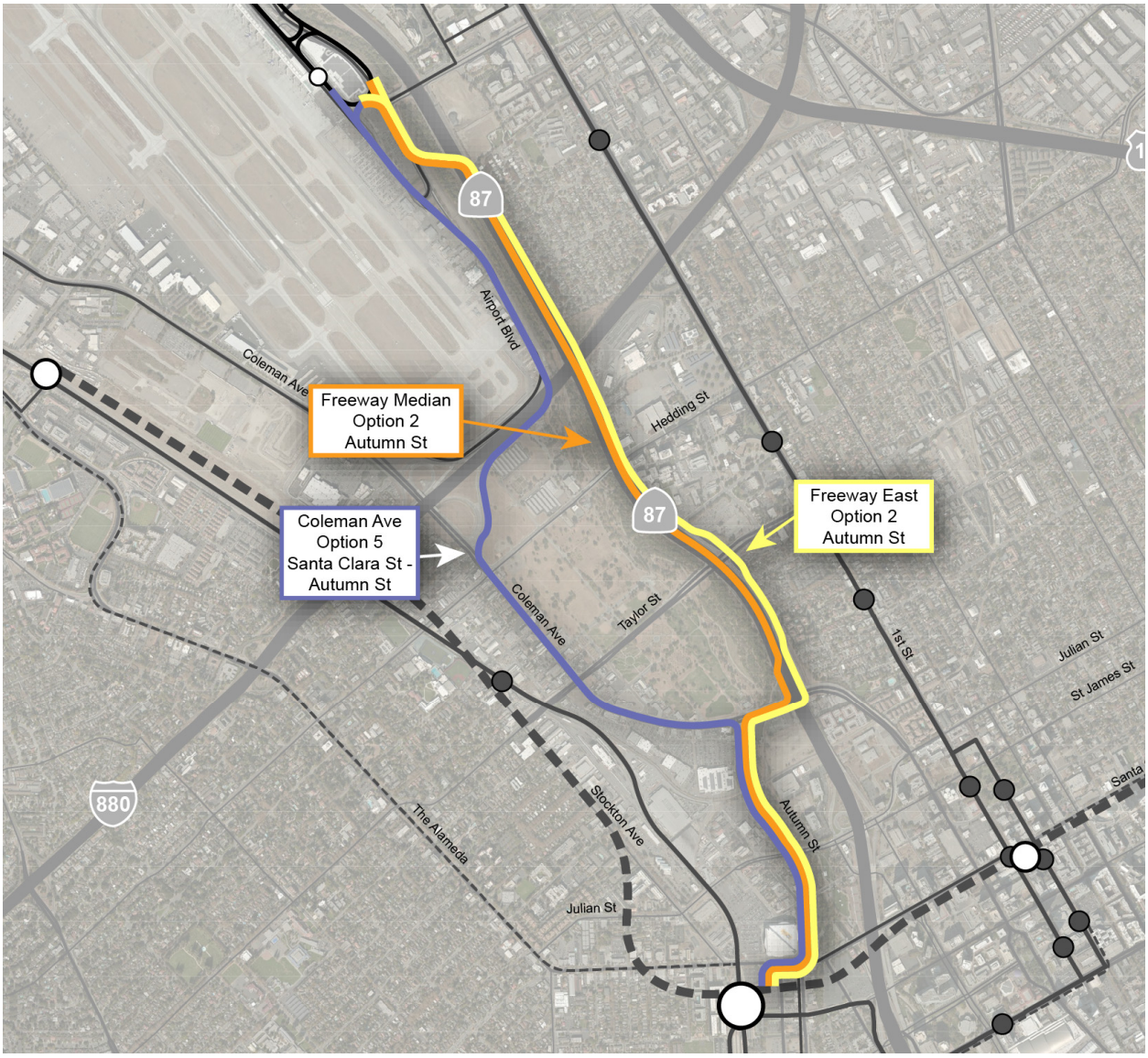
* Costs assuming ATN technology.
† Rider demand does not include non-airport regional transfers.
‡ Weekday ridership as of August 2015; system opened November 2014.
§ Daily ridership as of April 2015; system opened April 2013; includes Terminal 3 extension.

1.5 Alignment Analysis and Recommendation

An AGT system would require a continuous guideway to be constructed between the Airport and Diridon station. This study contemplates numerous alignment opportunities and constraints, and proposes thirteen alignment alternatives. Upon evaluation, the notable alignments arising from the evaluation exercise are:

- An elevated alignment along Airport Blvd that crosses under the Nimitz Freeway (I-880), then rises to an elevated guideway along Coleman Ave and Autumn St ("Coleman Ave Option 5"); and
- An elevated alignment that crosses the Guadalupe River to follow the Guadalupe Freeway (SR-87), then transitions to Autumn St via Coleman Ave ("Freeway Median Option 2" and "Freeway East Option 2").

Figure 2: Alternatives Recommended for Further Development



1.6 Key Conclusions

The following are the key conclusions from this study. Additional observations are described within each chapter of the report.

- There is sufficient potential demand to justify the construction and operation of an Automated Guideway Transit (AGT) system between Diridon Station and the Airport. The AGT system would provide a convenient, grade-separated transit link between the Airport and the major regional transit hub in Santa Clara County. The link would also connect future High-Speed Rail passengers to the Airport, including existing or future rental car and/or long term parking areas.
- An Automated Transit Network would be the most appropriate AGT technology choice to serve the Diridon-to-Airport corridor, given the potential demand and characteristics of the market identified in this study. An Automated People Mover system could also be considered. However, an on-demand ATN system would provide a higher quality of service compared to fixed-schedule, all-stop service.
- The capital cost-effectiveness (measured in terms of capital cost per passenger) of an ATN-based system could be on par, or potentially better than that of recently-built airport rail connector systems (e.g., Oakland Airport Connector).
- Several alignments between Diridon Station and the Airport are conceptually feasible and are suitable for further study.
- The Base AGT system between Diridon and the Airport could be expanded to serve additional activity centers in the subregion, namely Santa Clara, Downtown San José, and North San José. Such an Expanded AGT network would fill a general gap in the public transportation network around the Airport.
- ATN technology would be well-suited to serve the potential travel demand of an Expanded AGT network, providing fast, on-demand, point-to-point travel. The Expanded AGT network would be less cost-effective than the Base AGT system requiring proportionally greater capital investment for each new rider captured.
- The Base AGT Network would generate up to three times the demand than the alignment studied in the City's 2012 Airport-Area ATN report, which connected the Airport to North First Street Light Rail and the Santa Clara Caltrain/future BART station. The comparison excludes internal airport trips that both alignments would have served equally. A connection to Diridon would also enable the AGT Network to satisfy additional potential demand generated by high-speed rail service at Diridon station. Both the 2012 alignment and the Base AGT Network alignment would entail similar track mileage (9.6 single track miles for the Base AGT Network and 10.3 single track miles for the 2012 ATN alignment).

The City of San José Automated Guideway Transit Study provides a high-level assessment of the feasibility of an Automated Guideway Transit (AGT) system between Diridon Station, the Airport, and other nearby destinations. This study does not include detailed ridership forecasting or cost estimating; as such, demand and cost estimates contained therein are rough-order-of-magnitude (ROM) estimates. Further study is justified based on this assessment.

2 Introduction

In 2012, The City of San José (City) and funding partner Santa Clara Valley Transportation Authority (VTA) completed a feasibility study for an Automated Transit Network (ATN). The primary study goal was to fulfill the 2000 Measure A ballot measure to build an Automated People Mover connecting the San José Mineta Airport (Airport) with the Santa Clara Caltrain/future BART station west of the Airport and VTA's Light Rail Transit line east of the Airport. The study evaluated the feasibility in terms of physical context, alignment, ridership, capital and operating costs, environmental issues, and preliminary business case analysis. The analysis contained the following conclusions, among others:

- An ATN could offer a higher quality passenger experience than the current bus shuttles by providing minimal wait time, direct point-to-point service and a private riding experience.
- The Recommended Alignment demonstrates that at least one conceptual route is feasible given the physical constraints of the study area and the required connections of the ATN.
- The project risks associated for implementing the ATN are higher than they would be for an Automated People Mover (APM) or bus transit project, particularly in the areas of technological and regulatory risk.
- The ATN system would be anticipated to serve approximately 6,000 passengers per day under year 2011 Airport demand, and 14,000 passengers per day under year 2030 Airport demand.
- ATN passenger trips between Terminal A and Terminal B/Rental Car Center would be highly directional and would experience sharp peaks in demand. Demand on the rest of the network is relatively low.

The directionality and concentration of demand, combined with the anticipated passenger volumes, were among the factors considered in the technological feasibility evaluation by project partner The Aerospace Corporation. In its report, Aerospace concluded that, "the ATN technology requires further development to demonstrate its ability to deliver the passenger-carrying capacity required for the network of stations contemplated for this Project."

Given the conclusions presented in the 2012 study, the City decided not to pursue construction of an ATN at that time. This study is revisiting the possibility of serving the Airport via a different alignment and a broader set of destinations. It is also considering a wider array of automated transit technology, namely Automated Guideway Transit (AGT). AGT is a term that encompasses any form of automated transit that operates on a fixed guideway, and spans from automated metro rail systems to APMs to ATNs.

Following the 2012 study, the City identified the Airport to San José Diridon Station (Diridon) corridor as a candidate for analysis because of the potential to share complementary car rental and parking uses between the Airport and future high-speed rail service at Diridon. In addition, the City recognized the potential to connect the Airport to a greater variety and quality of regional transit services at Diridon.

The purpose of this study, the San José AGT Feasibility Study, is to assess the viability of constructing an AGT system connecting the Airport to Diridon. The primary goals of a potential AGT system include:

- Establishing a connection between the regional transit network and the Airport,
- Connecting the Airport to the proposed California High-Speed Rail system, and
- Sharing facilities and amenities (including parking and rental car facilities) jointly for passengers at the Airport and Diridon station.

This study differs from the 2012 study in the following respects:

- The geographic scope is significantly broader to include the Airport to Diridon corridor as well as opportunities for additional connections to Downtown San José, North San José, and Santa Clara. The travel markets are defined and described in the next chapter.
- The range of technology has been expanded to consider different forms of Automated Guideway Transit.
- The scope is focused on analyzing demand patterns and defining complementary AGT technologies to serve the identified needs. There is less emphasis on engineering feasibility and business case analysis. The final product is a project definition that can be used for further project development.

This report is organized into the following chapters:

- Introduction – this chapter.
- Background, Needs, and Opportunities – basic transportation information about the study area, organized by the primary geographic activity centers identified for the study.
- AGT Technology Scan – description of automated guideway transit technologies as they might apply to this study.
- Market Assessment – quantification of the travel markets identified for the study.
- Application Evaluation and Route Identification – quantification of the potential trips served by an AGT system and identification of relevant automated technologies to meet the demand patterns.
- Alignment Analysis – identification and evaluation of general alignments and route options.
- Conclusions – conclusions of this study.

3 Background, Needs, and Opportunities

This chapter contains a description of basic transportation information about the study area, organized by the primary geographic activity centers identified for the study.

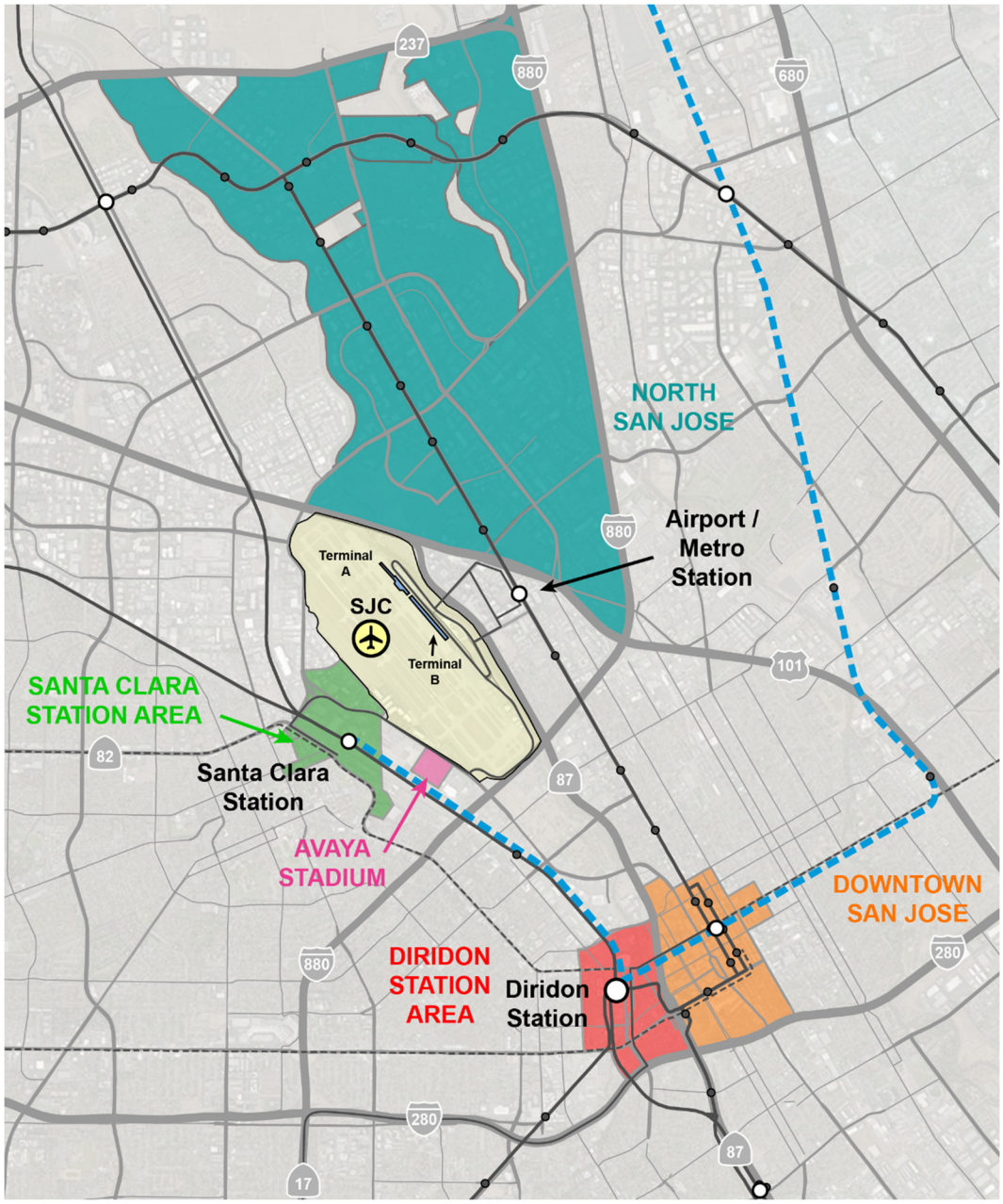
3.1 Study Area and Activity Centers

This study considers travel demand between four primary and two secondary activity centers located in central Santa Clara County:

1. San José Mineta International Airport (Airport)
2. San José Diridon Station (Diridon)
3. Downtown San José
4. North San José
5. Avaya Stadium (also known as Earthquakes Stadium)
6. Santa Clara Caltrain/BART station and Santa Clara University

The Airport is located approximately 2.5 miles north (as the crow flies) of both Downtown San José and Diridon. Diridon is located less than 1 mile west of the core of Downtown San José, across the Guadalupe River and State Route 87. North San José is a large mixed-use commercial area located north of the Airport, located along either side of the North First Street corridor, from approximately US 101 to State Route 237. Avaya Stadium is located near the southwest corner of the Airport across Coleman Avenue, north of Interstate 880. Santa Clara Caltrain and Santa Clara University are both located west of the Airport along El Camino Real. Figure 3 shows the study area including all the activity centers. Each of the primary activity centers is described in further detail below.

Figure 3: Study Area and Activity Centers



3.2 Potential Use Cases of AGT

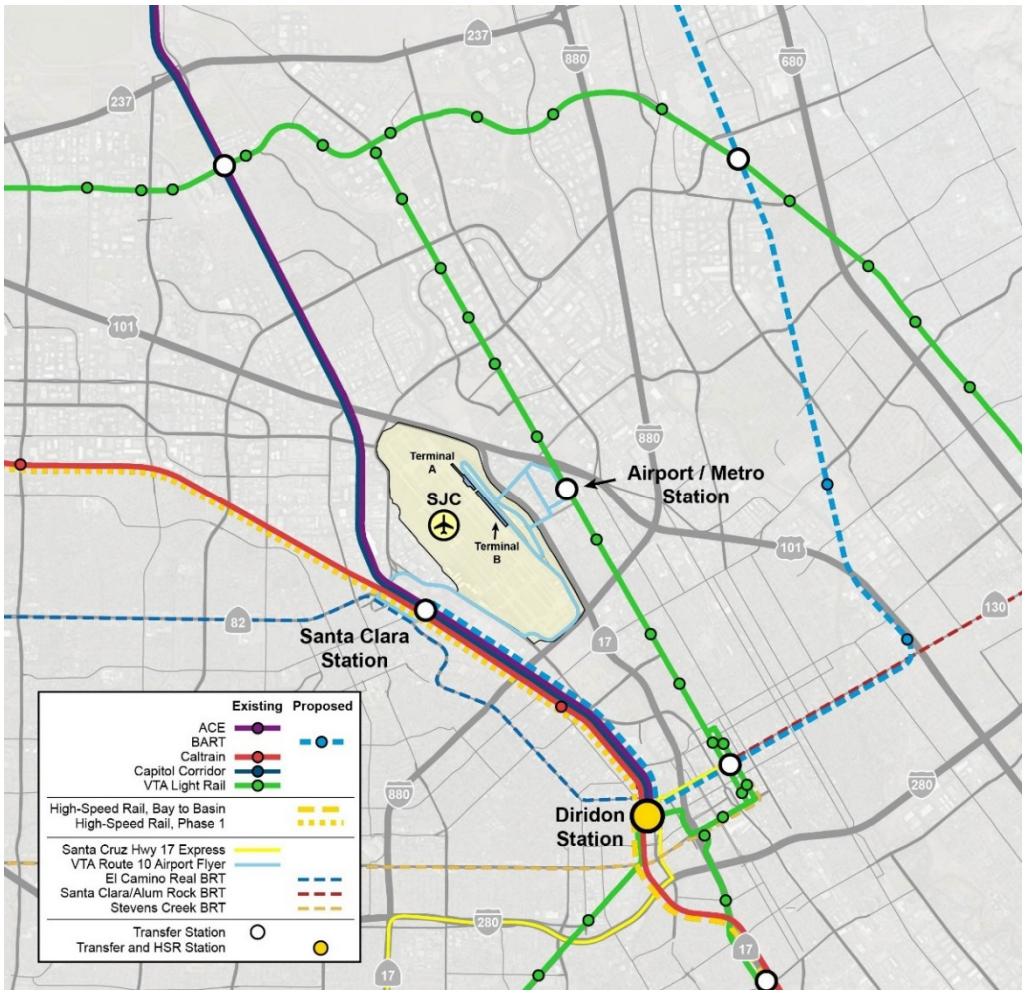
The primary purpose for this AGT study is to link the Airport to Diridon. Diridon is envisioned to serve as the regional transit gateway to the Airport.

Other key functions that the AGT could serve include:

- Connecting to other parts of Downtown San José, particularly those that are related to the Airport, such as the Convention Center and hotels; and
- Connecting to VTA's Light Rail Transit (LRT) line along North First Street, north of the Airport (where VTA's LRT forms the basis of a northern transit gateway, including future access to BART at Milpitas Station).

With a more dispersed ATN-type network, the AGT might also be able to serve areas in North San José that are further away from the LRT stations, providing a corridor-level, first-and-last-mile function. Connections to Avaya Stadium and Santa Clara may be possible depending on the travel demand and AGT technology. Figure 4 shows the existing and proposed higher-capacity transit services in the Airport-Diridon area.

Figure 4: Area Transit Context



For the purpose of this study, the trips that could logically be made between activity centers are categorized into three types:

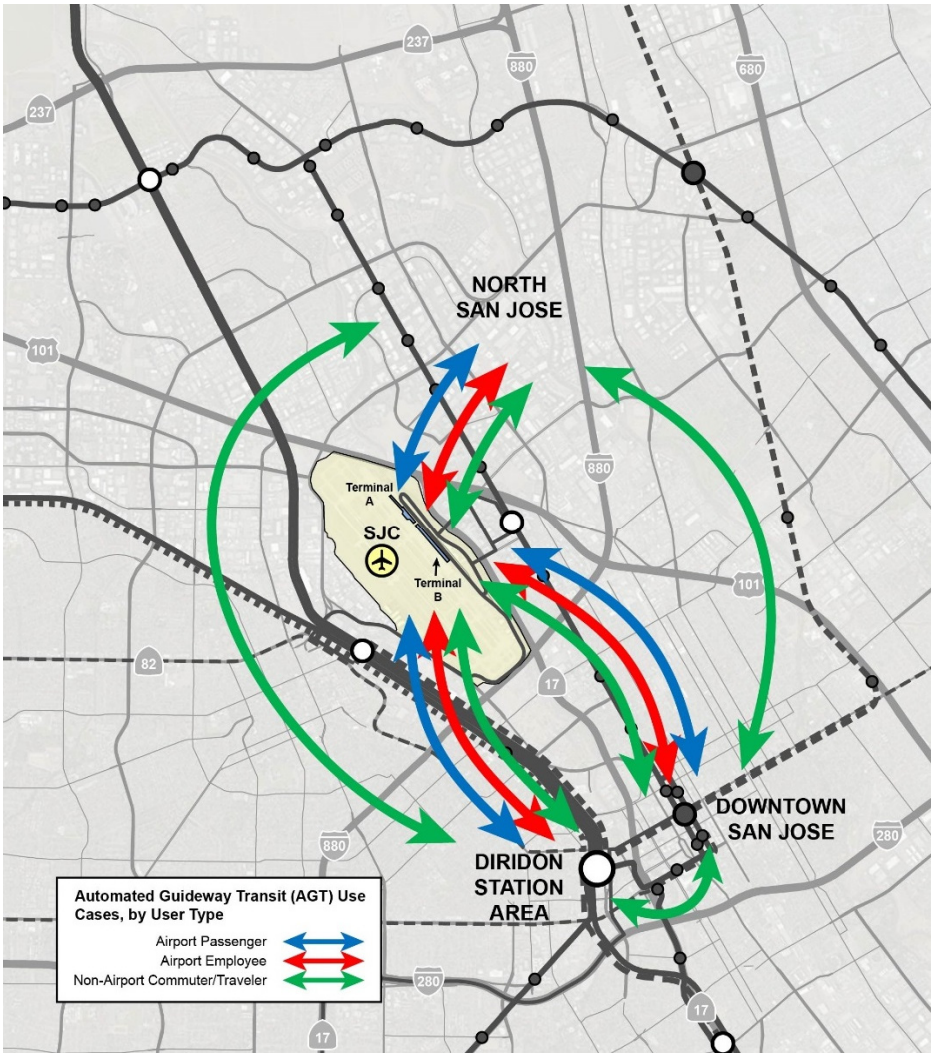
- **Airport Passenger** – a trip to or from the Airport for the purpose of making an airplane trip
- **Airport Employees** – a trip to or from the Airport for the purpose of working at the Airport
- **Non-Airport** – a broad label for any other kind of trip; this can include non-Airport work trips, non-Airport tourist trips, non-Airport sports spectator trips, pass-through transit trips, and trips to the Airport for non-flight or non-work purposes (such as car rental or non-airport parking).

Together, the three trip types represent the greatest potential trip-making opportunities for an AGT system. In the market assessment chapter, the potential demand is quantified for the Airport Passenger and Airport Employee trip types. Certain non-Airport trips are also quantified, based on the discussion in this chapter.

Note it is beyond the scope of this study to account for trips that start and end beyond the activity centers, even though some trips could theoretically include AGT as part of the trip.

Figure 5 illustrates all potential trip types between the major activity centers. Essentially, trips to and from the Airport can be any of the three types of trips, while trips made between non-Airport activity centers are non-Airport trips.

Figure 5: Automated Guideway Transit (AGT) Use Cases, by Trip Type



Tables 3 and 4 on the following pages similarly illustrate the trip types that are possible in each use case, each addressed in this study:

- A conventional AGT system connecting the major activity centers
- An expanded AGT system connecting major and secondary activity centers

Table 3: AGT Use Cases

Trip Type:	**Blue: Airport Passenger**	**Red: Airport Employee**	**Green: Non-Airport**

		DESTINATION ACTIVITY CENTERS				***Other Destinations***	
		San José Airport	**Diridon Station**	**Downtown San José**	**North San José**	***Earthquakes Stadium***	***Santa Clara Caltrain / University***
ORIGIN ACTIVITY CENTERS	**San José Airport**	🔵 ⚪ ⚪	🔵 🔴 🟢	🔵 🔴 🟢	🔵 🔴 🟢	⚪ ⚪ ⚪	🔵 🔴 ⚪
	Diridon Station	🔵 🔴 🟢	⚪ ⚪ ⚪	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢
	Downtown San José	🔵 🔴 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢
	North San José	🔵 🔴 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢
Other Origins	***Earthquakes Stadium***	⚪ ⚪ ⚪	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ ⚪	⚪ ⚪ 🟢
	Santa Clara Caltrain / University	🔵 🔴 ⚪	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ 🟢	⚪ ⚪ ⚪

Table 4 provides detail about how the AGT is accessed at each origin and destination. This informs the market assessment by indicating which potential trips could be attributed to the AGT.

For example, a person starting in North San José and making a non-Airport trip (green color in the chart) to Diridon could potentially walk or take transit to an AGT station, take the AGT system to Diridon, then walk or take transit or High-Speed Rail to their final destination. Based on this progression, the following would be assessed:

- High-Speed Rail trips going from Diridon that originate within walking distance of an AGT station in North San José
- Transit trips starting at Diridon that originate within walking distance of an AGT or transit station in North San José and passing through Diridon (e.g., Caltrain)
- Travel demand between North San José and Diridon attributed to origins within walking or transit distance of an AGT station in North San José and destinations within walking distance of Diridon

The market assessment also considers factors such as number of transfers, comparative travel time, convenience/experience, and trip cost to estimate how many people would use AGT compared to what is used now.

Notably, the expanded AGT network allows for circulation within activity centers, as indicated in the chart.

Table 4: AGT Use Cases, Access Mode Detail

Trip Type: **Blue: Airport Passenger** **Red: Airport Employee** **Green: Non-Airport**

		DESTINATION ACTIVITY CENTERS				*Other Destinations*	
		San José Airport	**North San José**	**Downtown San José**	**Diridon Station**	***Earthquakes Stadium***	***Santa Clara Caltrain / University***
ORIGIN ACTIVITY CENTERS	**San José Airport**	Terminal A ↔ AGT ↔ ConRAC* Terminals ↔ AGT ↔ Long-Term Parking	AGT → Walk/Transit AGT → Walk/Transit ConRAC → AGT → Walk/Transit	AGT → Walk AGT → Walk ConRAC → AGT → Walk	AGT → Transit/HSR/Walk AGT → Transit ConRAC → AGT → HSR		AGT → Caltrain / University AGT → Caltrain
	North San José	Walk/Transit → AGT Walk/Transit → AGT Walk/Transit → AGT → ConRAC	Walk ↔ AGT ↔ Walk	Walk/Transit → AGT → Walk	Walk/Transit → AGT → Transit/HSR/Walk	Walk/Transit → AGT	Walk/Transit → AGT → Caltrain / University
	Downtown San José	Walk → AGT Walk → AGT Walk → AGT → ConRAC	Walk → AGT → Walk/Transit	Walk ↔ AGT ↔ Walk	Walk → AGT → Transit/Caltrain/HSR	Walk → AGT	Walk → AGT → University
	Diridon Station	Transit/HSR/Walk → AGT Transit/Walk → AGT HSR/Walk → AGT → ConRAC	Transit/HSR/Walk → AGT → Walk/Transit	Caltrain → AGT → Walk		Transit/Walk → AGT	Transit/HSR → AGT → University
Other Origins	***Earthquakes Stadium***		AGT → Walk/Transit	AGT → Walk	AGT → Transit/Walk		AGT → Caltrain
	Santa Clara Caltrain / University	Caltrain / University → AGT Caltrain → AGT	Caltrain / University → AGT → Walk/Transit	University → AGT → Walk	University → AGT → Transit/HSR	Caltrain → AGT	

*ConRAC: San José Airport Consolidated Rent-A-Car Facility

3.3 Activity Center Descriptions

The following subsections contain a description of each of the activity centers defined for this study. The descriptions include relevant background information and a summary of important trips (i.e., strong candidates for trips to be served by Automated Guideway Transit).

3.3.1 Mineta San José International Airport

Activity Center Description

Mineta San José International Airport (Airport) is one of the three commercial airports in the Bay Area. In 2014, the Airport served 9.4 million passengers[1], amounting to fourteen percent of all Bay Area air passenger traffic.[2] Approximately four percent of Airport passenger traffic is international traffic.[3]

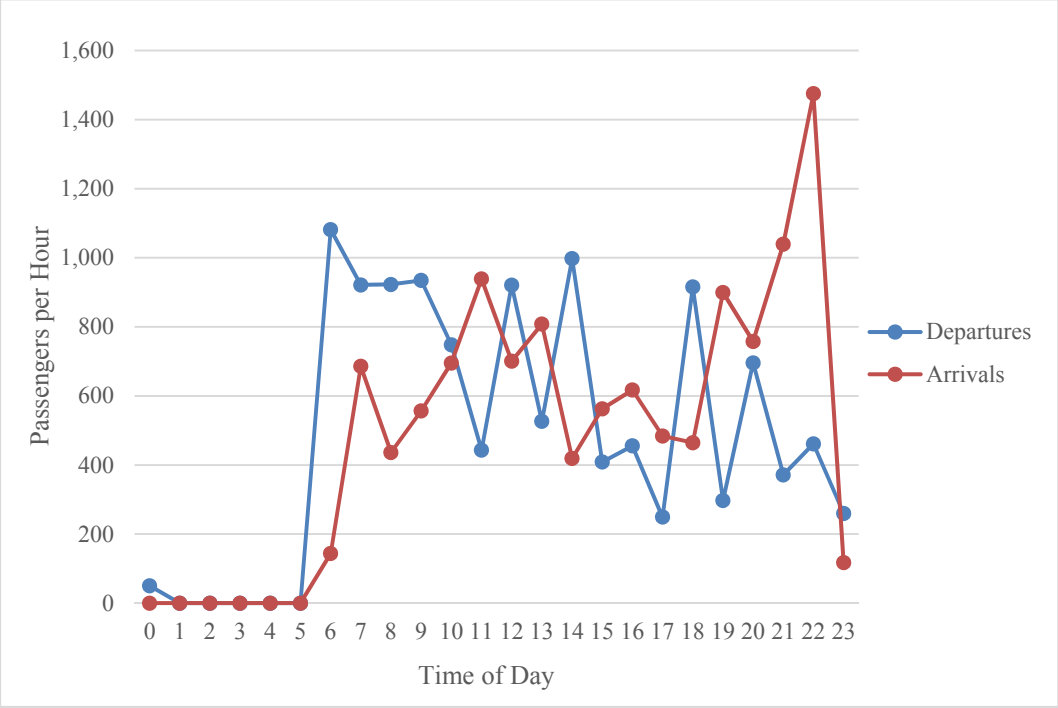
The Airport is located approximately two miles north of Downtown San José and is bordered by both the US-101 (Bayshore Freeway) and SR-87 (Guadalupe Freeway). The Airport property is also located approximately one-half mile from two major rail transit facilities, Caltrain and VTA Light Rail. However, the walking path to each of these facilities is lengthier and overall experience is inconvenient for most Airport passengers or employees. Transit access to the Airport is described in further detail below.

Airport Passengers

On the average day in 2014, 12,600 air passengers arrived and 12,600 air passengers departed via the Airport.[4] (Passengers that connect between flights and therefore do not enter/exit the Airport landside are excluded from this number.) On a typical day, approximately 250 commercial flights serve the Airport[5] over the course of 17 hours each day (6 AM – 11 PM). During its hours of operation, the Airport serves, on average, approximately 750 arriving and 750 departing passengers during each hour of operation. Figure 6 is a chart of departing and arriving passengers on a typical day.

[1] "Facts: Silicon Valley's Airport." Mineta San José International Airport. February 2015.
[2] In 2014, SFO served 47.2 million passengers (SFO December 2014 Comparative Traffic Report), OAK served 10.4 million passengers (OAK Year-End Airport Statistics Summary, 2014).
[3] Monthly Activity Report. Mineta San José International Airport. January 2015.
[4] Monthly Activity Report. Mineta San José International Airport. January 2015.
[5] FlightAware data, January 2015.

Figure 6: Cumulative Airport Passengers Served, Typical Day (2015)



The greatest flow of departing passengers occurs between 6:30 AM and 10:30 AM, with an average flow of 950 passengers/hour served.

The greatest flow of arriving passengers occurs:

- Between 11 AM and 12 PM, with an average flow of 900 passengers/hour, and
- Between 9 PM and 11 PM, with an average flow of 1,200 passengers/hour.

Passengers traveling through the Airport originate from or are destined to various locations throughout the Bay Area, as shown in Table 5. The mode of transportation used to access the Airport is shown in Table 6.

Table 5: Airport Passenger Origin and Destination Locations[6]

Location	Share of Aiport Passengers (%)
City of San José	36 %
Elsewhere in Santa Clara County	29 %
Santa Cruz County	9 %
Alameda County	6 %
San Mateo County	4 %
All Other Locations	16 %

[6] 2014 Air Passenger Survey, Mineta San José Mineta International Airport.

Table 6: Airport Passenger Access Mode[7]

Access Mode	Share of Airport Passengers (%)
Private Auto	46 %
Rental Car	35 %
Taxi	9 %
Shuttle Van or Limo	5 %
Public Transit	1 %
Other	3 %

Passenger traffic is forecast to increase at the Airport; by 2027, growth of nearly 90 percent is expected.

Table 7: Airport Passenger Traffic Forecasts[8]

Year	Annual Passengers (thousands)	Average Daily Passengers (thousands)
2014	9,400	26
2027	17,600	48

Airport Employees

Employees at the Airport number the following shown in Table 8.

Table 8: Airport On-Site Employees

Location	Employees (FTE)
SJC Airport (City of San José)[9]	187
Airlines, concessions, etc.	2,913
TOTAL[10]	3,100

Employees live predominately in San José and elsewhere in Santa Clara County, as shown in Table 9. Employees primarily drive to the Airport, shown in Table 10.

Table 9: Airport On-Site Employee Home Locations [11]

Home Location	Share of Aiport Employees (%)
City of San José	57 %
Elsewhere in Santa Clara County	19 %
Santa Cruz County	2 %
Alameda County	9 %
San Mateo County	3 %
All Other Locations	10 %

[7] Mineta San José Mineta International Airport, 2015.
[8] April 2011 Update: Airport Master Plan. Mineta San José Mineta International Airport, April 2011.
[9] Comprehensive Annual Financial Report. Mineta San José Mineta International Airport. June 2014. Figure derived from full-time equivalent (FTE) employees.
[10] Mineta San José Mineta International Airport, 2015.
[11] Mineta San José Mineta International Airport, 2015.

Table 10: Airport On-Site Employee Access Mode[12]

Access Mode	Share of Employees at the Airport (approx. %)
Private Auto	95 %
Transit	5 %

Most employees work during the day shift, but there are sizable numbers who work during other times of day, as indicated in Table 11.

Table 11: San José On-Site Employee Work Shifts[13]

Work Shifts	Share of Employees at the Airport (approx. %)
Day (~8 a.m. – 4 p.m)	65 %
Swing (~4 p.m. – midnight)	20 %
Grave (~midnight – 8 a.m.)	15 %

Transit Access

VTA operates its Line 10 Airport Flyer bus service between the Santa Clara Caltrain station, Airport, and the Metro/Airport VTA Light Rail station. This service is funded by the Airport and VTA and provided free-of-charge to passengers. This service operates every 15 minutes during most of the day. Line 10 currently serves approximately 1,200 passengers daily.[14]

VTA's Light Rail system currently provides service along the North First Street corridor between Downtown San José and North San José in the vicinity of the Airport. The Mountain View–Winchester line provides direct service from Diridon to the Metro/Airport Light Rail station, located approximately one mile (walking distance) from the Airport terminals. The Mountain View–Winchester Line and the Alum Rock–Santa Teresa lines both provide service from Downtown San José to the Metro/Airport Light Rail station.

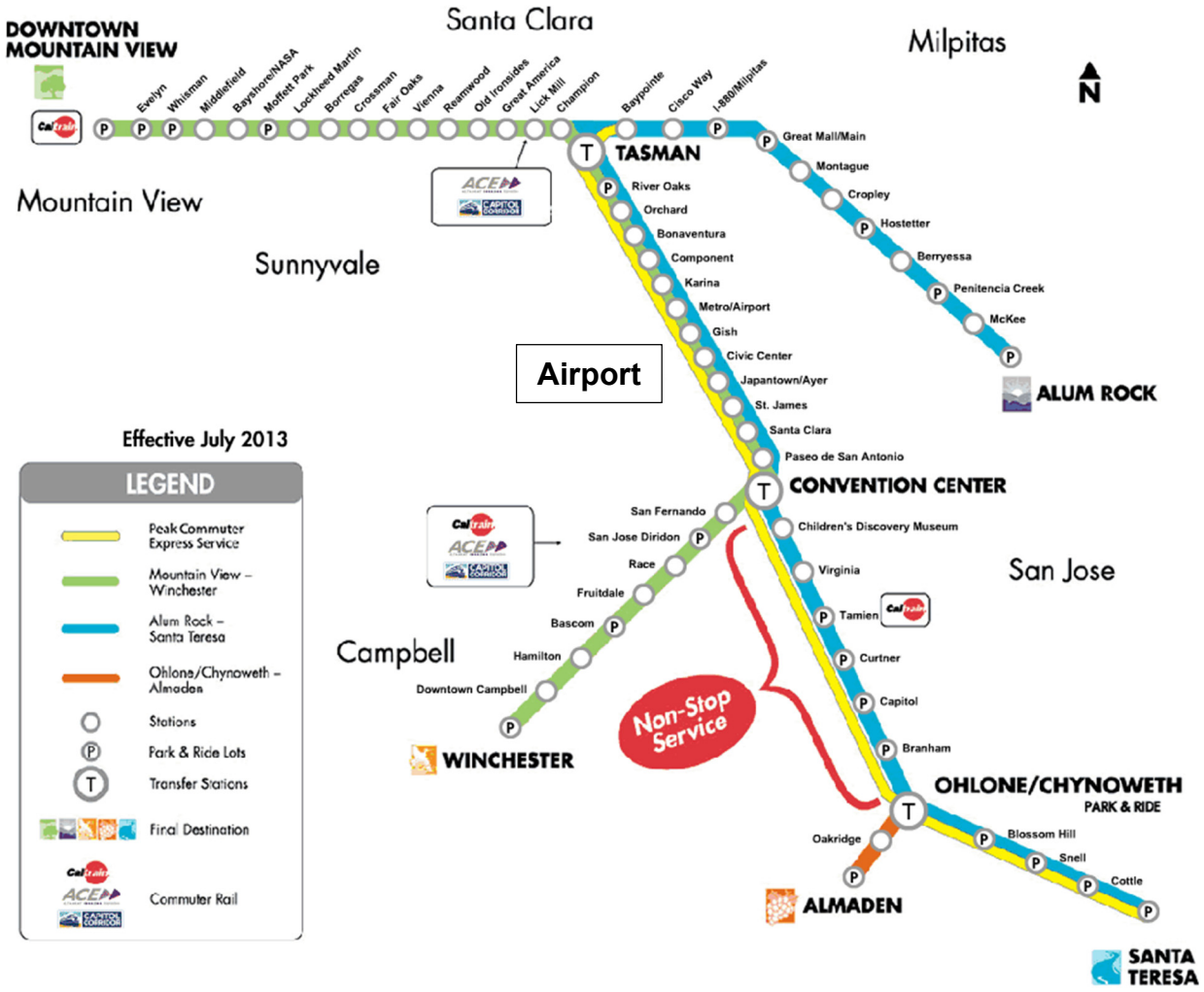
The Mountain View–Winchester Line operates approximately every 15 minutes during peak hours and every 30 minutes during off-peak hours. The Alum Rock–Santa Teresa operates approximately every 15 minutes during most of the day.

On an average weekday, the Metro/Airport station sees approximately 590 passenger boardings.[15]

Figure 7 shows the VTA Light Rail system at the time of writing.

[12] Mineta San José Mineta International Airport, 2015.
[13] Mineta San José Mineta International Airport, 2015.
[14] Santa Clara Valley Transportation Authority, November 2014.
[15] Santa Clara Valley Transportation Authority, December 2014.

Figure 7: Current VTA Light Rail System [16]

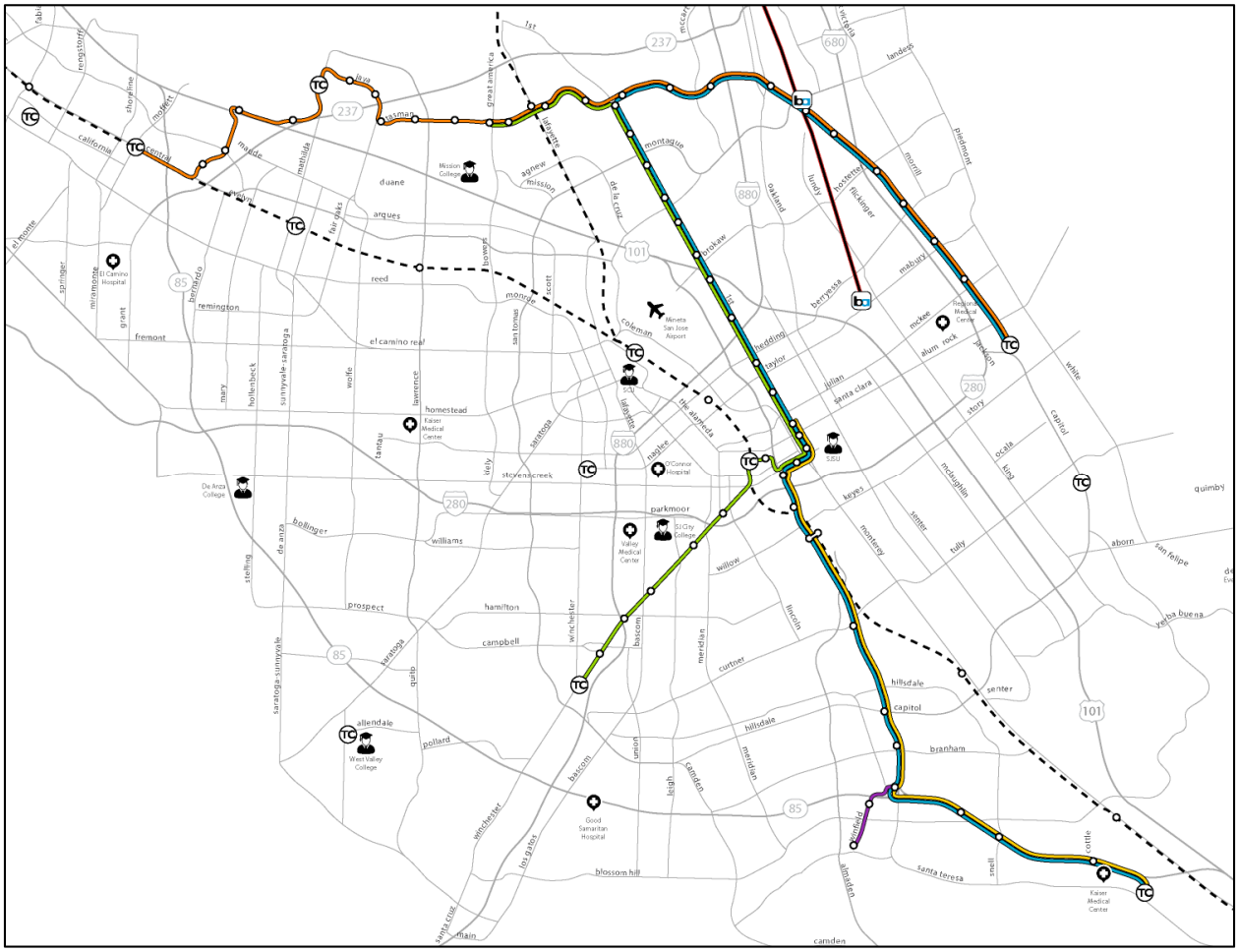


In 2015, VTA executed the "North First Street Corridor Light-Rail Speed Improvement Project," which increased maximum track speeds along the North First Street corridor between Civic Center station and Tasman station from 35 miles per hour to 45 miles per hour. [17]

At the same time, VTA is also executing its Next Network Project, which will greatly reconfigure its light rail network in fall 2017 to complement the completion of the under-construction BART extension to Berryessa[18]. Figure 8 shows the planned configuration of the VTA Light Rail system in 2017.

[16] Santa Clara Valley Transportation Authority, April 2015.
[17] Capital Program Dashboard: N. 1st St Corridor LR Speed Improvement. Santa Clara Valley Transportation Authority, December 2014 and staff update, December 2016.
[18] VTA Next Network website. Santa Clara Valley Transportation Authority, January 2017.

Figure 8: Future VTA Light Rail System – 2017[19]



Monterey Salinas Transit (MST) also operates its Route 81 Fort Hunter Liggett–San José Airport Express service, making intermediate stops in Salinas, Gilroy, and other cities along the US-101 corridor south of San José. In San José, this service serves the Airport, Downtown San José, and Diridon station, making two daily round-trips on weekdays and Saturdays and one round-trip on Sundays.

Summary of Important Trips

The Airport is the primary commercial airport for the South Bay subregion of the San Francisco Bay Area. Air passengers using the Airport travel to or from locations throughout the Bay Area, particularly Santa Clara County and the South Bay. An AGT system linking with the Airport would enable air passenger trips between the Airport and:

- Activity centers immediately surrounding other AGT stations (e.g. Downtown San José)
- Other areas throughout the region near major transit lines (e.g. Caltrain or BART) that would connect with the AGT system

[19] VTA Next Network Proposed Changes to Light Rail. Santa Clara Valley Transportation Authority, January 2017.

As a large airport, the Airport is also a major employment center in the region, considering Airport staff, airline staff, and concessionaire staff. Further, given that Airport employees, unlike air passengers, make frequent trips to airports (i.e. daily commute trips), they typically constitute a substantial share of the ridership of high-capacity transit systems that serve airports. As with air passengers, Airport employees that live near AGT stations or near connecting regional transit services would comprise a portion of potential AGT passengers.

3.3.2 North San José

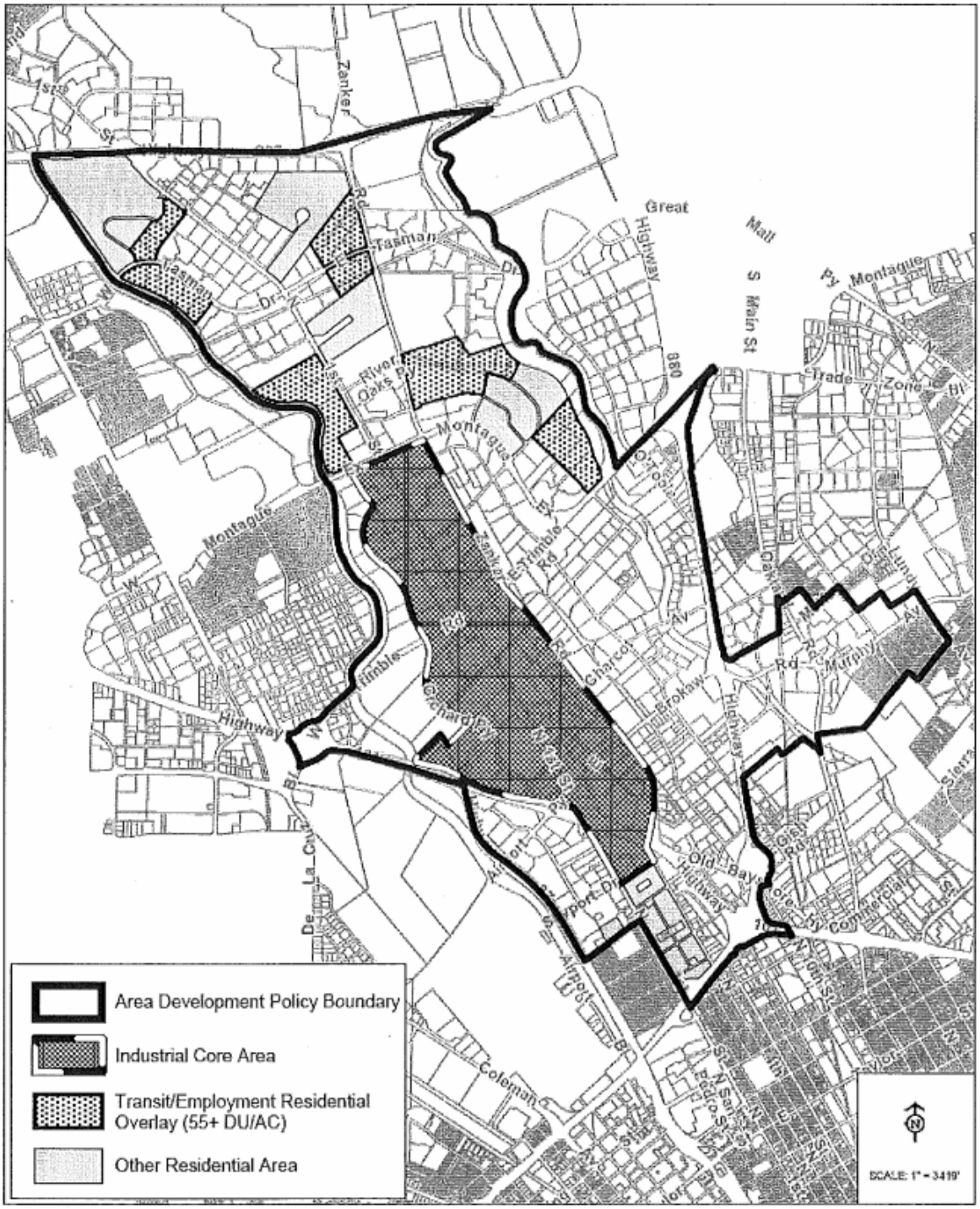
Activity Center Description

North San José is one of the Bay Area's largest concentration of office parks and is home to many industry-leading tech companies[20]. North San José was originally designed to facilitate auto travel. However, more recent policies adopted by the City, including the North San José Development Policy initially adopted in 2010, provide guidelines for the area to encourage higher intensity residential and commercial developments and facilitate greater transit use.

The North San José Development Policy encompasses the area bounded by State Route 237 to the north, Interstate 880 and Coyote Creek to the east, Interstate 880 and the Airport to the south, and Guadalupe River to the west. Figure 9 shows the land use vision for North San José.

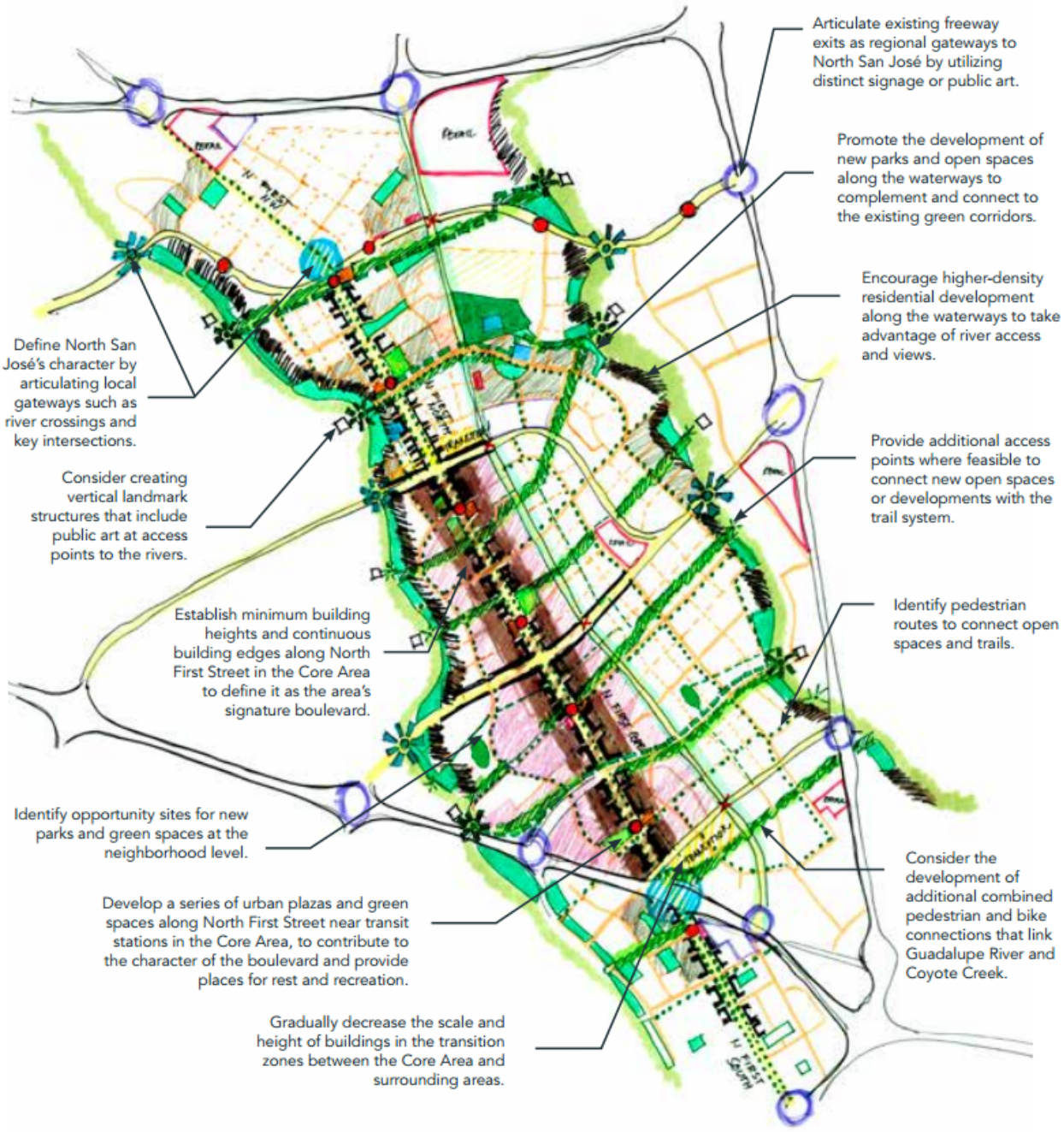
[20] Jobs-Housing Connection Strategy, Plan Bay Area. Association of Bay Area Governments, Metropolitan Transportation Commissions, May 2012.

Figure 9: North San José Area (City Development Policy) [21]



[21] North San José Area Development Policy. City of San José, February 2012.

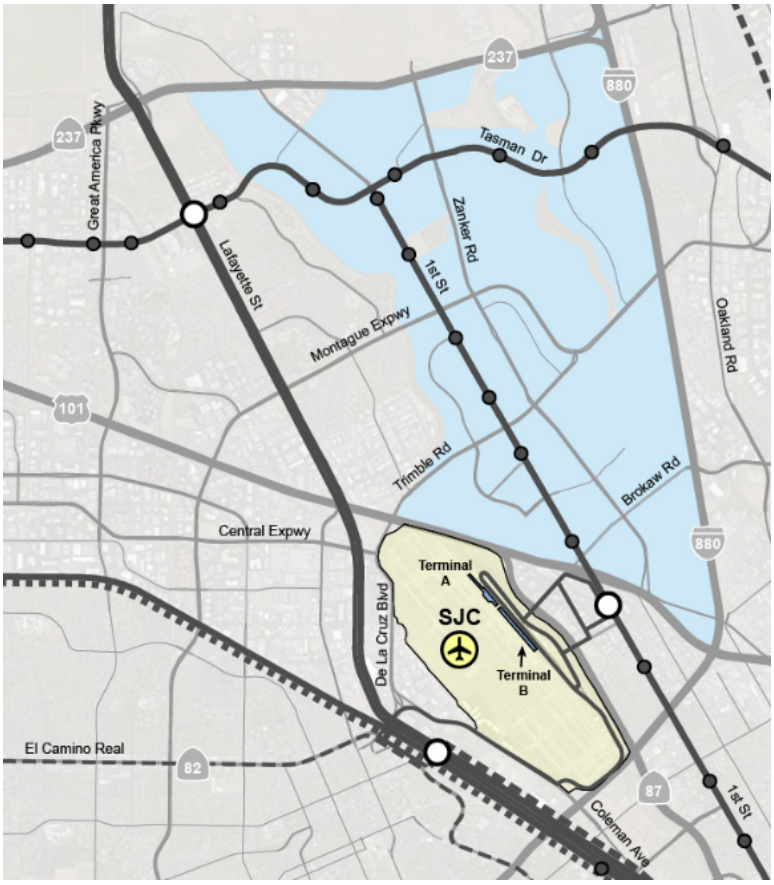
Figure 10: North San José Long-Term Framework[22]



[22] North San José Area Design Guidelines. City of San José, November 2014.

The geographic extents of North San José, as considered for this study, are shown below, in Figure 11 (area shaded blue).

Figure 11: North San José Area



The following population and employment were estimated for North San José:

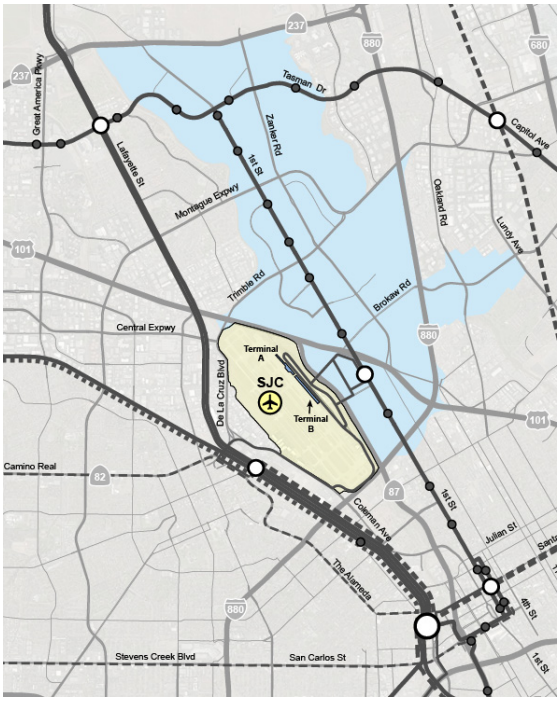
Table 12: Population and Employment in North San José[23]

	2015	2030
Population	23,565	50,510
Employment	81,633	99,678

North San José has been identified as a Priority Development Area (PDA). As such, the city has committed to developing additional housing with amenities and services in a pedestrian-friendly environment served by transit services.

[23] MTC Travel Demand Model. Metropolitan Transportation Commission, 2010.

Figure 12: North San José Area Priority Development Area[24]



Summary of Important Trips

North San José is a major employment center in the San José area. As a predominately commercial area, there are approximately five times as many jobs based in the area as there are residents. Accordingly, the most important trips to the area are commute trips from residential areas elsewhere in the region to workplaces in the North San José area.

The workplaces in the area likely also generate a small amount of business-related air travel at the Airport.

3.3.3 Downtown San José

Activity Center Description

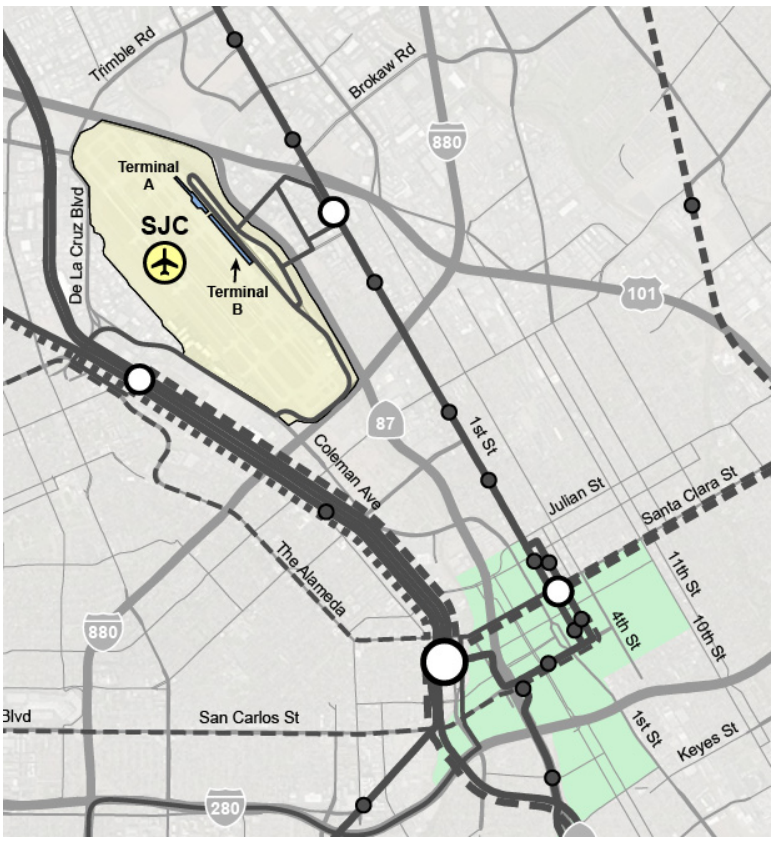
Downtown San José is the central business district of the City of San José and serves as the cultural and creative hub of the South Bay. It is principally a commercial district, although recent growth in housing has occurred, as well. Downtown San José is also home to cultural institutions, including San José State University, San José Museum of Art, Tech Museum of Innovation, San José Repertory Theatre, and San José Museum of Quilts & Textiles. Downtown San José also includes the San José McEnery Convention Center.

[24] Association of Bay Area Governments, July 2013.

As a regional center of the Bay Area, an increase in job growth is expected in Downtown San José, continuing the recent trend of growth of professional services.[25] This is representative of a trend of the Bay Area in attracting new businesses to locate in close proximity to related firms, services, and amenities.

The geographic extents of Downtown San José, as considered for this study, are shown below, in Figure 13 (area shaded green).

Figure 13: Downtown San José Area



The following population and employment were estimated for Downtown San José:

Table 13: Downtown San José Area[26]

	2015	2030
Population	20,210	34,508
Employment	35,084	51,381

Downtown San José has been identified as a Priority Development Area (PDA). As such, the city has committed to developing additional housing with amenities and services in a pedestrian-friendly environment served by transit services.

[25] Jobs-Housing Connection Strategy, Plan Bay Area. Association of Bay Area Governments, Metropolitan Transportation Commissions, May 2012.
[26] MTC Travel Demand Model. Metropolitan Transportation Commission, 2010.

Figure 14: Downtown San José Area Priority Development Area[27]

Summary of Important Trips

Downtown San José is a major commercial and cultural hub in the South Bay. There are approximately two times as many jobs in the area as there are residents. Accordingly, many of the trips to the area are work commute trips from residential areas elsewhere in the region. The workplaces in the area also likely generate some business-related air travel at the Airport.

Downtown San José is also home to the San José McEnery Convention Center. Over 690,000 people attended events at the Convention Center in 2014.[28] A sizable number of trips bound to the Convention Center or to hotels as part of Convention Center visits are made from origins throughout the Bay Area and from the Airport.

Additionally, San José State University (SJSU) is located on the eastern edge of Downtown. A large component of trips to and from Downtown are related to students, faculty, and staff making trips to and from the SJSU campus. SJSU includes approximately 3,000 faculty and staff[29] and 33,000 students[30].

3.3.4 Diridon Station Area

Activity Center Description

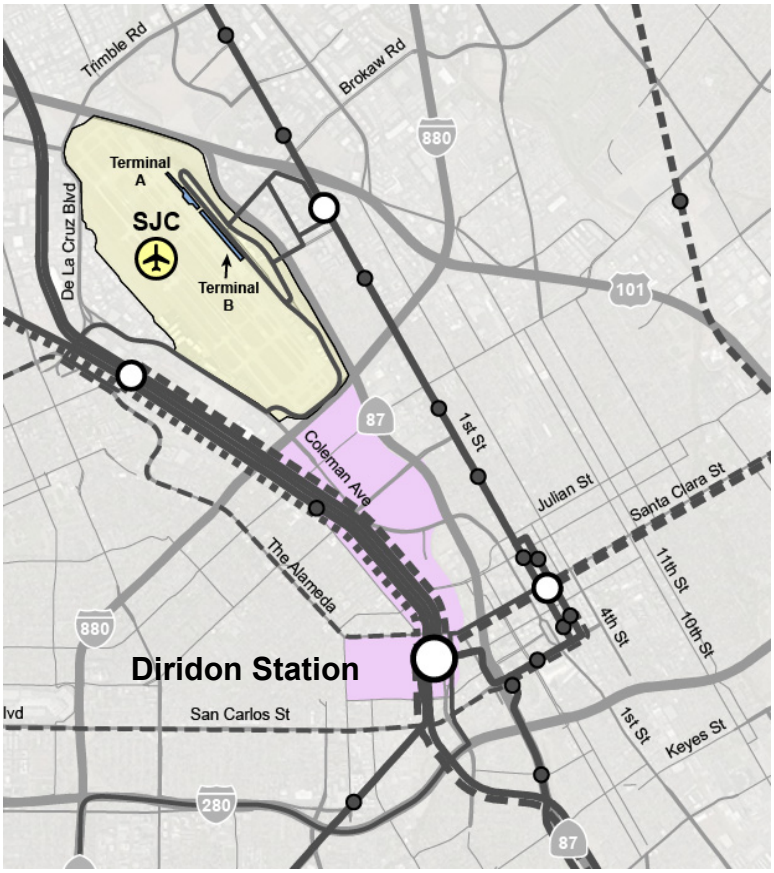
Diridon Station is a regional transit hub located on the western edge of Downtown San José, serving as a key connection point between several regional transit services. Diridon is currently served by rail services including Caltrain, Altamont Corridor Express (ACE), Capitol Corridor, VTA Light Rail, and Amtrak. The station is also served by many local and regional bus services.

[27] Association of Bay Area Governments, July 2013.
[28] Team San José, February 2015.
[29] "Profile of CSU Employees" (PDF). The California State University. 2012.
[30] "Institutional Effectiveness and Analytics - Student Information". San José State University. 2014.

In 2014, the City of San José approved the Diridon Station Area Plan, outlining concepts for the development of the Diridon station area, including open space, transportation facilities, and land use, over the subsequent 30 years.

The geographic extents of the Diridon Station Area, as considered for this study, are shown below, in Figure 15 (area shaded lavender).

Figure 15: Diridon Station Area



The following population and employment were estimated for the Diridon Station Area:

Table 14: Population and Employment the Diridon Station Area[31]

	2015	2030
Population	3,521	4,979
Employment	5,753	6,966

Connecting Transit Services at Diridon

The following transit services stop at Diridon and are described below:

- Caltrain

[31] MTC Travel Demand Model. Metropolitan Transportation Commission, 2010.

- VTA Light Rail
- Other Regional Rail (ACE, Capitol Corridor)
- Other Amtrak Services
- BART
- California High-Speed Rail Project

Caltrain

Caltrain currently provides commuter rail service north from San José Diridon station to San Francisco. Limited service is also provided south to Gilroy.

Currently, Caltrain operates a fleet of railcars and diesel locomotives. Today, during peak hours on weekdays, five trains are operated per hour in each direction between San José and San Francisco.

Table 15: Current Caltrain Peak Period Service Plan[32]

Service Type	Peak Hour Frequency (trains per hour per direction)	Travel Time, San José to San Francisco
Limited	3	69-90 minutes
Baby Bullet	2	59 minutes
TOTAL	5	-

By 2040, Caltrain will have completed the Caltrain Peninsula Corridor Electrification Project (PCEP) and will operate an all-electric fleet between San José and San Francisco. In the future, all trains will operate with the same general service plan during the peak periods, operating in a skip-stop pattern. However, one third of trains will operate all the way to the Transbay Terminal; two-thirds of trains will terminate at the 4th/King station.

Table 16: Planned 2040 Caltrain Peak Period Service Plan[33]

Service Type	Peak Hour Frequency (trains per hour per direction)	Travel Time, San José to San Francisco
To 4th/King	2	64 minutes
To Transbay Terminal	4	70 minutes
TOTAL	6	-

In 2015, the Peninsula Corridor Joint Powers Board (Caltrain) certified and adopted the Final Environmental Impact Report (FEIR) for the Peninsula Corridor Electrification Project (PCEP). The environmental impact report includes forecasts for Caltrain ridership.

[32] Peninsula Corridor Electrification Project Draft Environmental Impact Report, Appendix I, Ridership Technical Memorandum. Peninsula Corridor Joint Powers Board, February 2014.
[33] Peninsula Corridor Electrification Project Draft Environmental Impact Report, Appendix I, Ridership Technical Memorandum. Peninsula Corridor Joint Powers Board, February 2014.

Table 17: Caltrain Boardings at San José Diridon Station:[34]

Forecast Year	Daily Boardings
2013	3,523
2020	5,765
2040	10,994

Today, Caltrain passengers use multiple access modes to reach Diridon station. The existing access mode share (2007 figures) are presented in the table below:

Table 18: Caltrain Access Mode at San José Diridon Station[35]

Access Mode	Percent of Total Boardings
Drive	32 %
Walk	24 %
VTA Light Rail or Bus	16 %
Carpool	12 %
DASH (downtown shuttle)	9 %
Bicycle	5 %

VTA Light Rail

VTA's Light Rail system currently provides service from Diridon Station to many destinations in Santa Clara County, including the North First Street corridor in the vicinity of the Airport. The Mountain View–Winchester line provides direct service from Diridon to the Metro/Airport Light Rail station, located approximately one mile from the Airport terminals and served by the VTA Line 10 Airport Flyer bus.

The Mountain View–Winchester Line operates approximately every 15 minutes during peak hours and every 30 minutes during off-peak hours.

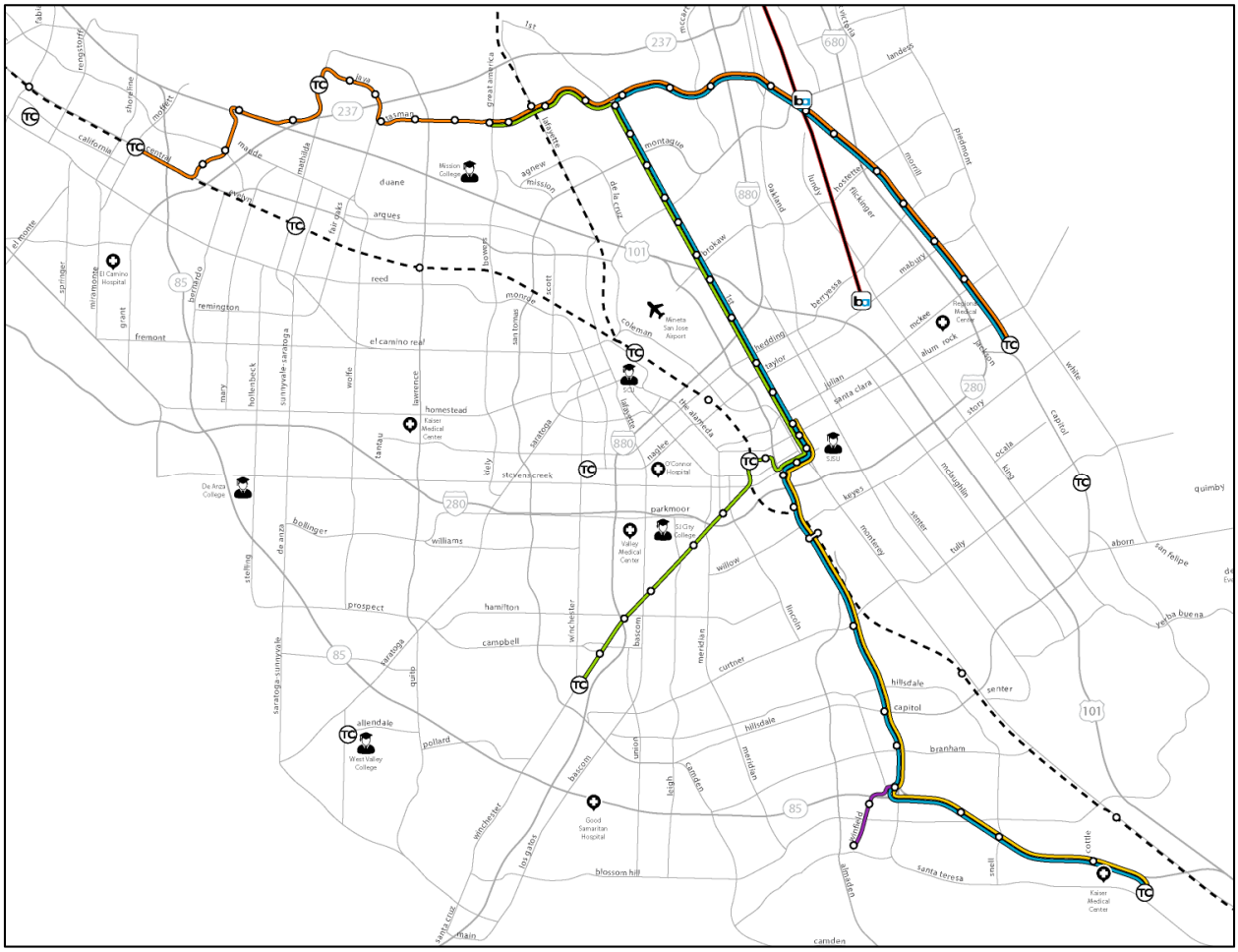
On an average weekday, the Diridon VTA Light Rail station sees approximately 670 passenger boardings.[36]

As introduced earlier, VTA has executed the "North First Street Corridor Light-Rail Speed Improvement Project," which increased track speeds along the First Street Corridor between Civic Center station and Tasman station, reducing travel times between Diridon station and the Metro/Airport station.

At the same time, VTA is also executing its Next Network Project, which will greatly reconfigure its light rail network in 2017 to complement the completion of the BART extension to Berryessa (under construction). Figure 16 shows the reconfigured system.

[34] Peninsula Corridor Electrification Project Draft Environmental Impact Report, Appendix I, Ridership Technical Memorandum. Peninsula Corridor Joint Powers Board, February 2014.
[35] Diridon Station Area Plan, Alternatives Analysis Report. City of San José, July 2010. Caltrain Onboard Survey, 2007.
[36] Santa Clara Valley Transportation Authority, December 2014.

Figure 16: Future VTA Light Rail System – 2017[37]



Other Regional Rail (ACE, Capitol Corridor)

Diridon is also currently served by two regional rail services, Altamont Corridor Express (ACE), and Amtrak's Capitol Corridor service.

In 2035, the following number of daily boardings are forecasted for Diridon station:

Table 19: 2035 Daily Regional Rail Boardings at San José Diridon Station: [38]

Service	Daily Boardings
ACE	1,800
Capitol Corridor	1,000

[37] VTA Next Network website. Santa Clara Valley Transportation Authority, January 2017.
[38] Diridon Station Area Plan, Alternatives Analysis Report. City of San José, July 2010. Caltrain Onboard Survey, 2007.

Other Amtrak Services

Diridon is also served by the Coast Starlight, an Amtrak long-distance intercity rail service. This service operates once daily, operating from Los Angeles to Seattle. While linking San José with both the Central Coast and the East Bay, Coast Starlight ridership at Diridon station is forecasted to have fewer than 100 boardings in 2035[39].

The California Department of Transportation (Caltrans) and the Coast Rail Coordinating Council have proposed the implementation of a new intercity rail service between San Francisco and Los Angeles, operating via San José and the Coast Corridor. Subject to the availability of capital and operating funding, this service, to be known as the Coast Daylight, would supplement existing Coast Starlight service, with up to two round-trips operating daily by 2040[40]. This existing service still would not be expected to generate more than several hundred boardings per day at Diridon station.

BART

The first phase of the BART Silicon Valley project is under construction; it involves an extension of the BART metro system from Warm Springs to Berryessa station. Revenue service on this segment is forecasted to begin in 2018. Phase II of the BART Silicon Valley project will extend the BART system further to Downtown San José and possibly Santa Clara, with revenue service forecasted to begin in 2025.

In 2035, between 10,600 and 16,200 daily BART boardings are forecasted at San José Diridon station.[41]

California High-Speed Rail Project

The California High-Speed Rail Project will construct a high-speed rail line from San Francisco to Los Angeles/Anaheim via San José. In San José, the high-speed rail service will serve Diridon.

In 2014, the California High-Speed Rail Authority issued its *Draft 2014 Business Plan*. The "Ridership and Revenue Forecasting Technical Memorandum" accompanying the Business Plan provides detailed explanation of ridership forecasts. According to the memorandum, San José will be incorporated into the high-speed rail system as part of two phases of the project's construction:

- Bay to Basin, providing service between San José/Merced and San Fernando, to be operational in 2027 (Figure 17)
- Phase 1, providing service between San Francisco/Merced (serving San José as an intermediate station) and Los Angeles, to be operational in 2029 (Figure 18).

[39] Diridon Station Area Plan, Alternatives Analysis Report. City of San José, July 2010.
[40] Coast Corridor Service Development Plan. California Department of Transportation, May 2013.
[41] Diridon Station Area Plan, Alternatives Analysis Report. City of San José, July 2010.

Figure 17: Bay to Basin High-Speed Rail System (2027)[42]

Figure 18: Phase 1 High-Speed Rail System (2029)[43]

[42] Ridership and Revenue Forecasting – Draft Technical Memorandum, 2014 Business Plan. California High-Speed Rail Authority, April 2014.
[43] Ridership and Revenue Forecasting – Draft Technical Memorandum, 2014 Business Plan. California High-Speed Rail Authority, April 2014.

Table 20 shows the service levels contemplated in each phase.

Table 20: Planned High-Speed Rail Service Levels at Diridon Station[44]

High-Speed Rail System Implementation Stage	Peak Train Frequency (trains per hour per direction)	Off-Peak Train Frequency (trains per hour per direction)
Bay to Basin (2027)	4	2
Phase 1 (2029)	4	3

Table 21 lists the daily high-speed rail daily boardings forecasted for Diridon with the proposed phased rail system implementation.

Table 21: High-Speed Rail Boardings at Diridon Station [45]

High-Speed Rail system Implementation Stage	Daily Boardings
Bay to Basin (2027)	13,900
Phase 1 (2029)	9,300
Phase 1 (future year 2040)	11,200

The phased nature of the construction of the high-speed rail system will have specific consequences for San José Diridon station. Specifically, Diridon station will serve the greatest ridership during the interim years when it functions as a high-speed rail terminus (i.e. before high-speed rail service is extended to San Francisco).

Demand for "drive and park" access trips to high-speed rail at Diridon station has also been estimated (shown in Table 22). The trips estimated below depend on several assumptions that are important to note as they will likely shift and/or not hold true through high-speed rail project implementation:

- Unlimited parking provided around Diridon station for high-speed rail passengers; and
- Parking priced at market rate of surrounding area.

Particularly, as land development intensifies around Diridon station as envisioned in the City's plans, parking will no longer be the highest and best use of land, and the parking provided will be costly. Therefore, it is worth considering whether an AGT could provide access to parking located nearby to serve the demand generated by "drive and park" high-speed rail trips.

Table 22: "Drive and Park" Trips at San José Diridon Station[46]

High-Speed Rail System Implementation Stage	Daily "Drive and Park" Trips
Bay to Basin (2027)	2,635
Phase 1 (2029)	2,280
Phase 1 (future year 2040)	2,555

[44] Ridership and Revenue Forecasting – Draft Technical Memorandum, 2014 Business Plan. California High-Speed Rail Authority, April 2014.
[45] California High-Speed Rail Authority, Fall 2014.
[46] California High-Speed Rail Authority, Fall 2014.

Summary of Important Trips

Diridon Station serves important blocs of trips including commuters bound for job locations in Downtown San José and commuters bound for job locations on the Peninsula and in San Francisco.

In the future, Diridon station will be served by the Silicon Valley extension of the BART system, providing frequent and direct rail service to the East Bay. Additionally, the station will be served by the proposed California High-Speed Rail Project, providing direct high-speed rail service to the Central Valley and Southern California.

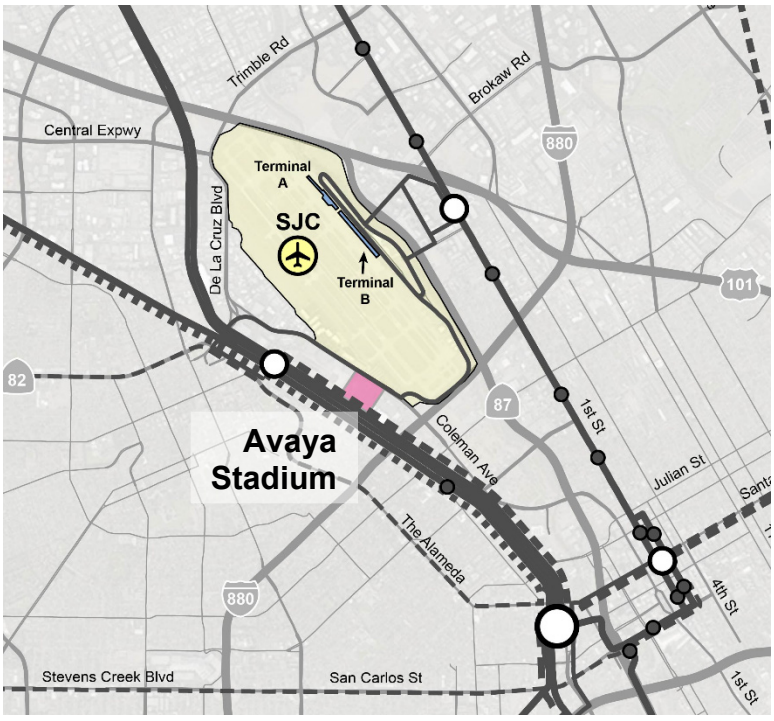
Secondarily, the community immediately surrounding Diridon Station is poised for growth, but generates relatively few trips. SAP Center is also a large generator of events-based trips.

3.3.5 Avaya Stadium

In 2015, Avaya Stadium opened as the new home of the San José Earthquakes Major League Soccer team. Located on the west side of Coleman Avenue, immediately opposite to the Airport, the stadium includes approximately 18,000 seats.

The location of Avaya Stadium is shown below (area shaded pink), in Figure 19.

Figure 19: Avaya Stadium



The approximate number of events that will be hosted at Avaya Stadium annually and the expected attendance for each type of event is given in Table 23 below. (The estimates for concert and event attendance developed for the Stadium EIR are based on data collected for similar events held at HP Pavilion.)

Table 23: Events at Avaya Stadium:[47]

Event Type	Events per Year (approx.)	Expected Attendance per Event
Soccer Games	20 (4 pre-season, 15 homes games, 1 possible other)	18,000 (sold-out)
Concerts	15	11,000*
Events	20	2,000 – 9,000*
TOTAL	55	-

3.3.6 Santa Clara Station and Santa Clara University

Santa Clara station (also known as Santa Clara University Station) is a rail station, located on the eastern edge of Santa Clara, served by several regional transit services.

The station is situated approximately one-quarter mile away from Downtown Santa Clara. The station area itself is planned for mixed-use transit-oriented development (TOD)[48]. The Santa Clara Station Area Plan notes key visions for the surrounding area, including the revitalization of Santa Clara's downtown and the growth of Santa Clara University. Downtown Santa Clara is planned to develop into a high-intensity, mixed-use center with new residential and commercial development. Integrating the station with the surrounding community is identified as a priority.

The station is currently served by rail services including Caltrain, Altamont Corridor Express (ACE), and the Capitol Corridor. Importantly, Santa Clara station is, in general, served by less Caltrain service than Diridon station is. While the station is served by all local trains during off-peak hours, during peak hours, the station is served by only two-thirds of limited trains and no Baby Bullet trains (i.e., only forty percent of all Caltrain trains running in the corridor at that time).

Table 24: Current Caltrain Peak Period Service Plan [49]

Service Type	Peak Hour Frequency (trains per hour per direction)	Travel Time, Santa Clara to San Francisco
Limited	2	79-85 minutes
Baby Bullet	0	-
TOTAL	2	-

By 2040, Caltrain will have completed the Caltrain Peninsula Corridor Electrification Project (PCEP) and will operate an all-electric fleet between San José and San Francisco. In the future, all trains will operate with the same general service plan during the peak periods, operating in a

[47] Draft Environmental Impact Report: Airport West Stadium and Great Oaks Place Project. City of San José, September 2009.
[48] Santa Clara Station Area Plan. Santa Clara Valley Transportation Authority, City of Santa Clara, City of San José. August 2010.
[49] Peninsula Corridor Electrification Project Draft Environmental Impact Report, Appendix I, Ridership Technical Memorandum. Peninsula Corridor Joint Powers Board, February 2014.

skip-stop pattern. However, one third of trains will operate all the way to the Transbay Terminal; two-thirds of trains will terminate at the 4th/King station. (Importantly, none of the trains that serve the Transbay Terminal will also serve Santa Clara station, likely contributing to the forecasted *decline* in Santa Clara station ridership between 2020 and 2040 noted in Table 25.) This service plan, as published, however, is merely a prototypical service plan; additional planning studies will be conducted before a service plan is implemented.

Table 25: Planned 2040 Caltrain Peak Period Service Plan [50]

Service Type	Peak Hour Frequency (trains per hour per direction)	Travel Time, Santa Clara to San Francisco
To 4th/King	2	59 minutes
To Transbay Terminal	0	-
TOTAL	2	-

In 2015, the Peninsula Corridor Joint Powers Board (Caltrain) certified and adopted the Final Environmental Impact Report (FEIR) for the Peninsula Corridor Electrification Project (PCEP). The environmental impact report includes forecasts for Caltrain ridership.

Table 26: Caltrain Boardings at Santa Clara Station[51]

Forecast Year	Daily Boardings
2013	792
2020	986
2040	885

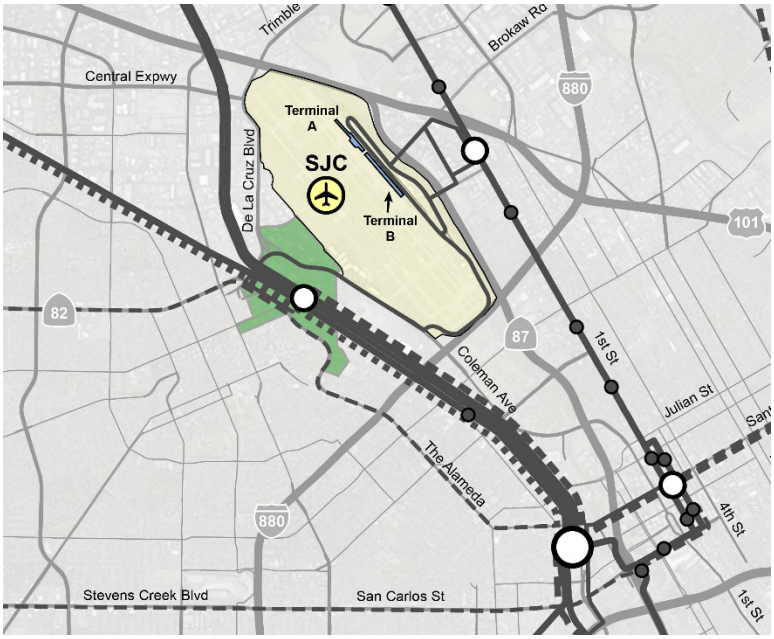
Santa Clara is also currently served by two regional rail services, Altamont Corridor Express (ACE), and Amtrak's Capitol Corridor service. Additionally, the station is also served by local and regional bus services.

The first phase of the BART Silicon Valley project is under construction; it involves an extension of the BART metro system from Warm Springs to Berryessa station. Revenue service on this segment is forecasted to begin in 2018. Phase II of the BART Silicon Valley project will extend the BART system further to Downtown San José and possibly Santa Clara, with revenue service forecasted to begin in 2025.

The geographic extents of the Santa Clara station area, as considered for this study, are shown below, in Figure 20 (area shaded green).

[50] Peninsula Corridor Electrification Project Draft Environmental Impact Report, Appendix I, Ridership Technical Memorandum. Peninsula Corridor Joint Powers Board, February 2014.
[51] Peninsula Corridor Electrification Project Draft Environmental Impact Report, Appendix I, Ridership Technical Memorandum. Peninsula Corridor Joint Powers Board, February 2014.

Figure 20: Santa Clara Station Area



The following population and employment were estimated for the Santa Clara Station area:

Table 27: Population and Employment in Santa Clara Station Area[52]

	2015	2030
Population	10,261	14,890
Employment	10,407	12,144

Additionally, Santa Clara University (SCU) is located opposite the Santa Clara station. A component of trips to and from the area are related to students, faculty, and staff making trips to and from the SCU campus. The university includes approximately 1,800 faculty and staff[53] and approximately 9,000 students[54].

3.4 Observations

For the purpose of this study, the trips that could logically be made between activity centers in the study area are categorized into three types: Airport Passenger (trips to/from the Airport for the purpose of making an air trip), Airport Employees (trips to/from the Airport for the purpose of working at the Airport, and Non-Airport (a broad label for any other kind of trip, including non-Airport work trips, non-Airport tourist trips, non-Airport sports spectator trips, pass-through transit trips, and trips to the Airport for non-flight or non-work purposes, such as car rental or non-airport parking).

Most of the activity centers in the project study area are anticipated to experience significant growth by 2030.

[52] MTC Travel Demand Model. Metropolitan Transportation Commission, 2010.
[53] "Faculty/Staff". Santa Clara University. Fall 2013.
[54] "Student Profile – Fall 2013". Santa Clara University. Fall 2013.

- Mineta San José Airport is the primary commercial airport for the South Bay subregion of the San Francisco Bay Area. As such, it serves a large number of air passengers but also employs a large number of employees (including Airport staff, airline staff, and concessionaire staff). In the 2014 to 2030 timeframe, the airport forecasts over 80 percent growth in air passenger traffic (and the number of employees can also be expected to increase significantly, as a result). Presently, the airport terminals are principally served by the VTA Line 10 Airport Flyer, which provides infrequent and lengthy service to nearby transit facilities (i.e., Caltrain at Santa Clara station and VTA Light Rail at Metro/Airport station).
- North San José is a major hub of office parks and leading tech companies. Designated as a Priority Development Area (PDA), the area is planned for significant growth in housing and modest growth in employment.
- Downtown San José is the central business district of the City of San José. Although home to San José State University (SJSU) and the San José McEnery Convention Center, it is principally a commercial district. Designated as a Priority Development Area (PDA), the area is planned for considerable growth in housing and employment.
- Diridon Station is a regional transit hub located on the western edge of Downtown San José, serving as the single most important connection point between regional transit services. In the future, the station is anticipated to also be served by BART and the proposed California High-Speed Rail Project. Secondarily, the community immediately surrounding Diridon Station is poised for growth, but generates relatively few trips. SAP Center is also a large generator of events-based trips.
- In 2015, Avaya Stadium opened as the new home of the San José Earthquakes Major League Soccer (MLS) soccer team. The stadium includes approximately 18,000 seats and is expected to serve approximately 20 sold-out events per year. Approximately 35 other smaller events are expected each year.
- Santa Clara station (also known as Santa Clara University Station) is a rail station, located on the eastern edge of Santa Clara, served by several regional transit services including infrequent Caltrain service. The station is situated approximately one-quarter mile away from Downtown Santa Clara. Additionally, Santa Clara University (SCU) is located opposite the Santa Clara station. Modest growth in population and employment is expected in the overall station area.

4 AGT Technology Scan

A wide range of automated transit systems are in operation today or are in some phase of development for future implementation. Each type of system has key advantages and disadvantages but can generally be ordered by its passenger capacity. Automated metro systems offer the greatest capacity, carrying up to 30,000 passengers per hour per direction, but accordingly come with the greatest infrastructure costs. Conversely, "personal rapid transit" (one version of an Automated Transit Network) has a lower capacity (1,000 – 2,500 passengers per hour per direction) and may be a better match for lower demand markets. However, this particular technology has a greater risk as it has not seen implementation on a larger scale. Automated transit technologies considered include:

- **Automated Metro:** Automated metro systems require robust guideways and station infrastructure but offer the greatest capacity of automated transit technologies. Automated metros operate on fixed schedules as long trains (typically consisting of four or more cars), stop at all stations, and are most appropriate to serve major urban corridors, similar to traditional heavy rail or light rail.
- **Automated People Mover (APM):** Automated people mover systems operate similarly as automated metros, on fixed schedules, stopping at all stations, but with shorter trains (typically consisting of one to three cars). These shorter train lengths, combined with reduced station and guideway requirements, gives the technology the flexibility to serve medium-sized markets, such as to/within airports or within resort complexes.
- **Automated Transit Network (ATN):** Automated transit networks use relatively small vehicles that can operate only when needed (on-demand) and provide non-stop, point-to-point service between origin and destination stations. The term ATN generally includes two subtypes, although the technology has not yet been standardized. Group Rapid Transit features larger vehicles (10-25 passengers) that may operate on-demand or may also operate on a fixed schedule like an APM. Personal Rapid Transit operates with single small vehicles serving one to six passengers each as an on-demand service.

Automated guideway transit technologies are further compared in Figure 21 on the following page.

Automated Guideway Transit (AGT)

ARUP

	Automated Metro	Automated People Mover (APM)	Automated Transit Network (ATN)	
			Estimates below based on understanding of current technology	
			Group Rapid Transit (GRT)	**Personal Rapid Transit (PRT)**
SERVICE TYPE	Scheduled	Scheduled	On-Demand or Scheduled	On-Demand or Scheduled
TYPICAL # CARS	4-6+ cars	1-3 cars	1 vehicle	1 vehicle
TYPICAL TRAIN CAPACITY	500-900 passengers	100-250 passengers	10-25 passengers	1-6 passengers
TYPICAL SPEED	40-60 mph	30-50 mph	15-25 mph	15-25 mph
PRACTICAL LINE CAPACITY	10,000-30,000 passengers per hour per direction (pphpd)	2,500-10,000 pphpd	2,500-5,000 pphpd	1,000-2,500 pphpd
THEORETICAL LINE CAPACITY			20,000 pphpd	10,000 pphpd
ALIGNMENT CONFIGURATION	Corridor	Corridor	Corridor (typical) or Network	Network (typical) or Corridor
REPRESENTATIVE IMAGE(S)		  		
GUIDEWAY TECHNOLOGY	Steel rail; Rubber tire on concrete	Rubber tire on concrete; Straddle beam monorail; Suspended monorail; Steel rail	Rubber tire on concrete	Rubber tire on concrete; Suspended steel rail; Supported steel rail
PROPULSION TECHNOLOGY	Electric linear induction; Electric third rail; Electric third rail	Electric third rail; Cable propelled; Electric third rail; Pneumatic	Electric third rail	On-board battery; Electric third rail
EXAMPLE SYSTEMS	Lille Metro, France Dubai Metro, United Arab Emirates Vancouver SkyTrain, Canada	Many U.S. Airports Las Vegas Monorail, Nevada Aria Resort, Las Vegas, Nevada Crystal Mover, Singapore	Morgantown, West Virginia Rivium, Netherlands	London Heathrow Airport, United Kingdom Masdar City, United Arab Emirates Suncheon Bay, South Korea
KEY BENEFITS	High system capacity Speed	Frequency High system capacity	Operating flexibility Passenger experience Frequency	Direct service between stations Passenger experience Frequency
KEY DRAWBACKS	Guideway size Alignment constraints Large station size	Guideway size Alignment constraints Large station size	Guideway size Low system capacity	Low system capacity

5 Market Assessment

The product of the market assessment is an estimate of all the possible daily trips that will be made to, from, and between each of the six activity centers defined for this study. The estimate is made for the forecast year of 2030 and includes an assumption that other major transit infrastructure improvements will be made in the Bay Area, notably including BART to San José, the electrification and modernization of Caltrain, and California High-Speed Rail service through San José.

The market assessment quantifies the relative contribution of airport passenger trips, airport employee trips, and trips made for all other purposes. This is a fundamental step toward estimating potential demand on an AGT system. As elaborated in the next chapter, shares of the total trips identified in this market assessment are later assigned to AGT alternatives based on the attractiveness of each AGT alternative being tested.

This study considers travel demand between these activity centers located in central Santa Clara County, as described in Section 3.3:

1. Mineta San José Airport (Airport)
2. San José Diridon Station (Diridon)
3. Downtown San José
4. North San José
5. Avaya Stadium (also known as Earthquakes Stadium)
6. Santa Clara Caltrain and Santa Clara University

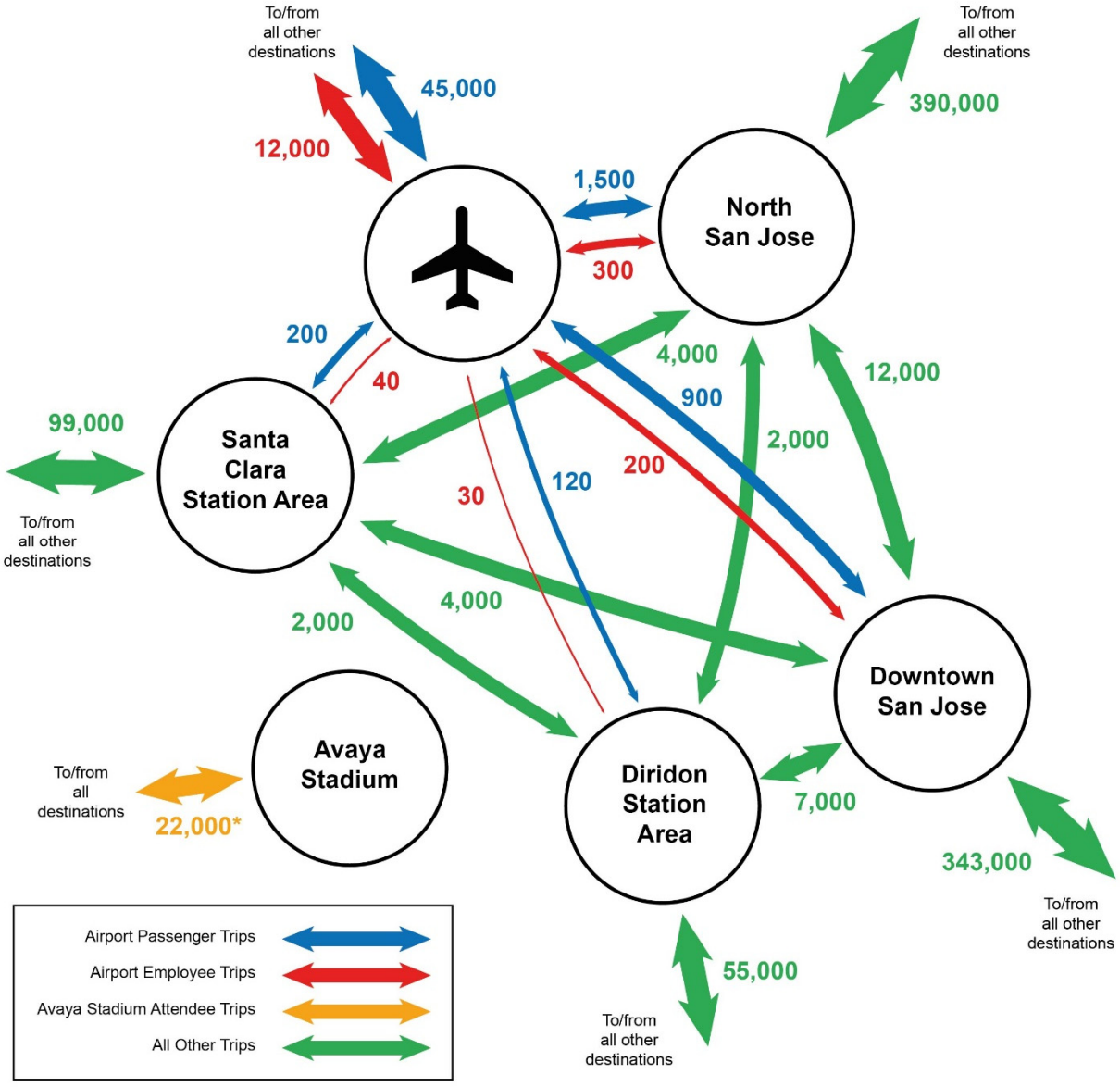
Assessment of the activity center-based travel demand is conducted using several datasets. These datasets include airport historical data and forecasts and outputs from the MTC regional travel demand model. The next section, 5.1, summarizes the findings of this assessment.

Separately, the market assessment also provides a focused look at the potential market for connecting travel between high-speed rail at Diridon station and flights at the Airport. This specific market is analyzed by focusing on portions of the state that could potentially benefit from a convenient high-speed rail connection to the Airport. The results of this analysis are discussed in Section 5.2.

5.1 Estimate of Activity Center-Based Trips in 2030

Figure 22 below indicates the total number of trips forecasted to be made to, from, and between the activity centers defined for the study. Note that the figure indicates the number of trips made between each origin and destination, not the path used. In subsequent analysis, trips are assigned to specific paths. The assumptions used for the analysis are described below in Section 5.1.2.

Figure 22: Daily Trips To/From Activity Centers (2030)



Notes:

* Origin locations of trips to Avaya Stadium were not identified in this study; Avaya Stadium trips were not assigned to the study activity centers. Of the various types of events hosted at Avaya annually, the daily attendee trips to/from Avaya Stadium shown corresponds to a median value for attendance. Some events will have larger attendance and others will have smaller attendance.

** Line widths are scaled logarithmically with trip volumes.

Several observations can be drawn from these trip patterns:

- Employee trips to/from the Airport represent a considerable number of trips to/from the airport (equal to approximately one-quarter of air passenger trips to/from the Airport).
- The vast majority (approximately 95 percent) of trips to/from the Airport are to/from locations other than the six study activity centers.
- The vast majority of travel between the study activity centers, taken together, is unrelated to the Airport.
- Demand for travel to North San José is approximately equal to demand for travel to/from Downtown San José.
- On days with "medium" or "large" events, demand for travel to/from Avaya Stadium is approximately one-third as demand for travel to/from the Airport.

5.1.1 Trip Origins and Destinations

The following figures show the estimated geographic distribution of the origins/destinations of trips to/from the study activity centers[55]. The origin/destination estimates were used in subsequent analysis to estimate the paths that people will likely use to travel to each of the activity centers studied. The assumptions used in the analysis are described below in Section 5.1.2. The figures include the following:

- Figure 23 – Origin and/or destination locations of San José Airport air passenger trips
- Figure 24 – Origin and/or destination locations of San José Airport employees
- Figure 25 – Origin and/or destination locations to Diridon area
- Figure 26 – Origin and/or destination locations to Downtown San José area
- Figure 27 – Origin and/or destination locations to North San José area
- Figure 28 – Origin and/or destination locations to Santa Clara Station area

[55] Geographic distribution of airport passenger origins based on 2014 Air Passenger Survey, Mineta San José International Airport. Geographic distribution of airport employees' origins based on data from Mineta San José International Airport. Geographic distribution of all other trips estimated by MTC regional travel demand model.

Figure 23: Estimated Origin and/or Destination Locations

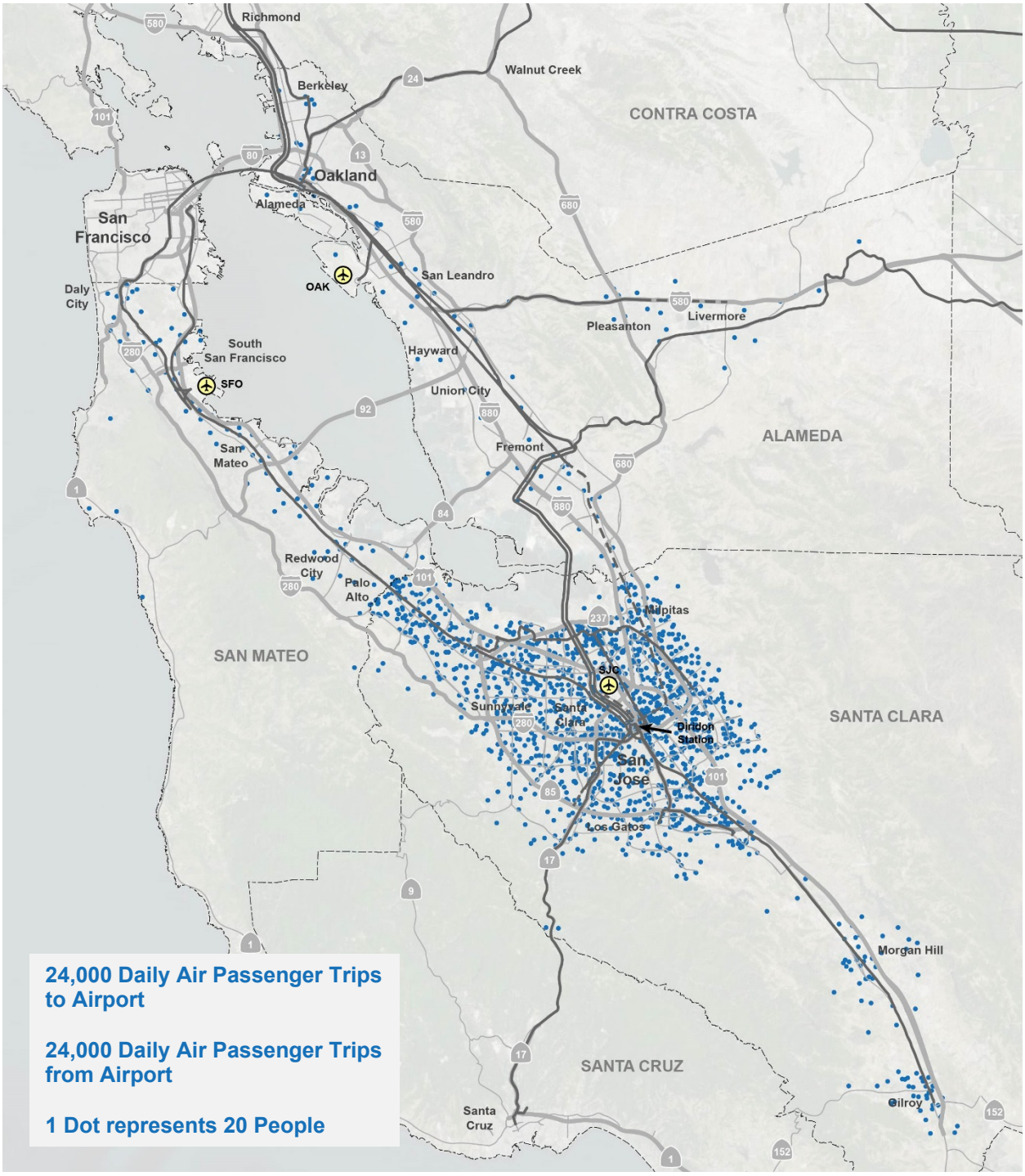


Figure 24: Estimated Airport Employee Home Locations (2030)

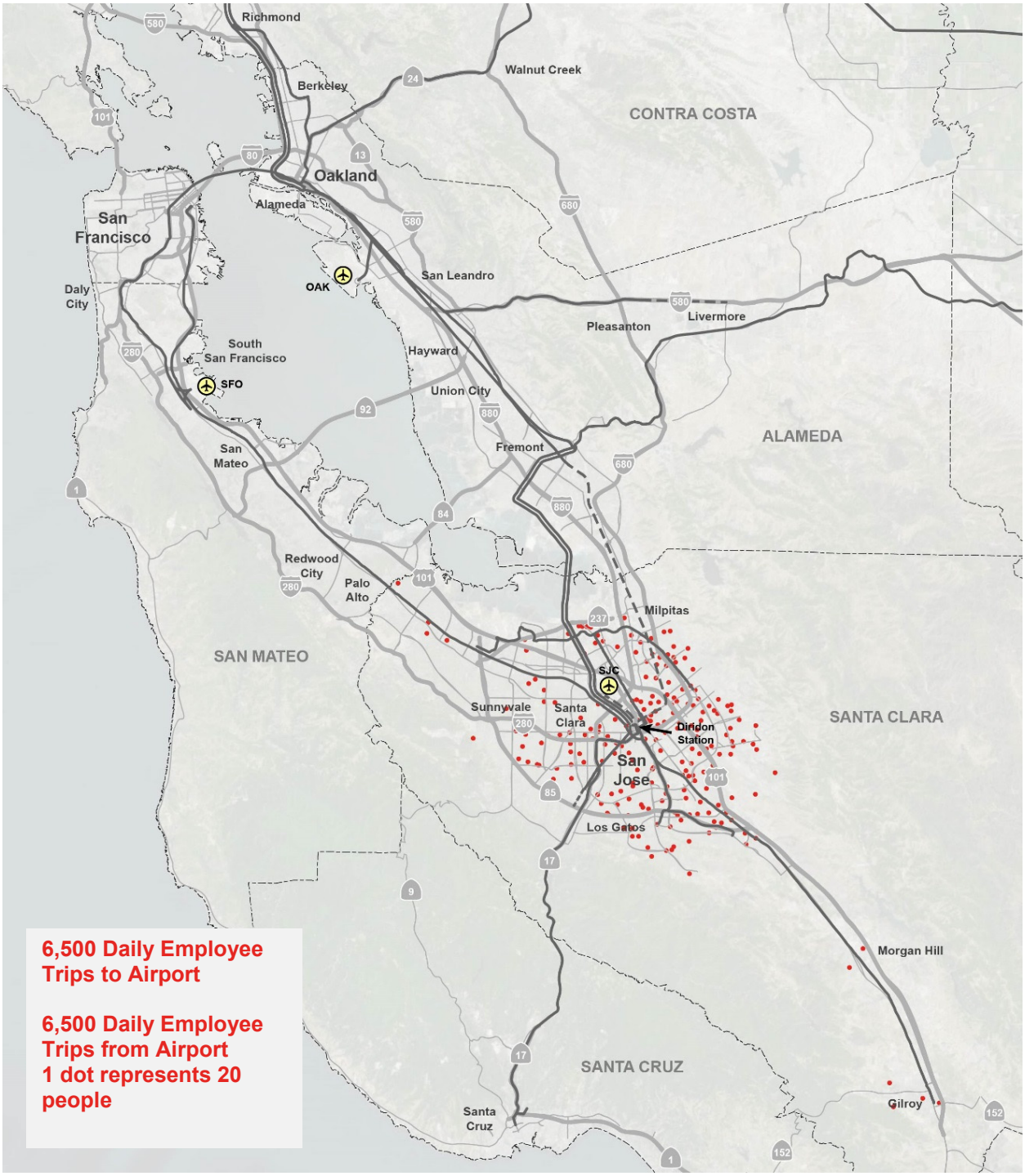


Figure 25: Estimated Origin Locations, Daily Trips to Diridon Area (2030)

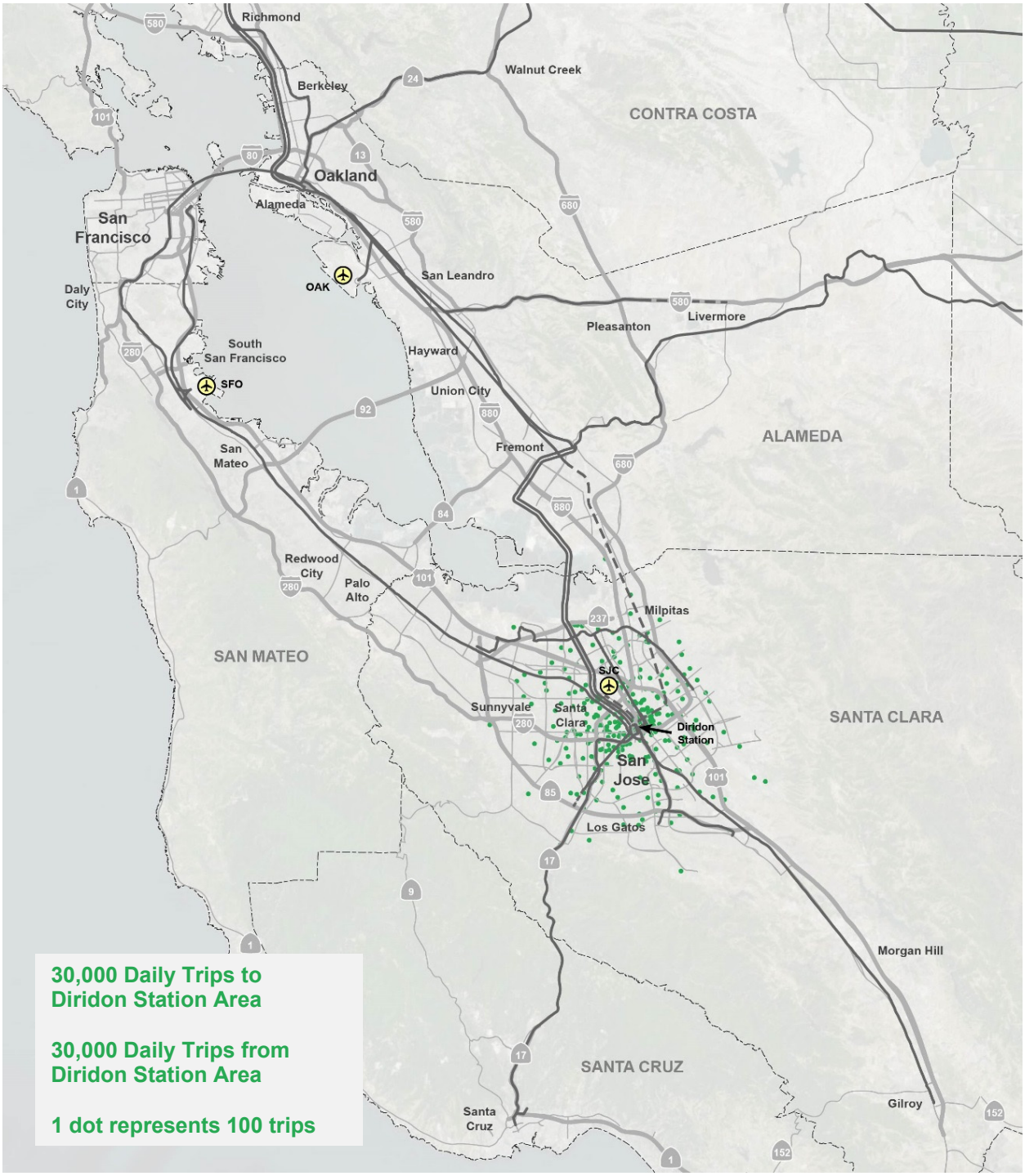


Figure 26: Estimated Origin Locations, Daily Trips to Downtown San José (2030)

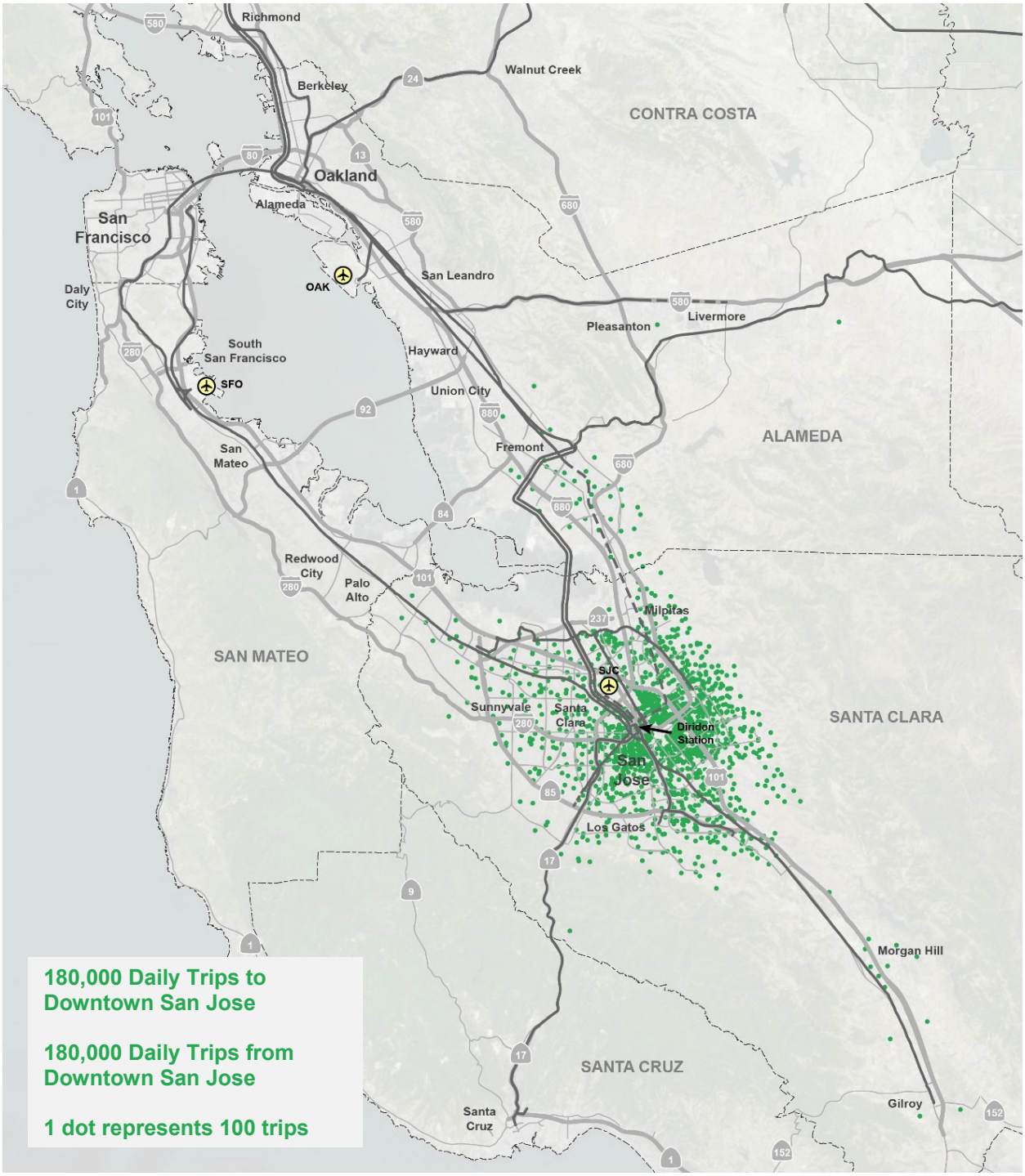


Figure 27: Estimated Origin Locations, Daily Trips to North San José (2030)

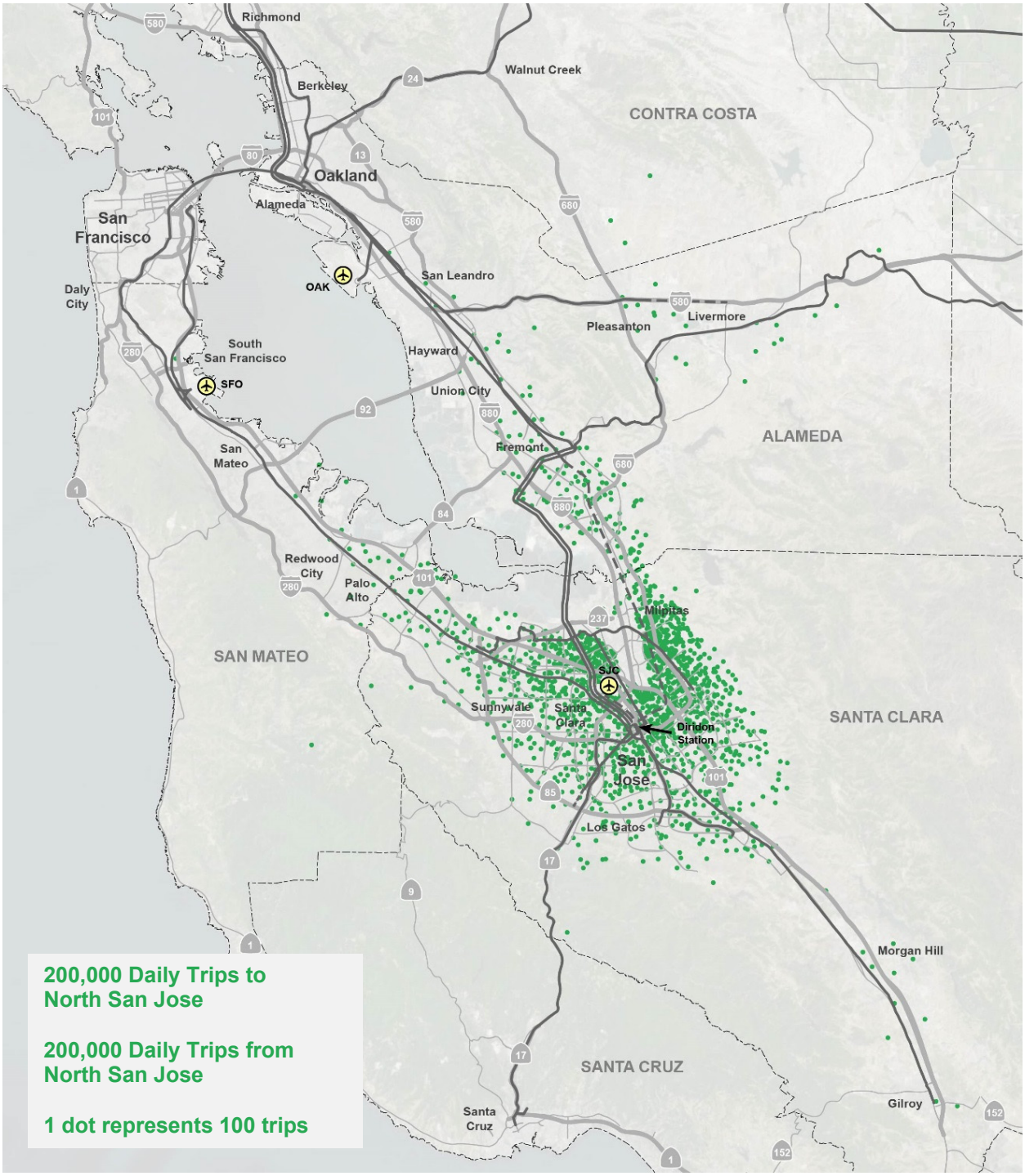
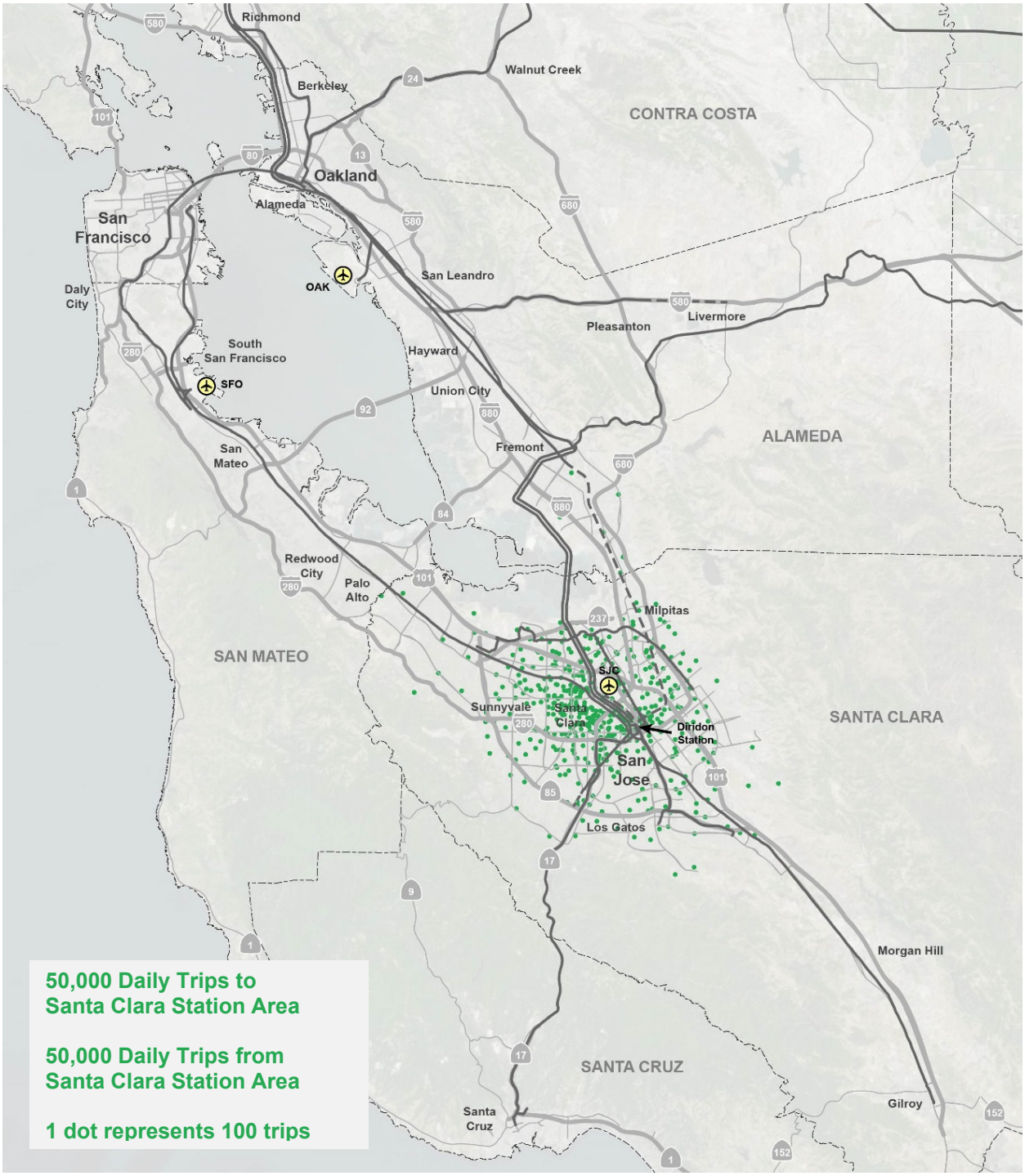


Figure 28: Estimated Origin Locations, Daily Trips to Santa Clara Station Area (2030)



5.1.2 Market Assessment Assumptions

In estimating 2030 daily trips to/from each activity center, a number of assumptions are made:

Mineta San José Airport

- 2027 air passenger traffic numbers, as forecasted by the San José Airport, are used.
- Air passengers' origin/destination locations are assumed to be distributed within each geographic subarea (e.g., the City of San José or San Mateo County) proportionally to forecasted 2030 population and employment.
- The geographic distribution of air passengers' origin/destination locations in the region will not change significantly from the current distribution (e.g., the fraction of total air passengers traveling to the City of San José will not change).
- Air passenger trips to/from Santa Clara County, San Mateo County, and Alameda County are modeled (accounting for 75 % of total air passenger traffic).
- The number of airport employees will scale proportionally with growth in air passenger traffic.
- The time-of-day profile of air passenger traffic is assumed not to change in future years.
- Airport employees' home locations are assumed to be distributed within each geographic subarea (e.g., the City of San José or San Mateo County) proportionally to forecasted 2030 population.
- The geographic distribution of airport employees' origin/destination locations in the region will not change significantly from the current distribution (e.g., the fraction of total airport employees living in the City of San José will not change).
- Airport employee trips to/from Santa Clara County, San Mateo County, and Alameda County are modeled (accounting for 88 % of total airport employees).
- Airport employees each make one trip to the airport and one trip from the airport daily.

Diridon Station Area, Downtown San José, North San José, Santa Clara Station Area

- Non-airport-related trips to/from each neighborhood are estimated based on trips forecast by the MTC Regional Travel Demand Model for a 2030 forecast year.
- Trips of all purposes, including work, recreational, school, etc., are considered.

Avaya Stadium

- A schedule of events and expected attendance is assumed for Avaya Stadium. See Section 3.4.5 for greater detail.
- Employee trips to/from Avaya Stadium are not specifically considered.
- Construction of a geographic distribution of trips to/from Avaya Stadium was not attempted, as the distribution would vary widely by type of event (consistent with most event centers).

5.2 High-Speed Rail to Mineta San José Airport Trips in 2030

This section discusses the potential for high-speed rail to serve as a feeder from the Central Valley to airports in the Bay Area and Southern California, including the Airport. The analysis provides a high-level estimate of the potential for high-speed rail to increase Central Valley air travel demand, assuming that high-speed rail would provide better connecting service from the Central Valley to major airports in California.

The analysis suggests that by 2030, up to a thousand additional daily passengers from the Central Valley could ride high-speed rail to Diridon Station and transfer using an Automated Guideway Transit (AGT) connection to the Airport. However, the use of this analysis is cautioned for several reasons discussed at the conclusion of this section.

5.2.1 The Context of High-Speed Rail and Airports

A key expected benefit of an AGT system in the study area would be a direct transit link to allow high-speed rail passengers to transfer quickly and easily from San José Diridon station to the Airport.

A key goal of the California High-Speed Rail system is to enable fast, convenient intrastate travel, thereby relieving major highways and airports within the state. In this sense, high-speed rail will compete with some existing air routes (specifically, short-haul flights within the state). However, high-speed rail can also serve as a complement to air routes by providing convenient access from portions of the state to longer-haul flights calling at the state's larger airports. The first phase of the California High-Speed Rail project is already planned to directly connect with two commercial service airports: San Francisco International Airport (SFO) and Burbank Bob Hope Airport (BUR).

The state's largest commercial airports are located in the San Francisco Bay Area or in Southern California. The Central Valley, with smaller airports and fewer flights, stands to gain from improved access to air destinations via high-speed rail.

In the Central Valley, four metro areas with commercial service airports will be served by Phase 1 of the California High-Speed Rail system (see Table 28 below):

- Merced, served by Merced Regional Airport (MCE)
- Fresno, served by Fresno Yosemite International Airport (FAT)
- Visalia, served by Visalia Municipal Airport (VIS)
- Bakersfield, served by Kern County/Bakersfield Airport (BFL)

Historically, commercial service airports in the Central Valley have had fairly limited flight availability and overall passenger traffic. Table describes how many daily flights and boardings occur now at the above-named Central Valley airports.

Figure 29: California HSR and Airport Context

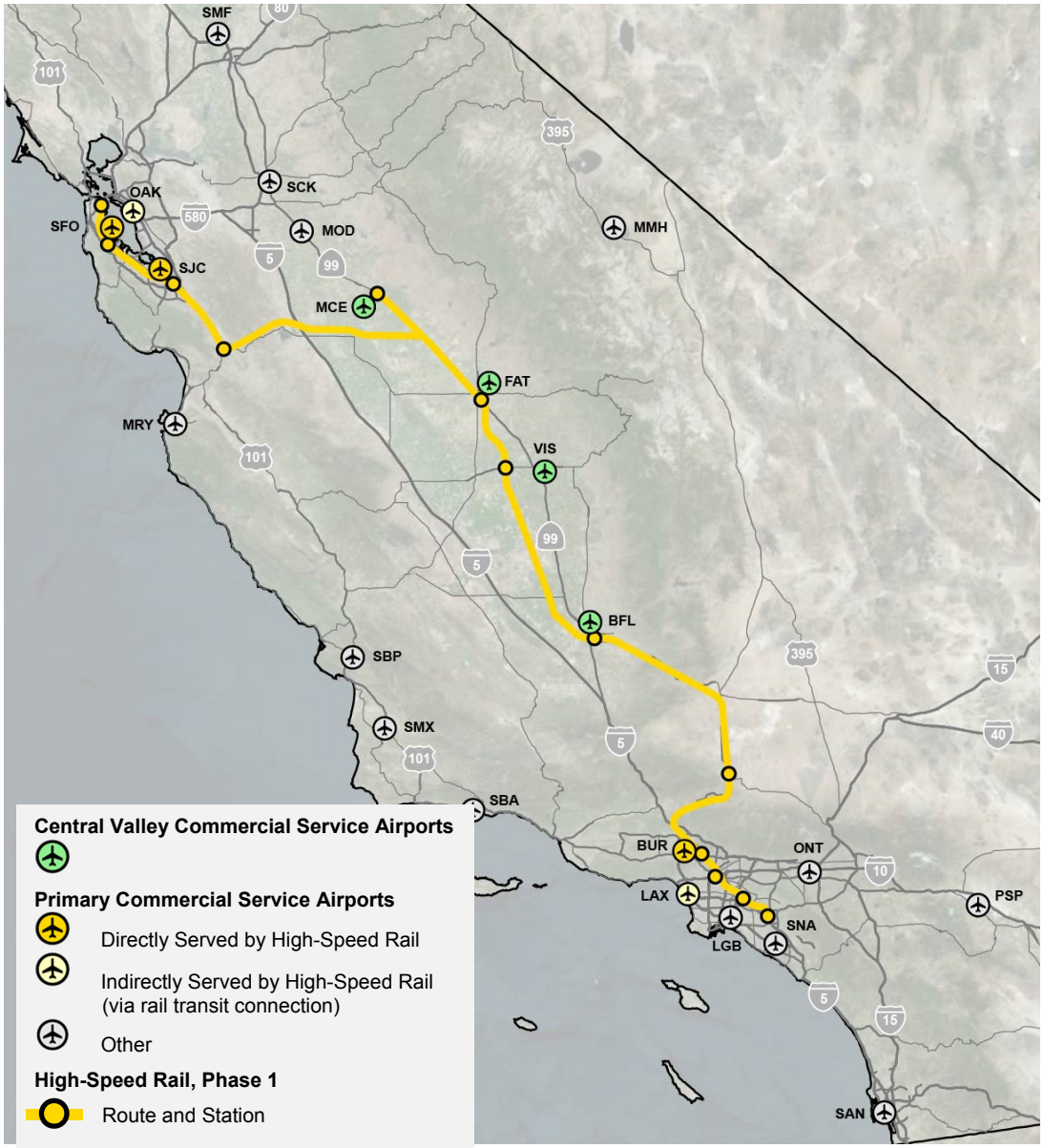


Table 28: Existing Central Valley Airport Activity

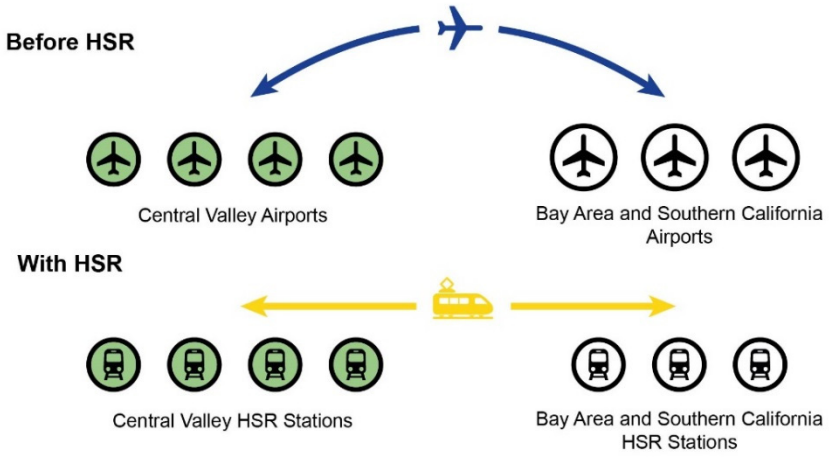
Airport	Daily Departing Flights[56]	Average Daily Boardings[57]
Merced (MCE)	1	7
Fresno (FAT)	32	1,876
Visalia (VIS)	9	10
Bakersfield (BFL)	12	392
TOTAL	**54**	**2,285**

[56] FlightAware, April 2015.
[57] Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports, Federal Aviation Administration, 2013.

In considering high-speed rail's effect on air travel in California, there are several types of Central Valley air trips that could possibly be served by the high-speed rail system:

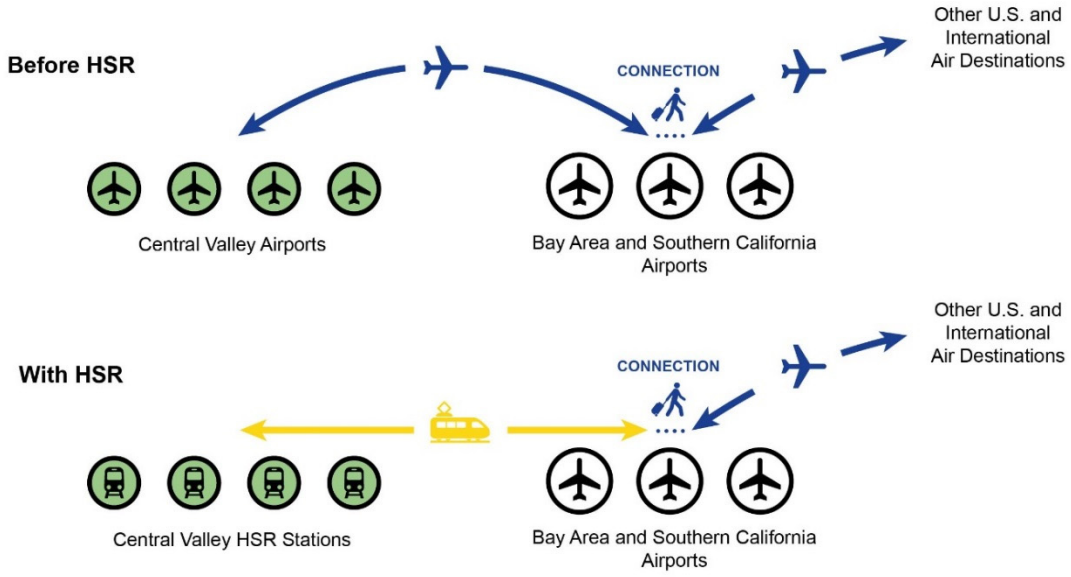
Use Case 1, High-Speed Rail (HSR) Diversion from Air. (Figure 30) High-Speed Rail replaces (or supplements) existing air trips between the Central Valley and the Bay Area or Southern California.

Figure 30: HSR Diversion from Air



Use Case 2, HSR as a Feeder. (Figure 31) High-speed rail replaces existing air trips between the Central Valley and major Bay Area or Southern California airports, feeding the major airports with passengers connecting to flights to long-haul destinations.

Figure 31: HSR as a Feeder



Use Case 3, HSR as a Generator. High-speed rail satisfies demand for "presently unmade" or "potentially demanded" air trips between the Central Valley and all air destinations (including major Bay Area or Southern California airports) that are not being made due to the current

inconvenience of air travel to/from the Central Valley (trips would be made in the form of Use Cases 1 or 2, but the volume of trips would be greater than existing Central Valley air trips).

5.2.2 Discussion of High-Speed Rail – Airport Demand Forecasts

As part of the development of the California High-Speed Rail Project, the California High-Speed Rail Ridership Model (CHSRRM) was developed to evaluate high-speed rail ridership and revenue[58]. Specific attention was given in the model to the diversion of intra-state air trips to high-speed rail. Therefore, Use Case 1, as introduced above, is accounted for in high-speed rail passenger forecasts.

The CHSRRM does not attempt to model trips by California residents to out-of-state locations or by visitors to California.[59] This represents Use Case 2. "In the ridership model, HSR was not explicitly modeled as a feeder mode for air."[60] However, future iterations of the model will include travel by visitors within the state.

A report published in April 2015, *Airport Cooperative Research Program (ACRP) Report 118: Integrating Aviation and Passenger Rail Planning,* assesses global experience with connecting airports with passenger rail facilities and offers direct insight to the California High-Speed Rail Project. It reports that rail service to "air as a feeder mode has little potential…The diversion of connecting air travelers was included in prior modeling efforts, and it was found that this market segment is small; an earlier unpublished study concluded that this market segment accounts for less than one percent of HSR ridership and revenue potential."[61]

The report continues, "In the Bay Area, it is believed by stakeholders that SFO is the only airport where using HSR as an air feeder mode makes sense. Planners at MTC believe that use of HSR as a feeder mode at the smaller airports such as San José or OAK will not prove to be significant, because of issues of location and scale. High-speed rail is not currently planned near OAK; other concerns at the Airport include a weakness in long-distance flights."[62]

While the CHSRRM will be modified in future to include Use Case 2, the discussion in ACRP Report 118 would suggest that high-speed rail as a feeder mode to major airports has low potential. The low air passenger volumes currently recorded in the Central Valley seem to support that conclusion.

The analysis conducted for this AGT study focuses on the "presently unmade" potential air travel demand (Use Case 3), rather than existing air travel (Use Cases 1 and 2). Starting with a high-level estimate for potential overall air travel demand based on a comparison with other regions across the United States, the overall potential demand is then screened to estimate air demand that could be served by a high-speed rail connection to flights at the Airport. This in turn would generate demand for a high-quality transit link between the high-speed rail station at Diridon and the Airport.

[58] ACRP Report 118: Integrating Aviation and Passenger Rail Planning. Transportation Research Board, 2015.
[59] California High-Speed Rail Authority, 2015.
[60] ACRP Report 118: Integrating Aviation and Passenger Rail Planning. Transportation Research Board, 2015.
[61] ACRP Report 118: Integrating Aviation and Passenger Rail Planning. Transportation Research Board, 2015.
[62] ACRP Report 118: Integrating Aviation and Passenger Rail Planning. Transportation Research Board, 2015.

5.2.3 Analysis of Potential Central Valley Air Demand

To estimate the potential demand for air trips from the Central Valley, air passenger traffic was analyzed in 15 similarly-sized U.S. metropolitan areas. Air trip-making was analyzed from this dataset to estimate the potential (and to-date, largely unrealized) demand in the Central Valley for air travel. Table 29 below shows population and annual air passengers in metro areas with populations of approximately 2-3 million, which is the combined population of the four Central Valley airport metro areas.

Table 29: Air Trips vs. Population, by Metro Area

Metro Area	Metro Area Population[63]	Annual Air Passengers[64]	Ratio: Annual Air Passengers / Metro Area Population	Air Market Notes
San Diego, CA	3,263,431	17,710,241	5.43	
Tampa, FL	2,915,582	16,920,086	5.80	
St. Louis, MO	2,806,207	12,570,128	4.48	
Denver, CO	2,754,258	52,556,359	19.08	Large hub for connecting flights
Charlotte, NC	2,380,314	43,457,471	18.26	Large hub for connecting flights
Pittsburgh, PA	2,355,968	7,884,170	3.35	
Portland, OR	2,348,247	15,029,569	6.40	
San Antonio, TX	2,328,652	8,252,330	3.54	
Orlando, FL	2,321,418	34,768,945	14.98	Tourist destination
Sacramento, CA	2,244,397	8,685,368	3.87	
Kansas City, MO	2,071,133	9,872,314	4.77	
Las Vegas, NV	2,069,681	40,933,037	19.78	Tourist and conference destination, and hub for connecting flights
Cleveland, OH	2,063,598	9,072,126	4.40	
Austin, TX	1,943,299	10,017,958	5.16	
Nashville, TN	1,792,649	10,351,709	5.77	

Of the above metro areas, many cannot be considered comparable to the Central Valley. For example, Denver has a notably large number of air passengers (relative to its metro area population) owing largely to its airport's role as a major hub for connecting flights. The Central Valley can be considered most comparable to metro areas with the following characteristics:

- Not a major tourist destination, and
- Not a major air hub (a hub has many air passengers that simply connect (transfer) to other flights at the hub while en route to other destinations).

[63] Annual Estimates of the Resident Population, April 1, 2010 to July 1, 2014, United States Census.
[64] Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports, Federal Aviation Administration, 2013.

For the purposes of benchmarking potential air tripmaking, the Central Valley can be considered similar to Pittsburgh, San Antonio, and Sacramento. The average air tripmaking rate across these three metro areas is 3.59 annual air passengers per metro area resident. From this rate, potential demand for air travel can be estimated for the four study Central Valley metro areas, as indicated in Table 30.

Table 30: Existing and Potential Central Valley Airport Activity

Airport	Metro Area Population[65]	Existing Average Daily Boardings[66]	Potential Average Daily Boardings
Merced (MCE)	266,000	7	1,300
Fresno (FAT)	966,000	1,876	4,800
Visalia (VIS)	458,000	10	2,300
Bakersfield (BFL)	875,000	392	4,300
TOTAL	**2,565,000**	**2,285**	**12,600**

The above potential demand for air travel could potentially be served one of two ways:

1. Flights directly serving the four Central Valley airports, or
2. High-speed rail service linking Central Valley cities to flights arriving/departing at major airports in the Bay Area or Southern California.

In 2014, air passengers from the four study Central Valley metro areas flew to the following destinations:

Table 31: Air Trips from Central Valley Airports, by Destination [67]

Destination	% of Annual Boardings
Pacific Northwest	**9 %**
• Seattle	6 %
• Portland	3 %
Northern California	**9 %**
• San Francisco (SFO)	8 %
• Oakland	0.1 %
Southern California	**18 %**
• Los Angeles (LAX)	13 %
• San Diego	5 %
Denver	**14 %**
Salt Lake City	**6 %**
Las Vegas	**8 %**
Phoenix	**21 %**
Texas	**15 %**
• Dallas-Ft. Worth	11 %
• Houston	5 %

[65] Annual Estimates of the Resident Population, April 1, 2010 to July 1, 2014, United States Census.
[66] Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports, Federal Aviation Administration, 2013.
[67] Air Carriers: T-100 Domestic Segment (U.S. Carriers), Bureau of Transportation Statistics, U.S. Department of Transportation, 2014.

It is assumed that given increased accessibility to convenient flights, the volume of air trips from the Central Valley would increase but the proportion of air trips to each of the above destinations would be unchanged.

It is also assumed that Central Valley air passengers would not use high-speed rail significantly "out-of-direction" to access a flight to their ultimate air destination (e.g., an air passenger in Bakersfield would not take high-speed rail to San José to board a flight to San Diego). Central Valley air passengers would therefore probably only consider accessing the Airport to board flights to the following destinations:

- Pacific Northwest
- Denver
- Salt Lake City
- Texas

Trips to the above four destinations constitutes 44 percent of total current Central Valley air trips.

Existing passenger traffic at each major airport can be considered an indirect metric for the availability of flights (or, more specifically, flight seats) to air destinations. Central Valley air passengers can, at large, be expected to travel from the major airports below in proportion to the number of available flight seats. Daily passenger traffic at major California airports of interest is shown in Table 32 below:

Table 32: Airports with Future Transit Connections to High-Speed Rail

Airport	Existing Average Daily Boardings[68]	Planned Connection to High-Speed Rail
Oakland (OAK)	13,070 (7.3%)	Indirect, lengthy via BART with one transfer
San Francisco (SFO)	59,465 (33.3%)	Direct, via BART
San José (SJC)	11,824 (6.6%)	Direct, via AGT
Burbank (BUR)	5,255 (2.9%)	Direct, via walking or short shuttle
Los Angeles (LAX)	88,838 (49.8%)	Indirect, lengthy via Metro Rail with transfers or Flyaway Bus
TOTAL	**178,452 (100%)**	

However, each airport is planned to be connected to the high-speed rail system by transit with varying degrees of directness and convenience. For example, a connection from Oakland International Airport to high-speed rail would be relatively inconvenient for travelers, requiring approximately 40 minutes of BART travel to reach the San Francisco Transbay Transit Center or approximately 60 minutes of BART travel to reach San José Diridon Station. Conversely, Burbank Airport, for example, is planned to have a high-speed rail station within walking distance of the airport terminals. Taking account of these varying degrees of convenience of

[68] Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports, Federal Aviation Administration, 2013.

access, adjusted proportions are used in Table 33 below to assign potential Central Valley air trips to major California airports:

Table 33: Assignment of Central Valley Air Trips to Major California Airports

Airport	Proportion of Total Central Valley Air Trips	Daily Trips from Central Valley via HSR to Major Airport
Oakland (OAK)	3 %	200
San Francisco (SFO)	40 %	2,200
San José (SJC)	20 %	1,100
Burbank (BUR)	20 %	1,100
Los Angeles (LAX)	17 %	1,000
TOTAL	**100 %**	**5,500**

From the above table, it can be seen that approximately 1,100 daily Central Valley air passengers could conceivably use high-speed rail to board flights at the Airport. (1,100 arriving air passengers could at the same time use high-speed rail to access the Central Valley from the Airport, for a total of 2,200 daily air passenger trips.) This is a considerable number of passengers, relative to forecasted high-speed rail use at Diridon station. Current high-speed rail ridership projections anticipate 9,300 daily high-speed rail boardings at Diridon station in 2030[69].

Importantly, the preceding analysis has several limitations. For instance, the Central Valley may be unable to develop the same per-capita intensity of air tripmaking as the comparison U.S. areas. A contributing factor could be the relatively low incomes observed in the Central Valley. In addition, the Airport may be unable to attract air passengers arriving via high-speed rail given the limited availability of longer-haul flights from that airport, especially compared to nearby SFO Airport. Finally, the current reported composition of destinations for air passengers from Central Valley airports may also not represent the true desired destinations of Central Valley air passengers; many travelers are likely using short-haul flights to connect to other flights at major hubs (such as Denver or Dallas-Fort Worth) to reach their final destinations.

5.3 Observations

In 2030, a wide variety of trips are expected to be made within and between the activity centers in the project study area. As noted before in Section 5.1, a number of observations can be drawn from these trip patterns:

- Employee trips to/from Mineta San José Airport represent a considerable number of trips to/from the Airport (equal to approximately one-quarter of air passenger trips to/from the Airport).
- The vast majority (approximately 95 percent) of trips to/from the Airport are to/from locations other than the six study activity centers.

[69] California High-Speed Rail Authority, Fall 2014.

- The vast majority of travel between the study activity centers, taken together, is unrelated to the Airport.
- Demand for travel to North San José is approximately equal to demand for travel to/from Downtown San José.
- On days with "medium" or "large" events, demand for travel to/from Avaya Stadium is approximately one-third as demand for travel to/from the Airport.

One additional observation from the analysis of California High-Speed Rail:

- The California HSR project will also introduce the possibility for high-speed rail passengers to use an AGT system to travel between high-speed rail at Diridon station and flights at the Airport. Unmet potential demand for air travel to/from the Central Valley and potential HSR-to-airport connections at several other major California airports (including SFO airport) were considered. Up to 2,200 daily AGT trips could be reasonably expected to serve passengers connecting between high-speed rail at Diridon and flights at the Airport.

6 Application Evaluation & Route Identification

In this chapter, the rider demand and performance of a potential Automated Guideway Transit (AGT) system are assessed to serve the travel markets identified in Chapter 5.

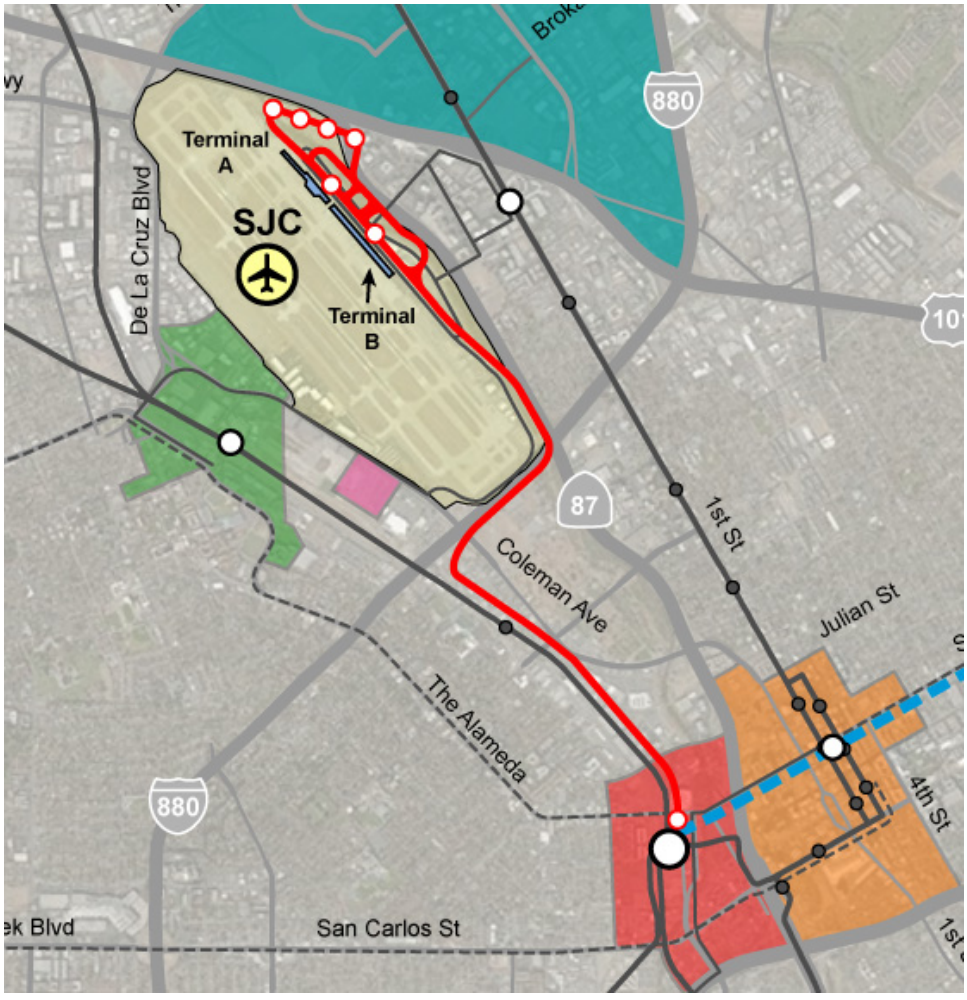
This analysis is applied to two versions of potential AGT systems serving the study area:

1. Base AGT Network (connecting the Airport with Diridon station)
2. Expanded AGT network (Base AGT Network and extensions serving North San José, Santa Clara, and Downtown San José)

Separately, route options and alignments are assessed for physical and geometric feasibility in Chapter 7.

6.1 Base Automated Guideway Transit Network

Figure 32: Assignment of Central Valley Air Trips to Major California Airports



The assumed Base AGT Network includes stations at:

- Airport Economy Lot 1 (Long-Term Parking)
- Airport Terminal A
- Airport Terminal B / Consolidated Rent-A-Car Facility (ConRAC)
- Diridon Station

(The physical and geometric feasibility of specific alignments are not the emphasis of this section of the report. The specific alignment shown in Figure 32 is representative. See Chapter 7 for detailed analysis of alignment options.)

There are two primary categories of market potential for the Base AGT Network. The focus of this study is on airport-related trips generated by a direct, high-quality transit connection to Diridon Station, and additional trips that could be generated with the addition of High-Speed Rail.

- **Airport-Related Trips**
  - **Airport Passengers + Employees**
  - **Terminal A ←→ ConRAC (intra-airport)**
  - **Terminal A ←→ Long-Term Parking (intra-airport)**
  - **Terminal B ←→ Long-Term Parking (intra-airport)**
- **HSR-Related Trips**
  - **HSR ←→ San José Airport Flights**
  - **HSR ←→ San José Airport Parking**
  - HSR ←→ San José Airport ConRA

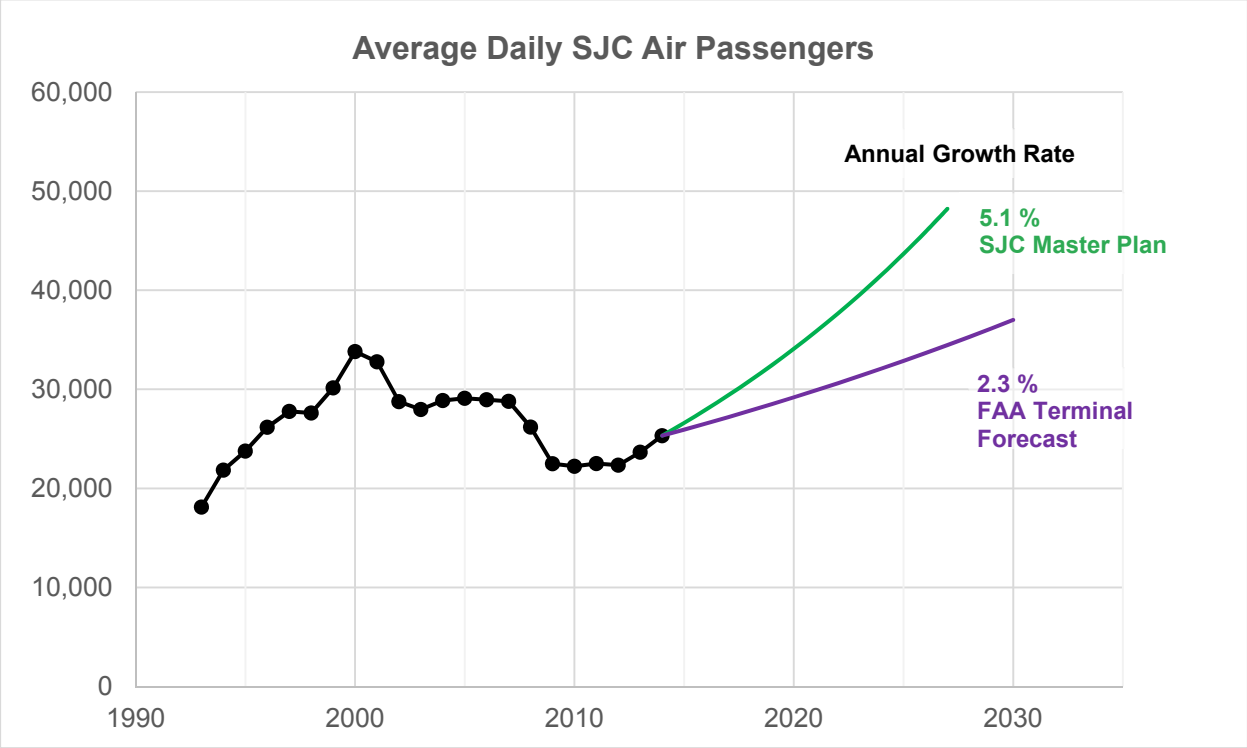
6.1.1 Mineta San José Airport Passengers + Employee

The number of the Airport passengers and employees that would use an AGT network to access the Airport would be strictly determined by two numbers: forecasted airport growth (in terms of passengers and employees) and AGT mode share.

Multiple forecasts are available for projected growth of activity at the Airport. Two sources are presented in Figure 33 below:

- "Airport Master Plan for Norman Y. Mineta San José International Airport," City of San José Airport Department (2011), projecting an average annual growth in air passenger traffic of 5.1 percent out to 2027.
- "Terminal Area Forecast Summary, Fiscal Years 2013-2040," Federal Aviation Administration (2013), projecting an average annual growth in air passenger traffic of 2.3 percent out to 2030.

Figure 33: San José Airport Air Passenger Forecasts



Currently, the primary transit service serving the Airport and linking it to the regional transit network is VTA's Line 10 Airport Flyer bus service. Line 10 currently serves approximately 1,200 passengers daily. This ridership is compared in Table 34 below to ridership observed to/from SFO and OAK airports.

Table 34: Transit Mode Share at Bay Area Airports

Airport:	SFO	OAK	SJC
Daily Air Passengers	140,672	30,521	25,321
Daily Employee Trips	67,160	16,000	6,200
Daily Air Passenger + Employee Trips	207,832	46,521	31,521
Daily Transit-to/from-Airport Trips	13,128	2,892	1,155
Overall Transit Mode Share (passengers + employees)	6.3 %	6.2 %	3.7 %

VTA operates its Line 10 Airport Flyer bus service between the Santa Clara Caltrain station, Airport, and the Metro/Airport VTA Light Rail station. This service is funded by the Airport and VTA and provided free-of-charge to passengers. This service operates every 15 minutes during most of the day. Line 10 currently serves approximately 1,200 passengers daily.

Combining possible airport growth scenarios and AGT mode share scenarios, we see a range of likely airport-related AGT ridership in Table 35 below:

Table 35: Transit Mode Share at Bay Area Airports

Annual Airport Growth Rate		2030 Daily Air Passenger + Employee Trips	AGT Potential Mode Share		
			3.5 % ~ Existing SJC Airport Flyer Mode Share	**5 %** Lower Range of Potential AGT Transit Mode Share	**7 %** Lower Range of Potential AGT Transit Mode Share
No Growth (2014 Traffic)	0 %	32,000	1,100	1,600	2,200
FAA Terminal Forecast	2.3 %	42,000	1,500	**2,100**	2,900
SJC Master Plan Forecast	5.1 %	60,000	2,100	3,000	**4,200**

The lowest scenarios for airport growth (zero growth) and for AGT mode share (equal to existing Airport Flyer mode share) are considered unlikely. An AGT system can be reasonably expected to almost certainly have greater ridership than the existing Airport Flyer bus service. The combination of medium scenarios (resulting in 2,100 daily AGT riders) and of high scenarios (resulting in 4,200 daily AGT riders), both shown in red in the table above, are therefore considered to bound the range of potential airport-related ridership on an AGT system. Daily ridership would vary from two times to four times the current transit ridership.

6.1.2 Intra-Airport Trips

Potential demand is also considered for several types of intra-airport passenger trips.

Terminal A ←→ ConRAC

Assumptions:

- 30 % of San José Airport air passengers arrive / depart via Terminal A.
- 35 % of San José Airport air passengers arrive / depart via Rental Car.
- 50 – 80 % of Terminal A rental car users use AGT to access the ConRAC.

Based on these assumptions, 2,000 - 3,200 daily passengers are expected to use AGT to travel between Terminal A and the ConRAC.

Terminal A ←→ Long-Term Parking

Assumptions:

- 30 % of San José Airport air passengers arrive / depart via Terminal A.
- 46 % of air passengers park vehicles at the Airport facilities.
- 59 % of air passengers take trips 3+ nights long. 59 % of parking air passengers are therefore assumed to park in Long-Term Parking.
- 100 % of air passengers parking in Long Term Parking use AGT to/from the airport terminals.

Based on these assumptions, 2,700 daily passengers are expected to use AGT to travel between Terminal A and the ConRAC.

Terminal B ←→ Long-Term Parking

Assumptions:

- 70 % of San José Airport air passengers arrive / depart via Terminal B.
- 46 % of air passengers park vehicles at the Airport facilities.
- 59 % of air passengers take trips 3+ nights long. 59 % of parking air passengers are therefore assumed to park in Long-Term Parking.
- 100 % of air passengers parking in Long Term Parking use AGT to/from the airport terminals.

Based on these assumptions, 6,400 daily passengers are expected to use AGT to travel between Terminal A and the ConRAC.

6.1.3 High-Speed Rail ←→ Airport Flights

An AGT system linking the Airport with Diridon Station would provide a convenient connection between flights and the proposed California high-speed rail system.

The potential for connecting passenger traffic between flights at the Airport and High-Speed Rail at Diridon is previously discussed at greater length in Section 5.2.

The Airport and high-speed rail at Diridon, if linked by an AGT system, would complement each other in key aspects. Principally, AGT would allow passengers to directly transfer between flights at AGT and high-speed rail at Diridon. Between 1,600 and 2,700 passengers would be expected to make this connection via AGT daily (in one direction or the other).

It is assumed that the AGT mode share for this market would be 100%, i.e. passengers would not take taxi/shuttle/public transit/other modes when connecting between San José Airport flights and high-speed rail at Diridon.

6.1.4 High-Speed Rail ←→ Airport Parking

The Airport and high-speed rail at Diridon would also serve complementary roles as high-speed rail passengers could potentially use existing parking facilities at the Airport before/after high-speed rail trips to/from Diridon. (This assumes the availability of parking capacity at the Airport parking facilities.) This could potentially eliminate the need for new parking capacity in the area immediately surrounding Diridon station.

It is assumed that the 50 to 80 percent of park-and-ride high-speed rail trips to/from Diridon station would be served by San José Airport parking and an AGT system. Between 2,200 and 3,600 passengers would be expected to use AGT to connect between Airport parking facilities and high-speed rail daily (in one direction or the other).

6.1.5 High-Speed Rail ←→ Airport ConRAC

Similarly, high-speed rail passengers could potentially use existing rental car facilities at the Airport before/after high-speed rail trips to/from Diridon.

It is assumed that the 50 to 80 percent of rental car high-speed rail trips to/from Diridon station would be served by the Airport parking and an AGT system. Between 800 and 1,300 passengers would be expected to use AGT to connect between the Airport rental car facilities and high-speed rail daily (in one direction or the other).

6.1.6 Summary

Considering the above markets together, the following daily AGT trip demand is anticipated for a Base AGT Network:

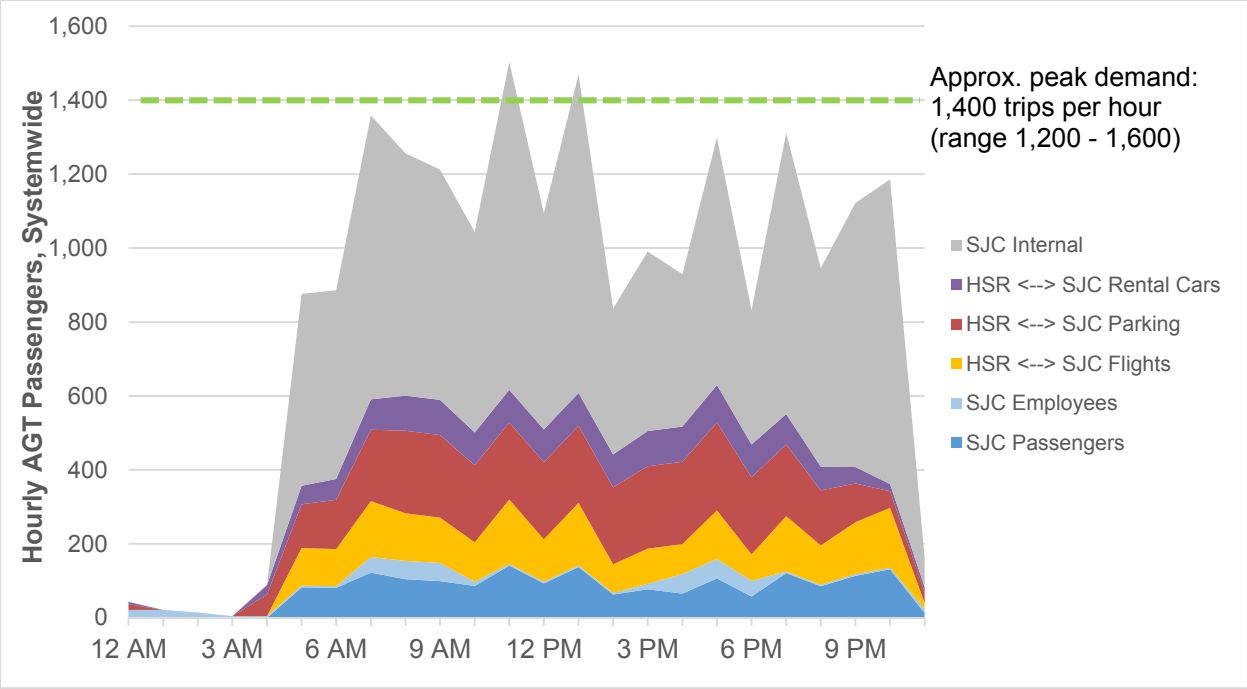
Table 36: 2030 Base AGT Network Daily Trip Demand, by Market

Potential Daily AGT Ridership	**Year 2030**
SJC Passengers + Employees	2,100 – 4,200
Intra-Airport Trips	11,100 – 12,300
HSR ←→ SJC Flights	1,600 – 2,700
HSR ←→ SJC Parking	2,200 – 3,600
HSR ←→ SJC ConRAC	800 – 1,300
Total Daily AGT Trips *without* Intra-Airport Trips	**6,700 – 11,800**
Total Daily AGT Trips *with* Intra-Airport Trips	**17,800 – 24,100**

Approximately half of the potential demand is from passengers making intra-airport trips (i.e., between the airport terminals, between the airport terminals and long-term parking, and between Terminal A and the rental car facility at Terminal B). Approximately one sixth of the potential demand would be from airport passengers or employees traveling between Diridon station and the airport. Finally, approximately one third of the potential demand would be related to High-Speed Rail trips to/from Diridon station for connecting flights or access to parking or rental cars.

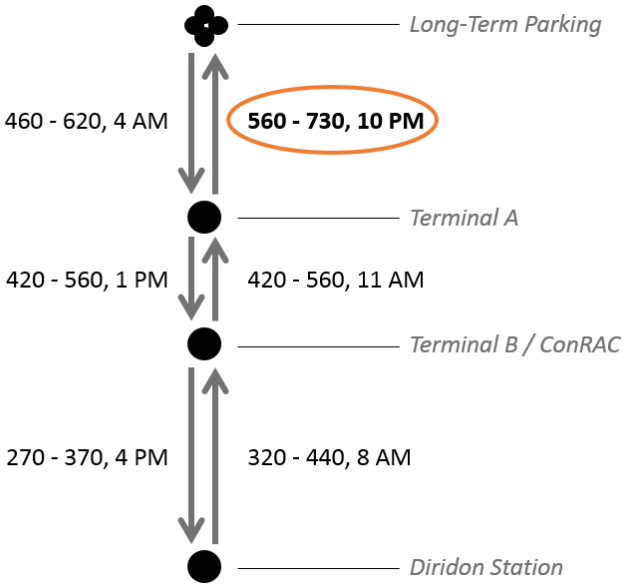
The above daily trips are distributed throughout the day as shown in Figure 34 below. This figure shows total system boardings, by hour.

Figure 34: 2030 Base AGT Network Hourly Demand, by Market



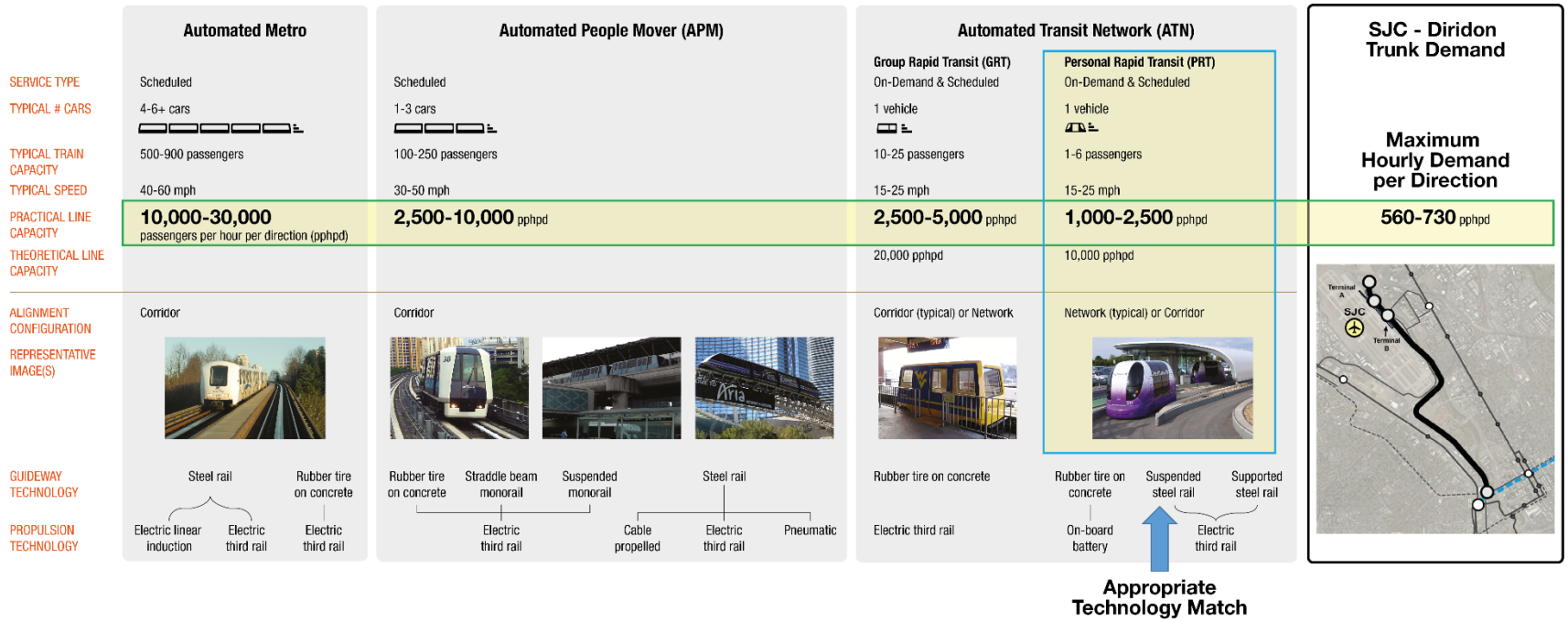
To determine an appropriate technology for the Base AGT network, it is necessary to identify the peak hourly passenger demand on any given link of the network. The peak demand for each link is shown in Figure 35 below:

Figure 35: 2030 Base AGT Network Peak Hourly Segment Demand, by Link



From the above figure, the largest peak hourly demand on any system link ranges from 560 to 730 passengers. This is then compared against the hourly capacities of various automated transit technologies, as presented in Figure 36 below:

Figure 36: Baseline AGT Network vs. Comparison of Automated Guideway Transit (AGT) Technologies



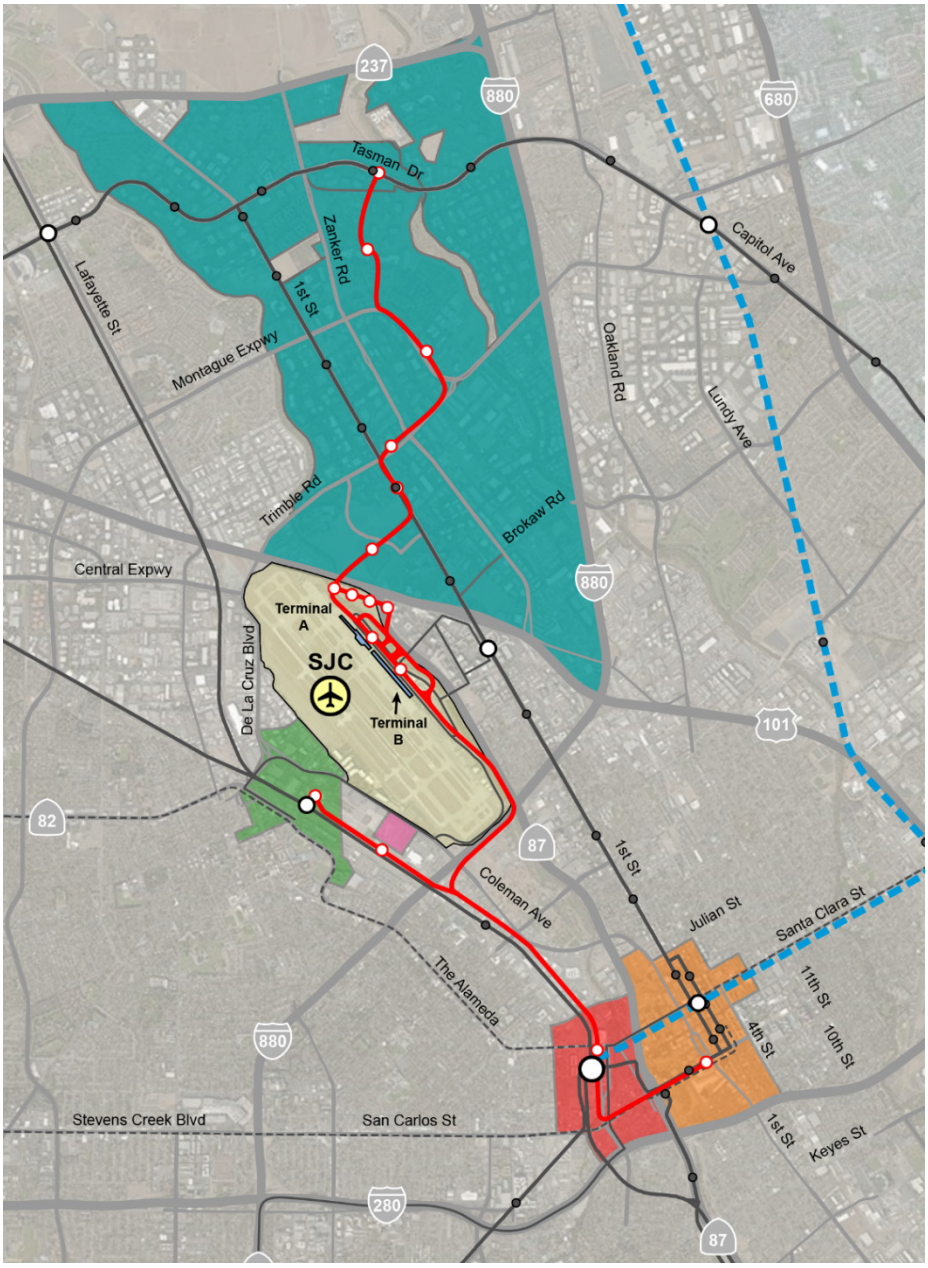
Comparing this peak hour demand against the hourly capacities of various automated transit technologies (as shown in the preceding Figure 36), an Automated Transit Network (ATN) would be the most appropriate AGT technology choice to serve the Diridon-to-Airport corridor, given the potential demand and characteristics of the market identified in this study. An Automated People Mover (APM) system could also be considered. However, an on-demand ATN system would provide a higher quality of service compared to fixed-schedule, all-stop service.

6.2 Expanded AGT Network

An expanded AGT network is also considered, including additional segments to:

- Downtown San José
- North San José
- Santa Clara
- Avaya Stadium (event-dependent; AGT demand not specifically calculated in this analysis)

Figure 37: Expanded AGT Network



The alignment above in Figure 37 shows conceptual access to specific activity centers; this figure does not represent specific alignments. See Chapter 7 for discussion of the feasibility of various alignment options.

An expanded AGT network would serve:

- Base AGT network airport-related trips (i.e., trips between Diridon and the Airport, as described in the preceding section)
- **Expanded AGT network airport-related trips** (i.e., trips between Downtown San José, North San José, or Santa Clara and the Airport)
- **Expanded AGT network non-airport-related trips** (i.e., trips between Downtown José, North José, and Santa Clara)

To estimate demand on an expanded AGT network, the following assumptions were made:

- **Downtown San José and Santa Clara**: All of each activity center is conveniently served by AGT (within walking distance). 6% transit/AGT mode share assumed.
- **North San José**: Portions of area served by AGT (within 1/3-mile walking distance): 6% transit/AGT mode share assumed. Portions of area served by VTA light rail (within 1/3-mile walking distance): 3% transit/AGT mode share assumed (transfer required to reach AGT destinations). Assumed station area catchments are shown in Figure 38 below.

AGT trips are assumed to comprise all transit trips between activity centers except between North San José and Downtown San José. Between these two specific destinations, an AGT system would compete with the existing VTA light rail system; AGT is therefore assumed to only capture 70% of these transit trips.

Demand to/from Avaya Stadium would be dependent on specific scheduled events and is therefore not considered in this analysis of typical daily demand.

Figure 38: North San José Transit Station Catchments

(Blue: Assumed AGT; Green: VTA Light Rail)

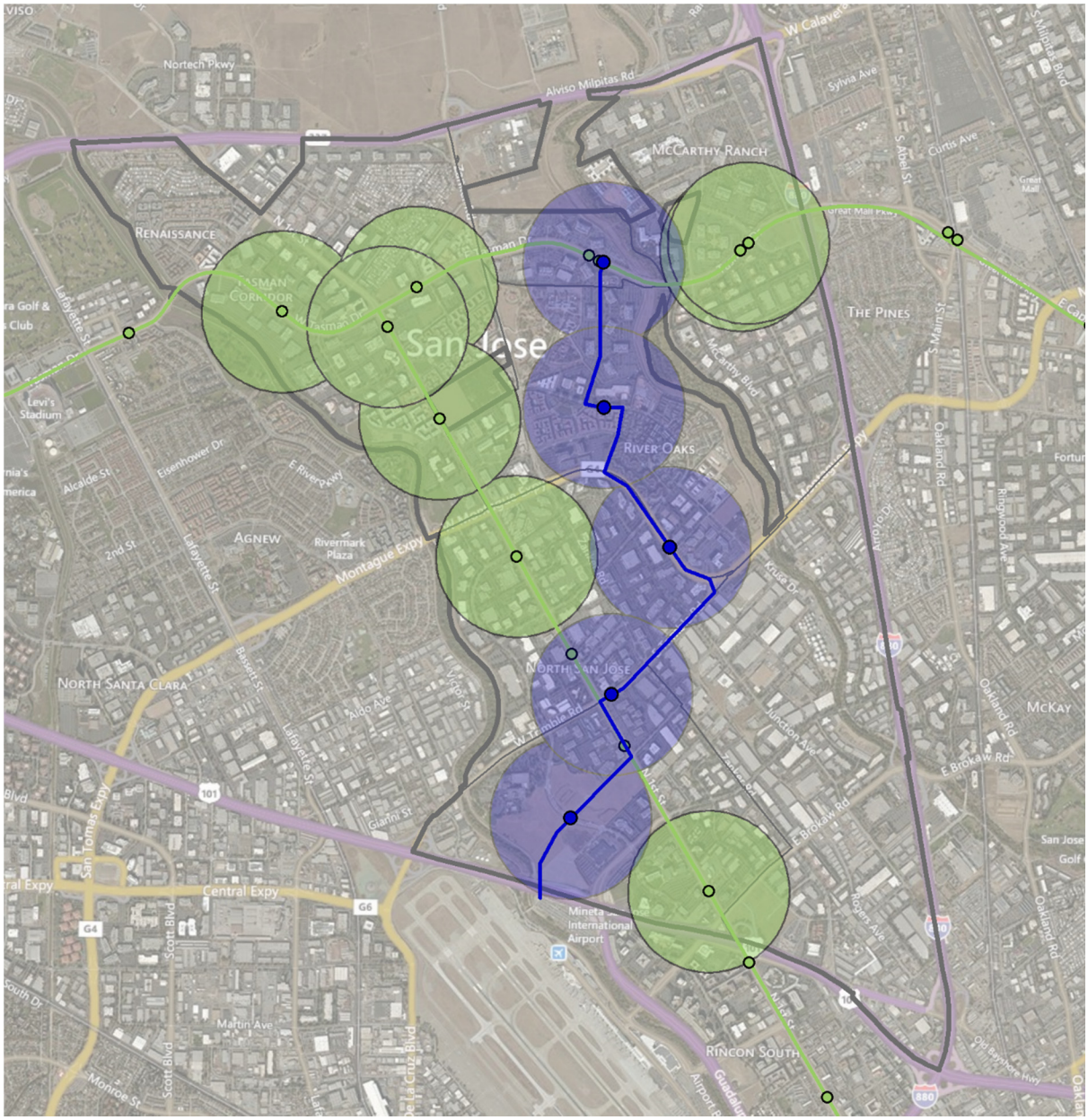


Figure 39: 2030 Daily Demand by Link, Expanded AGT Network

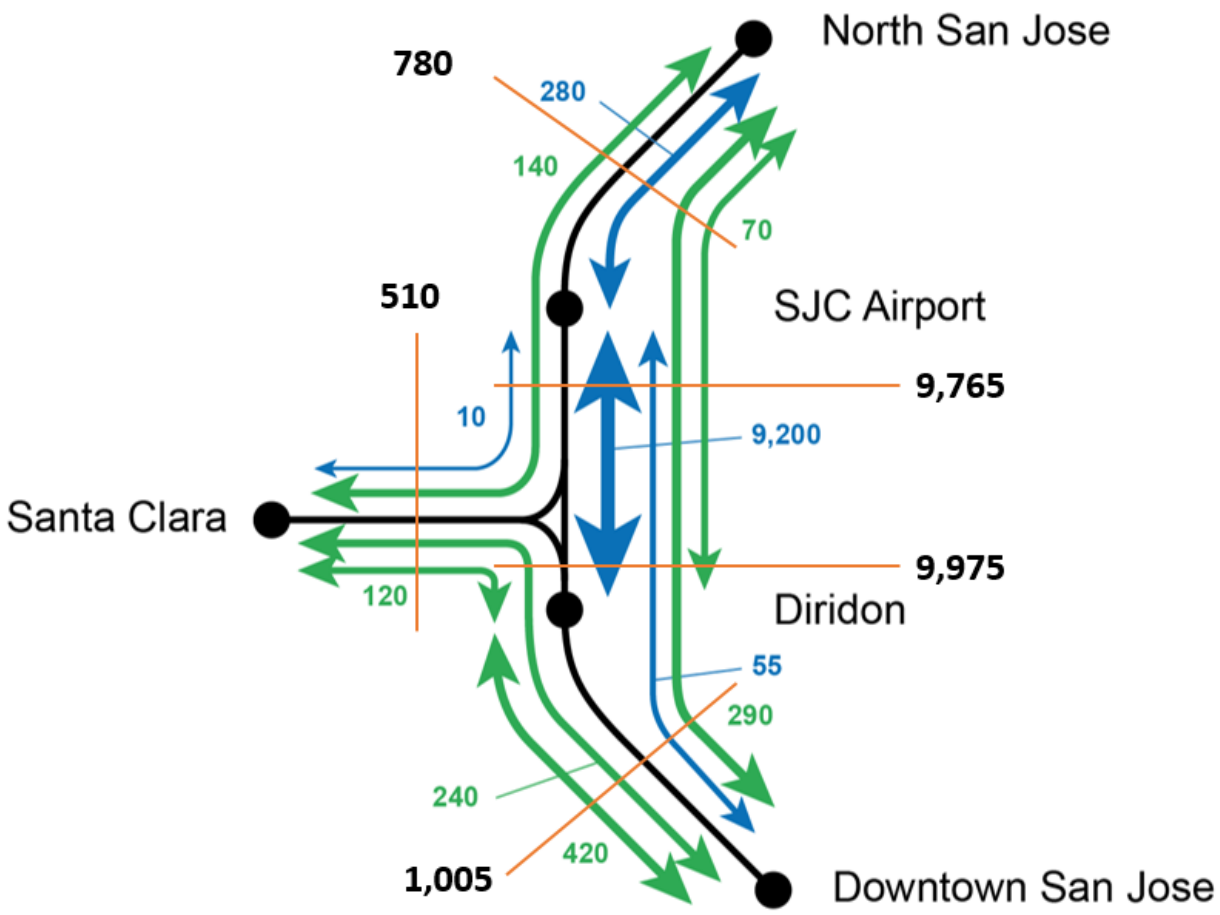


Table 37: 2030 Daily Demand, by Origin-Destination Pair, Expanded AGT Network

From… To…	Airport	Diridon	North San José	Santa Clara	Downtown San José	Other	TOTAL
Airport	*	4,600	140	5	30	-	4,775
Diridon Area	4,600		35	60	210	-	4,905
North San José	140	35		70	145	?	390
Santa Clara	5	60	70		120	?	255
Downtown San José	30	210	145	120		?	505
Other	-	-	?	?	?		?
TOTAL	4,775	4,905	390	255	505	?	10,830+

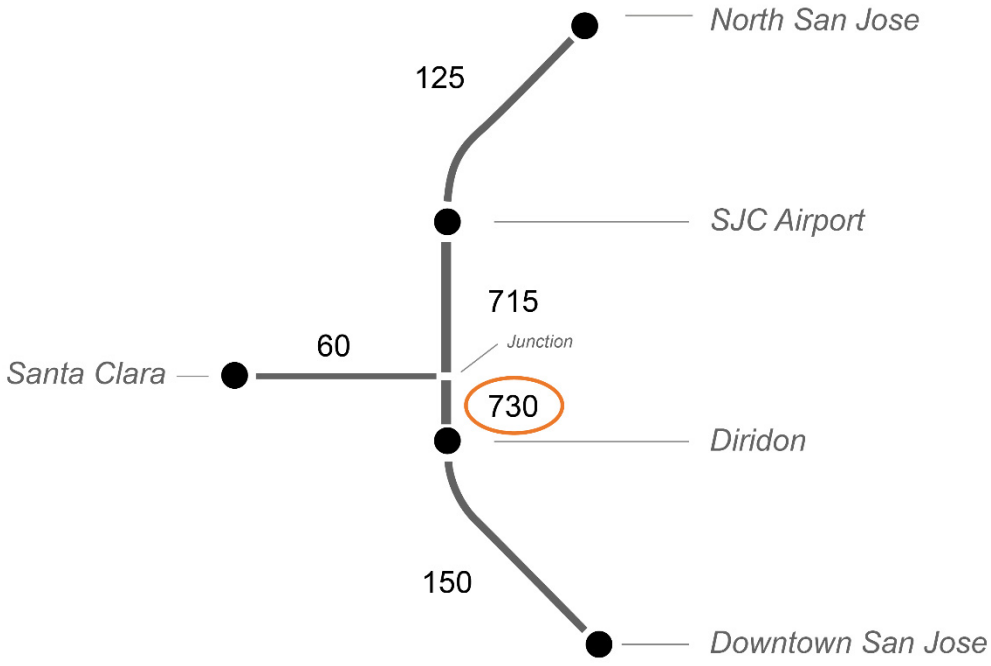
*Intra-Airport Trips adds 11,100-12,300 trips that are not included in the totals above.

Table 38: 2030 Daily Demand, Base and Expanded AGT Network

Potential Daily AGT Demand	Base AGT Network	Expanded AGT Network
Airport Passengers + Employees, and HSR	6,700 – 11,800	6,700 – 11,800
Additional Airport Passengers + Employees with Expanded AGT Network	-	350
Intra-Airport Trips	11,100 – 12,300	11,100 – 12,300
Non-Airport Transit Trips within Expanded AGT Network	-	1,280
Non-Airport Transit Trips beyond Expanded AGT Network	-	?
Total Daily AGT Trips *without* Intra-Airport Trips	**6,700 – 11,800**	**8,300 – 13,400**
Total Daily AGT Trips *with* Intra-Airport Trips	**17,800 – 24,100**	**19,400 – 25,700**

To determine an appropriate technology for the Base AGT network, it is necessary to identify the peak hourly passenger demand on any given link of the network. The peak hourly demand for each segment is shown in Figure 40 below.

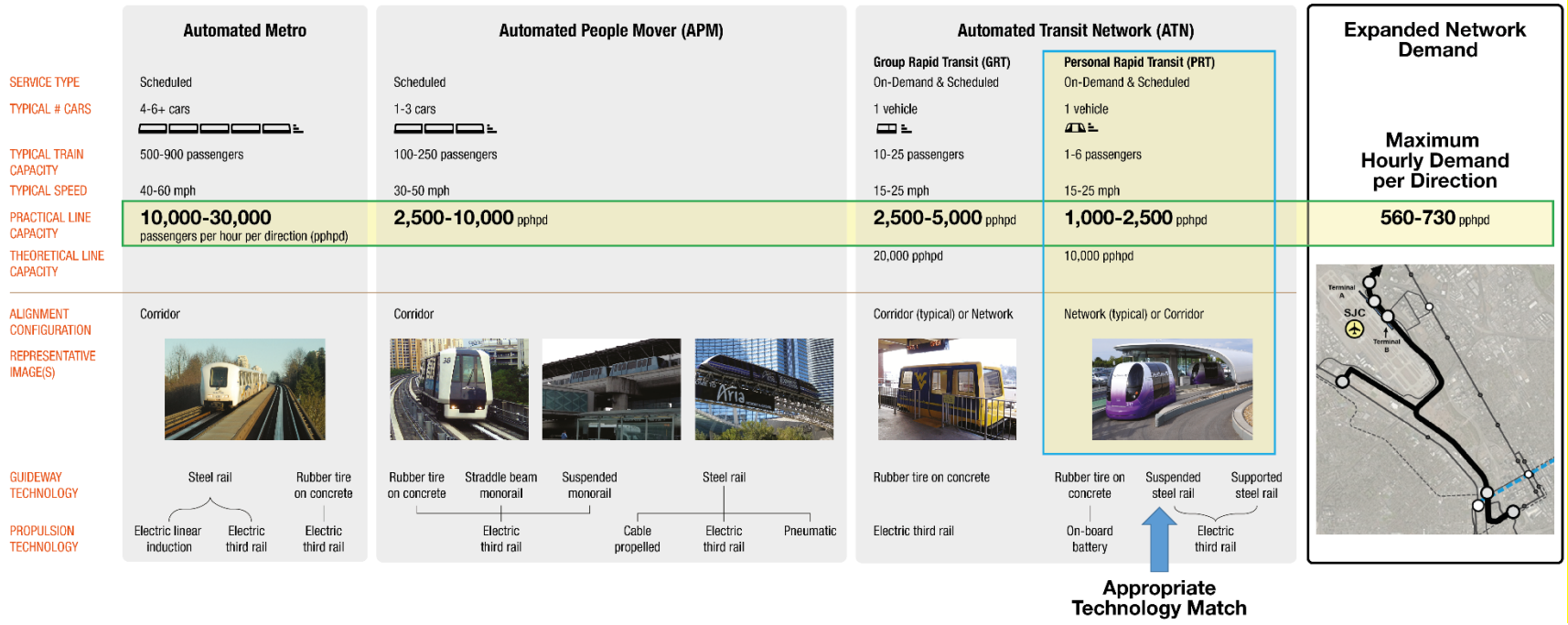
Figure 40: 2030 Expanded AGT Network Peak Hourly Segment Demand, by Link



Note: The above peak hourly demand values given above are the highest hourly demand expected in *either direction* on each network segment. Link demand includes trips between the multiple origin-destination pairs identified on the previous page.

From the above figure, the largest peak hourly demand on any system link is in the range of 700 to 800 passengers. This is then compared against the hourly capacities of various automated transit technologies, as presented in Figure 41 below:

Figure 41: Expanded AGT Network vs. Comparison of Automated Guideway Transit (AGT) Technologies



Comparing this peak hour demand against the hourly capacities of various automated transit technologies (as shown in the preceding Figure 41), we see that an Automated Transit Network (ATN) would likely be an appropriate AGT technology choice to meet the potential demand and travel characteristics identified in this study. An Automated People Mover (APM) system could also be considered, however an on-demand ATN system would provide a higher quality of service compared to fixed-schedule service.

6.3 Comparison: Base AGT Network vs. Expanded AGT Network

The overall performance of both the Base AGT Network and the Expanded AGT Network, each assuming ATN technology, are shown in Table 39 below. They are also both compared to two recent airport people mover projects, the BART Oakland Airport Connector (completed in 2014) and Phoenix PHX Sky Train (segment 1 completed in 2013 and segment 2 completed in 2014). Note that, as the ATN industry is still in the development phase, the AGT cost estimates include large contingencies for risk.

Table 39: Capital Cost per Trip, by Network

Alternative	Base AGT Network*	Expanded AGT Network*		BART Oakland Airport Connector	Phoenix Airport People Mover
Single Track Miles (miles)	9.6	20.9		6.4	4.8
Approx. Capital Cost ($ m)	$ 380	$ 830		$484	$884
Cost per Track Mile ($ m / mi)	$ 40	$ 40		$76	$184
Total Daily Trips (without intra-airport trips)	6,700 – 11,800	8,300 – 13,400 †		3,300 ‡	
Total Daily Trips (with intra-airport trips)	17,800 – 24,100	19,400 – 25,700 †			13,000 §
Average Capital Cost per Trip (without intra-airport trips)	$ 32,000 - 57,000	$ 62,000 – 100,000		$147,000	
Average Capital Cost per Trip (with intra-airport trips)	$ 16,000 – 22,000	$ 32,000 – 43,000			$68,000

* Costs assuming ATN technology and network.
† Ridership does not include non-airport regional transfers.
‡ Weekday ridership as of August 2015; system opened November 2014.
§ Daily ridership as of April 2015; system opened April 2013; includes Terminal 3 extension.

An Expanded AGT Network has several advantages and disadvantages compared to the Base AGT Network:

Advantages

- Expanded network makes key sub-regional connections and reduces total trip travel time.
- Additional ridership potential with transfers from AGT to regional transit and high-speed rail at Diridon station.
- Cost per passenger is likely within range of other airport rail connections.

Disadvantages

- Cost per passenger is higher than for base AGT network.
- Higher capital cost than bus-based alternatives.
- Could be perceived as competition to VTA Light Rail (for North San José to Downtown and Diridon to Downtown).

6.4 Observations

Several observations can be drawn from the preceding analysis:

- The potential rider demand is comprised of a number of different traveler markets that were analyzed in this study.
  - Approximately half of the potential demand is from passengers making intra-airport trips (i.e., between the airport terminals, between the airport terminals and long-term parking, and between Terminal A and the rental car facility at Terminal B).
  - About one sixth of the potential demand would be from airport passengers or employees traveling between Diridon station and the Airport.
  - About one third of the potential demand would be related to High-Speed Rail trips to/from Diridon station.
- High-Speed Rail has a large potential to capture a share of Central Valley air travel demand, and some of those trips could be made at Diridon with a convenient transfer to the Airport.
- High-Speed Rail has a large potential to drive demand for parking or rental cars served by an AGT system connecting to Diridon station.
- An Automated Transit Network would be the most appropriate AGT technology choice to serve the Diridon-to-Airport corridor, given the potential demand and characteristics of the market identified in this study. An Automated People Mover system could also be considered. However, an on-demand ATN system would provide a higher quality of service compared to fixed-schedule, all-stop service.
- The capital cost-effectiveness (measured in terms of capital cost per passenger) of an ATN-based system could be on par, or potentially better than that of recently-built, similar airport rail connector systems (e.g., Oakland Airport Connector).
- AGT demand specifically by Airport passengers and employees will depend heavily on airport growth (which is historically volatile and has widely varying future forecasts) and on overall airport transit mode share.

- The maximum hourly potential demand on any link (in any one direction) of an AGT system, whether the Base AGT Network or an Expanded AGT Network, will be between 560 and 730 passengers per hour.
- The Base AGT system between Diridon and the Airport could be expanded to serve additional activity centers in the subregion, namely Santa Clara, Downtown San José, and North San José. Such an Expanded AGT network would fill a general gap in the public transportation network around the Airport.
- ATN technology would be well-suited to serve the potential travel demand of an Expanded AGT network, providing fast, on-demand, point-to-point travel. The Expanded AGT network would be less cost-effective than the Base AGT system requiring proportionally greater capital investment for each new rider captured (i.e., the overall cost per AGT rider nearly doubles). However, the overall cost-effectiveness could be on par, or potentially better than that of recently-built, similar airport rail connector systems.

7 Alignment Analysis

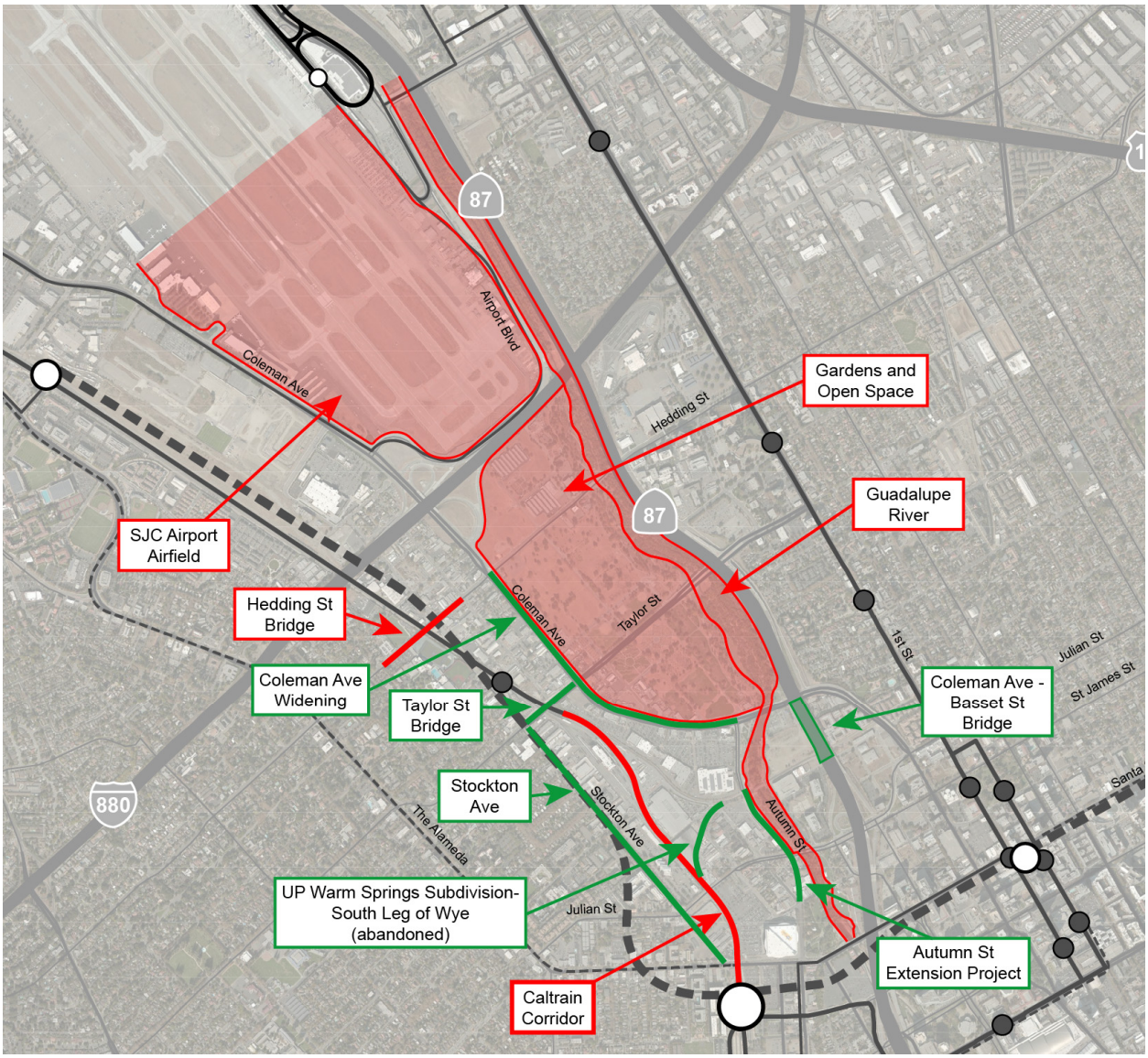
The operation of an automated guideway transit system between the Airport and Diridon Station would require the construction of a continuous guideway between the two locations. Between the two locations, numerous existing and proposed physical facilities lend themselves to the complementary development of an AGT system; however, many specific obstacles exist and limit the availability of feasible corridors.

Within the context of major opportunities and obstacles, general families of potential alignments are evaluated; sub-alternatives (nested within each alternative family) are thereafter evaluated. Finally, preferred alternatives are identified.

7.1 Description of Alternatives

First, specific physical constraints and opportunities were identified in the study area, as identified in Figure 42 below:

Figure 42: Constraints + Opportunities



Constraints

- **Airport Airfield:** San José Airport's airfield includes its two runways (12L/30R and 12R/30L) and taxiways and specific surrounding airspace. To support the airport's current operations, these features cannot be disrupted or displaced, thereby restricting the availability of land for an automated guideway transit system.

- **Guadalupe River:** The Guadalupe River and the parks and paths on its banks cannot be disrupted with the guideway necessary for this project. Further, setback requirements require 25-100 feet of open space beyond the banks of the river.[70]
- **Gardens and Open Space:** The gardens and open space adjacent to the Guadalupe River are protected open spaces and a new transit guideway would generally be incompatible with this space.
- **Hedding St Bridge:** The Hedding St Bridge (National Bridge ID 37C0279) is a 670-foot bridge carrying Hedding St across the Caltrain Corridor and right-of-way. A new guideway would have to pass around this existing bridge without significantly impacting surrounding properties.
- **Caltrain Corridor:** This active rail corridor, owned by the Peninsula Corridor Joint Powers Board (PCJPB), is used by passenger and freight trains, including Caltrain, Altamont Corridor Express (ACE), Capitol Corridor, and Amtrak trains. Portions of the corridor right-of-way are also proposed for use by the California High-Speed Rail Project. The corridor is also adjacent to Caltrain's Centralized Equipment Maintenance and Operations Facility (CEMOF).

Opportunities

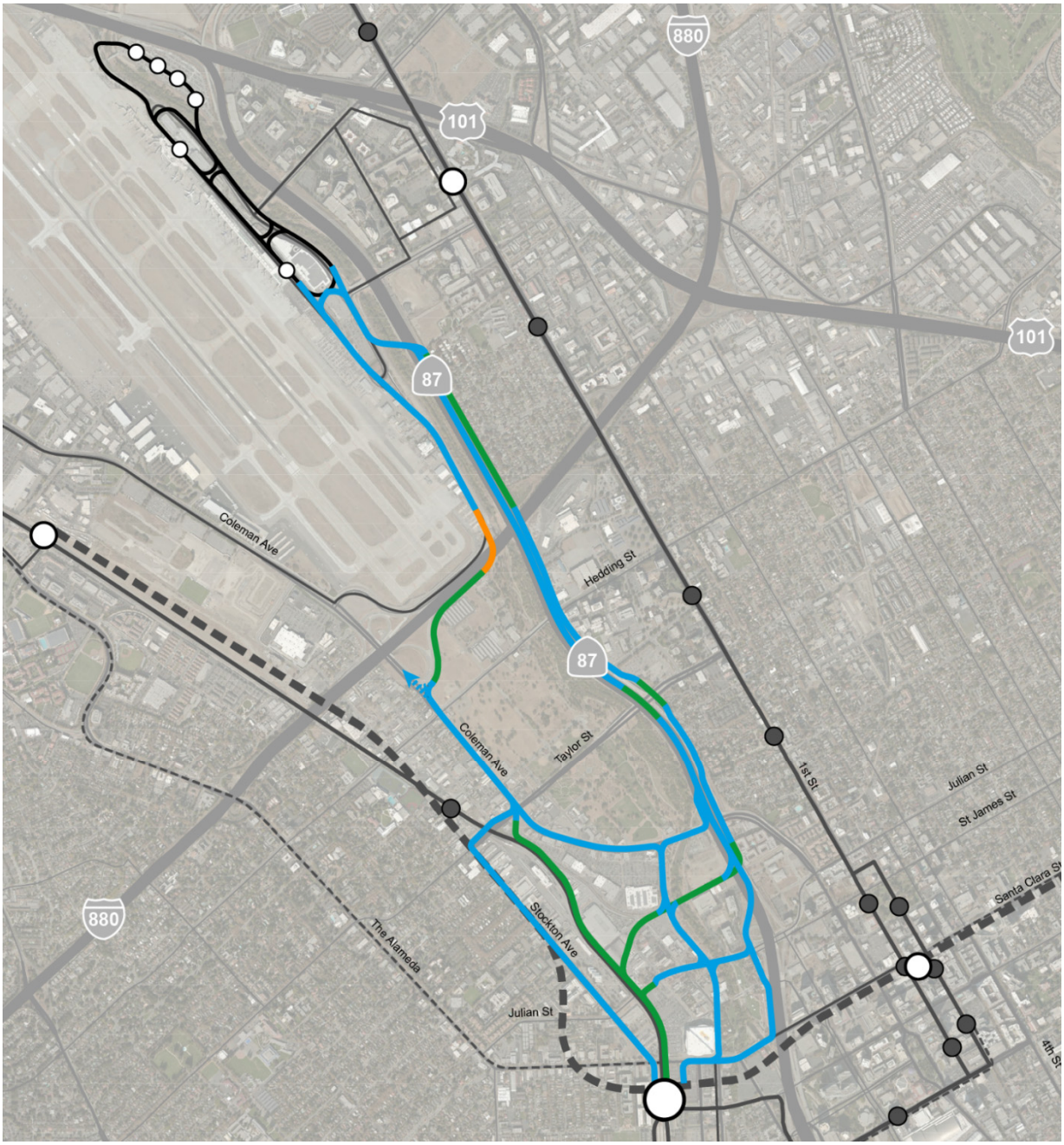
- **Coleman Ave Widening Project:** Coleman Ave is currently planned to be widened to six lanes between Hedding St and Autumn St., thereby providing a wider right-of-way that could accommodate an elevated transit guideway.
- **Taylor St Caltrain Bridge:** This three-span bridge carries six Caltrain tracks over Taylor St. The westbound left-turn lane approaching the intersection of Taylor St and Stockton Ave. passes under the center span of the bridge; this left-turn lane could be repurposed to carry a transit guideway beneath the Caltrain tracks.
- **Coleman Ave – Bassett St Bridge:** This bridge (National Bridge ID 06-37 0311) carries SR-87 (Guadalupe Fwy) over Coleman Ave and the Union Pacific (UP) Warm Springs Subdivision railroad tracks. With wide spacing between column bents (~130 feet), the bridge is a convenient location for a potential curved guideway alignment transitioning from the freeway right-of-way to the UP Warm Springs Subdivision.
- **Stockton Ave:** Stockton Ave is a two-lane road on a wide road surface (~55 feet). This wide corridor could likely physically accommodate a transit guideway.
- **Union Pacific Warm Springs Subdivision, South Leg of Wye:** The south leg of the Union Pacific Warm Springs Subdivision wye railroad tracks (connecting to the Caltrain Corridor) is reportedly abandoned, providing a convenient right-of-way for a transit guideway to access Diridon station.
- **Autumn St Extension Project:** Autumn St is currently planned to be extended from Coleman Ave to Park Ave, thereby providing a continuous right-of-way for a transit guideway.

[70] Guadalupe River Park & Gardens, Urban Design Guidelines for Development Adjacent to the Guadalupe River.

As a result of considering the constraints and opportunities in the study area, Figure 43 below shows the potential alignment segments between Airport and Diridon station. Generally there are few segments between the San José Airport and Taylor St, and many more potential segments between Taylor St and Diridon station. Alignment segments are colored according to the assumed alignment profile in each segment:

- Blue: above-grade / aerial
- Green: at-grade
- Orange: below-grade / tunnel

Figure 43: Alignment Alternatives

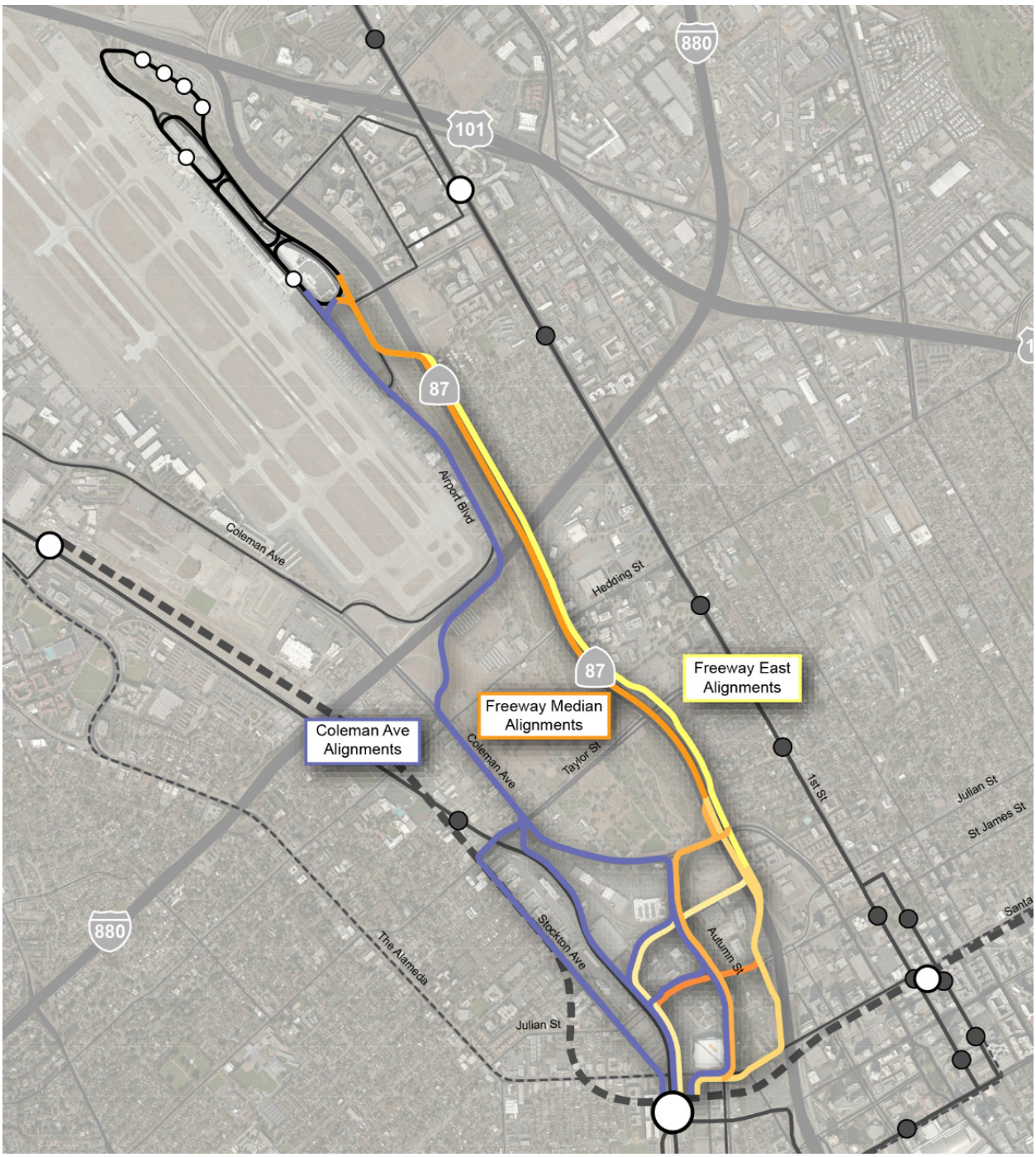


The segments identified above can be combined in various ways to create single complete alignment alternatives between the Airport and Diridon station. For the purposes of this analysis, the above alignments have been grouped into three alignment "families" as shown on Figure 44:

- Coleman Ave alignments
- Freeway (SR- 85 Guadalupe Freeway) Median alignments
- Freeway (SR- 85 Guadalupe Freeway) East alignments

Within each alignment family, several sub-alternatives are subsequently analyzed in Section 7.3.

Figure 44: Alignment Alternatives by Family



7.2 Evaluation Criteria

To evaluate potential alignments between the Airport and Diridon station, each alignment alternative is compared according to a set of evaluation criteria. These criteria consider the physical impacts of operational characteristics of each alternative; these criteria are outlined in Table 40 below.

Table 40: Evaluation Criteria and Scoring

Criterion		Description	Possible Scores
Constructability / Cost		General constructability, considering alignment length, cost, right-of-way availability and the presence of physical obstacles	1- Easily constructible or constructible with minor difficulty or risk 2- Constructible with some difficulty and risk 3- Not constructible
	ROW Availability / Risk	Availability of and risk associated with proposed right-of-way	1- Right-of-way vacant and available 2- Right-of-way occupied or not easily available 3- Right-of-way neither vacant nor easily available
	Total Alignment Length (mi)- TOTAL - Above-Grade - At-Grade - Below-Grade	Alignment length, by profile type (approximate); to inform capital cost	
	Major Physical Obstacles	Primary physical barriers complicating alternative	
Travel Time		End-to-end travel time of alternative (minutes)	
River / Park Impacts		Impact of alternative on Guadalupe River or park / gardens	1- No/minor impacts 2- Moderate impacts 3- Major impacts
Community Impacts		Impact of alternative on surrounding community (esp. residential neighborhoods)	1- No/minor impacts 2- Moderate impacts 3- Major impacts
Network Expansion Opportunity		Ease of adding future expansions to network (e.g., to Santa Clara)	1- Easily expandable 2- Expandable with some difficulty 3- Expansion infeasible

7.3 Analysis

The three alignment families are compared in Table 41 below. Sub-alternatives (nested within each alternative family) are thereafter evaluated.

Table 41: Alternative Families Evaluation

Criterion	Coleman	Freeway- Median	Freeway- East
Constructability / Cost	**1**- Easily constructible or constructible with minor difficulty or risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk
ROW Availability / Risk	**1**- Right-of-way vacant and available (Coleman Ave widening and Autumn St extension projects create convenient corridors)	**3**- Right-of-way neither vacant nor easily available (extensive coordination with Caltrans required)	**2**- Right-of-way occupied or not easily available (Some land unoccupied east of freeway; coordination with Caltrans required, elevated structures required where land not available)
Alignment Length (mi) -TOTAL - Above-Grade - At-Grade - Below-Grade	**2.9 - 3.1 miles** 2.4 - 2.6 mi 0.3 mi 0.2 mi	**2.9 - 3.0 miles** 2.4 - 3.0 mi 0 - 0.5 mi 0 mi	**2.9 - 3.0 miles** 2.4 - 3.0 mi 0 - 1.1 mi 0 mi
Major Obstacles	- I-880 (requires tunnel) - SJC airspace (requires tunnel / at-grade sections)	- Guadalupe River (requires bridges) - SR-87 Guadalupe Freeway (requires elevated viaducts)	- Guadalupe River (requires bridges) - SR-87 Guadalupe Freeway (requires bridges)
Travel Time	**7 minutes**	**7 minutes**	**7 minutes**
River / Park Impacts	**3**- Major impact (acquisition of north end of park required)	**2**- Moderate impact (two river crossings required)	**2**- Moderate impact (two river crossings required)
Community Impacts	**2**- Moderate impact (adjacent to residential communities)	**1**- No impacts (not adjacent to residential communities)	**3**- Major impact (adjacent to residential communities)
Network Expansion Opportunity	**1**- Easily expandable (short extension to Santa Clara from Coleman / I-880 feasible)	**2**- Expandable with some difficulty (long extension to Santa Clara from Diridon area feasible)	**2**- Expandable with some difficulty (long extension to Santa Clara from Diridon area feasible)

On a high level, the Coleman Ave family of alternatives avoids many of the difficulties associated with the Freeway Median and Freeway East families of alternatives. Specifically, all Freeway alternatives would require extensive coordination with Caltrans to accommodate a new elevated AGT guideway within the freeway right-of-way. Further, the Freeway alternatives would also require two crossings of the Guadalupe River.

Conversely, Coleman Ave sub-alternatives all must pass through the Guadalupe River Gardens in a low-profile configuration to avoid interference with the flight paths of aircraft arriving and departing the San José Airport.

Sub-alternatives (within each alignment family) are subsequently compared amongst each other.

The Coleman family of alternatives is presented in Figure 45 below.

Figure 45: Coleman Sub-Alternatives

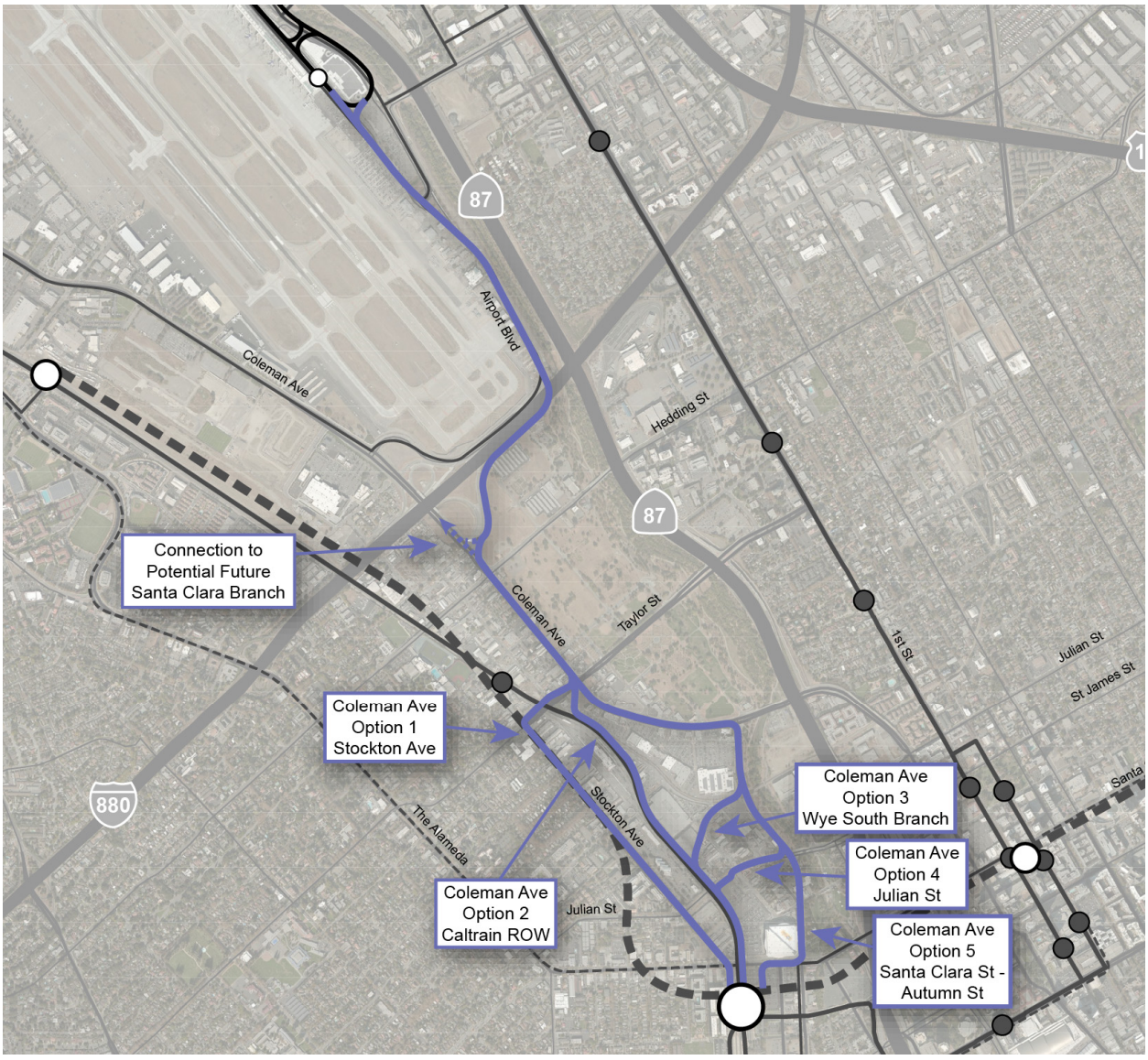


Table 42: Coleman Ave Sub-Alternative Evaluation

Criterion	Option 1- Stockton Ave	Option 2- Caltrain ROW	Option 3- Wye South Branch	Option 4- Julian St	Option 5- Autumn St - Santa Clara St
Constructability / Cost	**1**- Easily constructible or constructible with minor difficulty or risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**1**- Easily constructible or constructible with minor difficulty or risk
ROW Availability / Risk	**2**- Right-of-way occupied or not easily available (Would require repurposing Stockton Ave, currently ~55 ft curb-to-curb)	**3**- Right-of-way neither vacant nor easily available (Highly constrained spaces along existing tracks; proposed HSR further limits ROW)	**2**- Right-of-way occupied or not easily available (Wye branch abandoned; Highly constrained space along short portion of Caltrain corridor)	**2**- Right-of-way occupied or not easily available (Would require repurposing Julian St, currently ~75 ft curb-to-curb)	**1**- Right-of-way vacant and available (Coleman Ave widening and Autumn St extension projects create convenient corridors)
Alignment Length (mi) -TOTAL - Above-Grade - At-Grade - Below-Grade	**2.9 miles** 2.4 mi 0.3 mi 0.2 mi	**2.8 miles** 2.3 mi 0.3 mi 0.2 mi	**3.1 miles** 2.6 mi 0.3 mi 0.2 mi	**3.1 miles** 2.6 mi 0.3 mi 0.2 mi	**3.1 miles** 2.6 mi 0.3 mi 0.2 mi
Major Obstacles	- Crossing over Caltrain and HSR corridor	- Constrained Caltrain and HSR corridor - Buildings adjoining Caltrain corridor	- Constrained Caltrain and HSR corridor - Buildings adjoining Caltrain corridor - Adjacent to Guadalupe River	- Adjacent to Guadalupe River	- Adjacent to Guadalupe River - Visual impacts to SAP Center
Travel Time	**7 minutes**				
River / Park Impacts	**3**- Major impact (acquisition of north end of park required)				
Community Impacts	**3**- Major impact (adjacent to residential communities for most of alignment)	**3**- Major impact (adjacent to residential communities for short segments)	**2**- Moderate impact (adjacent to residential communities for short segments)	**2**- Moderate impact (adjacent to residential communities for short segments)	**1**- Minor impacts (only adjacent to residential communities near park)
Network Expansion Opportunity	**1**- Easily expandable (short extension to Santa Clara from Coleman / I-880 feasible)				

From Table 42 above, all of the Coleman family sub-alternatives have comparable total alignment length and end-to-end travel time. However, Option 5 (Autumn St – Santa Clara St) has several strengths compared to the other Coleman Ave sub-alternatives. Specifically, the alternative can take advantage of rights-of-way to be created by two projects proposed by the City of San José, the Coleman Ave Widening Project and the Autumn St Extension Project. Both projects would enable the construction of an elevated guideway along major streets in the project area. Further, of the sub-alternatives, Option 5 best avoids residential communities.

A secondary alternative with notable strengths is Option 1 (Stockton Ave). This alignment would provide a somewhat direct path and could take advantage of the wide road right-of-way along Stockton Ave. However, this would be directly adjacent to residential communities. Additionally, while the Taylor St / Union Pacific Railroad undercrossing could potentially accommodate an AGT guideway, the overall configuration would be somewhat complex.

The remaining alternatives have more challenges, either following lengthier paths, following the constrained Caltrain Corridor, or passing through residential communities.

Figure 46: Freeway Median Sub-Alternatives

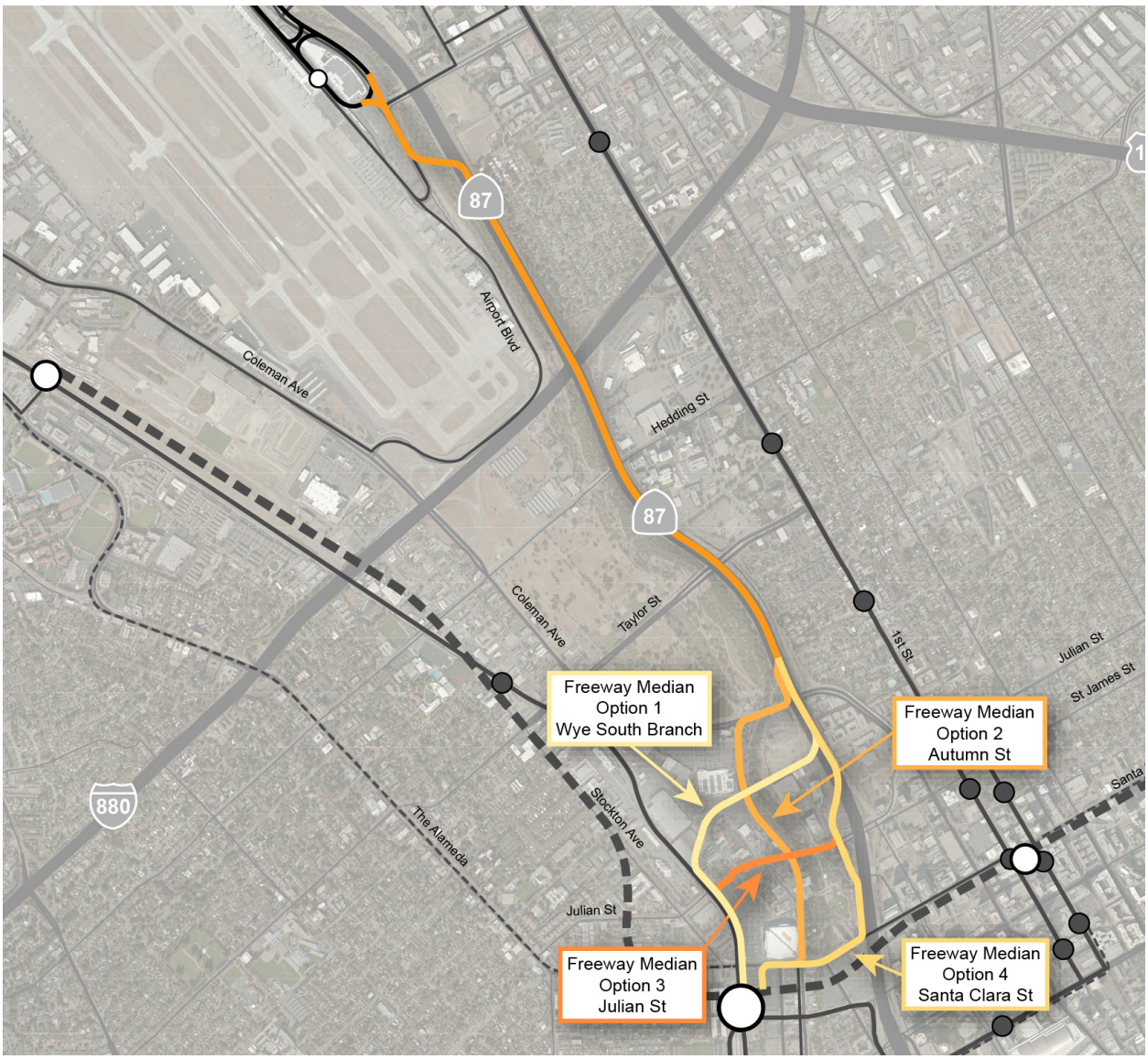


Table 43: Freeway Median Sub-Alternative Evaluation

Criterion	Option 1- Wye South Branch	Option 2- Autumn St	Option 3- Julian St	Option 4- Santa Clara St
Constructability / Cost	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk
ROW Availability / Risk	**3**- Right-of-way occupied or not easily available (Wye branch abandoned; Highly constrained space along short portion of Caltrain corridor)	**2**- Right-of-way vacant and available (Autumn St extension project creates convenient corridors)	**2**- Right-of-way available (Would require elevated guideway along Julian St.)	**2**- Right-of-way available (Would require elevated guideway on and above streets adjacent to freeway)
	Extensive coordination with Caltrans required for all Freeway Median sub-alternatives			
Alignment Length (mi) -TOTAL - Above-Grade - At-Grade - Below-Grade	**2.9 miles** 2.4 - 2.9 miles 0 - 0.5 miles 0 miles	**2.9 miles** 3.0 miles 0 miles 0 miles	**3.0 miles** 3.0 miles 0 miles 0 miles	**3.0 miles** 3.0 miles 0 miles 0 miles
Major Obstacles	- Guadalupe River (requires bridges) - Constrained Caltrain and HSR corridor	- Guadalupe River (requires bridges) - Visual impacts to SAP Center	- Guadalupe River (requires bridges)	- Guadalupe River (requires bridges) - Visual impacts to SAP Center
Travel Time	**7 minutes**			
River / Park Impacts	**2**- Moderate impact (two river crossings required)			
Community Impacts	**1**- No impacts (only adjacent to residential communities near park)	**1**- No impacts (only adjacent to residential communities near park)	**2**- Moderate impact (adjacent to residential communities for one short segment)	**1**- No impacts (only adjacent to residential communities near park)
Network Expansion Opportunity	**2**- Expandable with some difficulty (long extension to Santa Clara from Diridon area feasible)			

From Table 43 above, all of the Freeway Median family sub-alternatives have comparable total alignment length and end-to-end travel time. However, Option 2 (Autumn St) has several strengths compared to the other Coleman Ave sub-alternatives. Specifically, the alternative can take advantage of rights-of-way to be created by two projects proposed by the City of San José, the Coleman Ave Widening Project and the Autumn St Extension Project. Both projects would enable the construction of an elevated guideway along major streets in the project area.

The remaining alternatives present more challenges, either following more circuitous paths, following the constrained Caltrain Corridor, or passing through residential communities.

Figure 47: Freeway East Sub-Alternatives

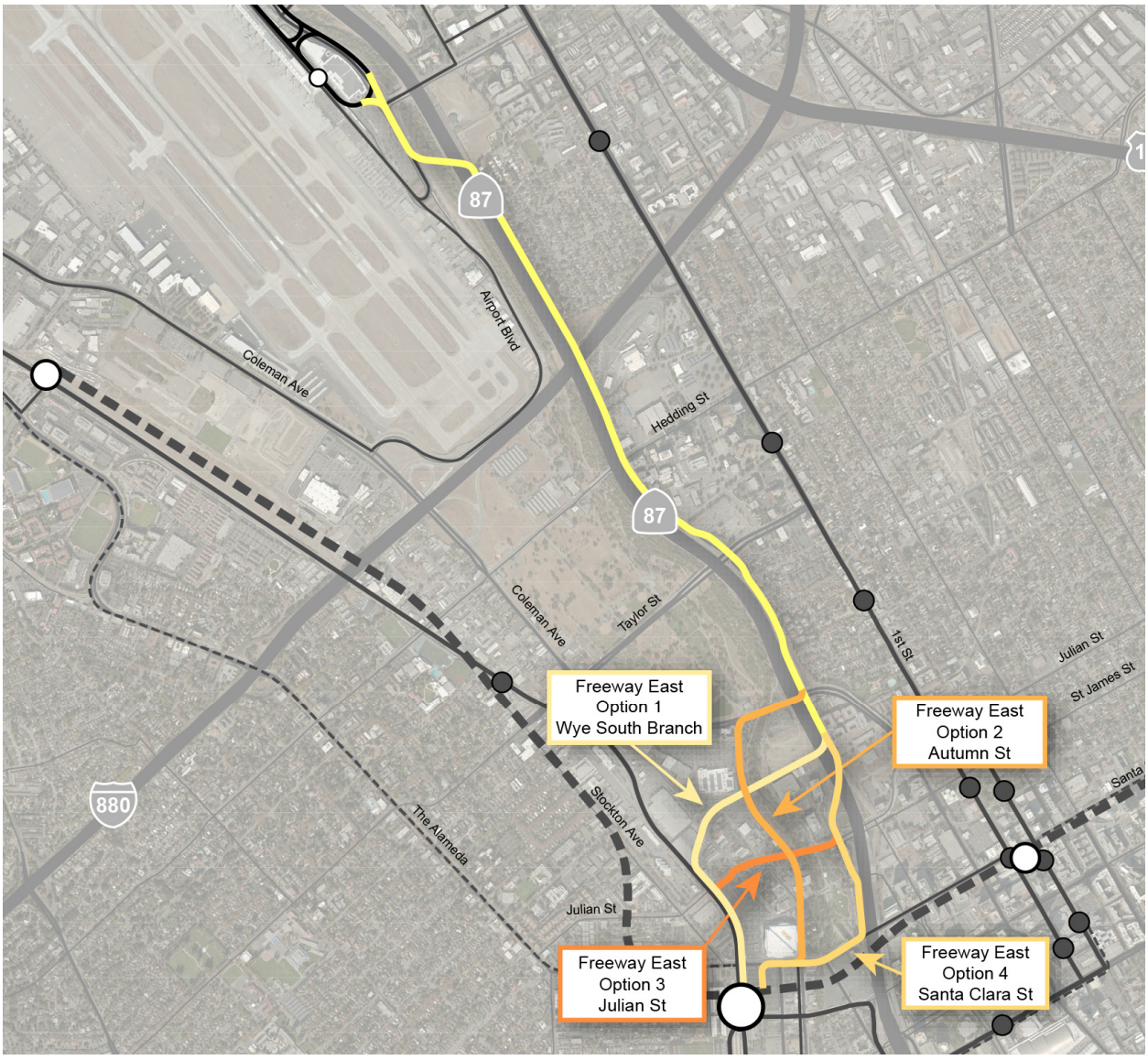


Table 44: Freeway East Sub-Alternative Evaluation

Criterion		Option 1- Wye South Branch	Option 2- Autumn St	Option 3- Julian St	Option 4- Santa Clara St
Constructability / Cost		**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk
	ROW Availability / Risk	**3**- Right-of-way occupied or not easily available (Wye branch abandoned; Highly constrained space along short portion of Caltrain corridor)	**2**- Right-of-way vacant and available (Autumn St extension project creates convenient corridors)	**2**- Right-of-way available (Would require elevated guideway along Julian St.)	**2**- Right-of-way available (Would require elevated guideway on and above streets adjacent to freeway)
		Extensive coordination with Caltrans required for all Freeway East sub-alternatives			
	Alignment Length (mi) -TOTAL - Above-Grade - At-Grade - Below-Grade	**2.9 miles** 1.8 - 2.9 miles 0 – 1.1 miles 0 miles	**2.9 miles** 2.3 - 2.9 miles 0 - 0.6 miles 0 miles	**3.0 miles** 2.4 - 3.0 miles 0 - 0.6 miles 0 miles	**3.0 miles** 2.4 - 3.0 miles 0 - 0.6 miles 0 miles
	Major Obstacles	- Guadalupe River (requires bridges) - Constrained Caltrain and HSR corridor	- Guadalupe River (requires bridges) - Visual impacts to SAP Center	- Guadalupe River (requires bridges)	- Guadalupe River (requires bridges) - Visual impacts to SAP Center
Travel Time		**7 minutes**			
River / Park Impacts		**2**- Moderate impact (two river crossings required)			
Community Impacts		**1**- No impacts (only adjacent to residential communities near park)	**1**- No impacts (only adjacent to residential communities near park)	**2**- Moderate impact (adjacent to residential communities for one short segment)	**1**- No impacts (only adjacent to residential communities near park)
Network Expansion Opportunity		**2**- Expandable with some difficulty (long extension to Santa Clara from Diridon area feasible)			

The sub-alternatives within the Freeway East family of sub-alternatives all perform similarly, compared to one another, as do the Freeway Median alternatives (see preceding sections). As before, Option 2 (Autumn St) has several strengths compared to the other Coleman Ave sub-alternatives, using rights-of-way created by the proposed Coleman Ave Widening Project and the Autumn St Extension Project. The other alternatives present more challenges, either following more circuitous paths, following the constrained Caltrain Corridor, or passing through residential communities.

Table 45: Comparison of All Sub-alternatives

Criterion	Coleman Ave					Freeway Median				Freeway East			
	Option 1- Stockton Ave	**Option 2- Caltrain ROW**	**Option 3- Wye South Branch**	**Option 4- Julian St**	**Option 5- Autumn St - Santa Clara St**	**Option 1- Wye South Branch**	**Option 2- Autumn St**	**Option 3- Julian St**	**Option 4- Santa Clara St**	**Option 1- Wye South Branch**	**Option 2- Autumn St**	**Option 3- Julian St**	**Option 4- Santa Clara St**
Constructability / Cost	**1**- Easily constructible or constructible with minor difficulty or risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**1**- Easily constructible or constructible with minor difficulty or risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk	**2**- Constructible with some difficulty and risk
ROW Availability / Risk	**2**- Right-of-way occupied or not easily available (Would require repurposing Stockton Ave, currently ~55 ft curb-to-curb)	**3**- Right-of-way neither vacant nor easily available (Highly constrained spaces along existing tracks; proposed HSR further limits ROW)	**2**- Right-of-way occupied or not easily available (Wye branch abandoned; Highly constrained space along short portion of Caltrain corridor)	**2**- Right-of-way occupied or not easily available (Would require repurposing Julian St, currently ~75 ft curb-to-curb)	**1**- Right-of-way vacant and available (Coleman Ave widening and Autumn St extension projects create convenient corridors)	**3**- Right-of-way occupied or not easily available (Wye branch abandoned; Highly constrained space along short portion of Caltrain corridor)	**2**- Right-of-way vacant and available (Autumn St extension project creates convenient corridors)	**2**- Right-of-way available (Would require elevated guideway along Julian St.)	**2**- Right-of-way available (Would require elevated guideway on and above streets adjacent to freeway)	**3**- Right-of-way occupied or not easily available (Wye branch abandoned; Highly constrained space along short portion of Caltrain corridor)	**2**- Right-of-way vacant and available (Autumn St extension project creates convenient corridors)	**2**- Right-of-way available (Would require elevated guideway along Julian St.)	**2**- Right-of-way available (Would require elevated guideway on and above streets adjacent to freeway)
Alignment Length -TOTAL - Above-Grade - At-Grade - Below-Grade	**2.9 miles** 2.4 mi 0.3 mi 0.2 mi	**2.8 miles** 2.3 mi 0.3 mi 0.2 mi	**3.1 miles** 2.6 mi 0.3 mi 0.2 mi	**3.1 miles** 2.6 mi 0.3 mi 0.2 mi	**3.1 miles** 2.6 mi 0.3 mi 0.2 mi	**2.9 miles** 2.4 - 2.9 miles 0 - 0.5 miles 0 miles	**2.9 miles** 3.0 miles 0 miles 0 miles	**3.0 miles** 3.0 miles 0 miles 0 miles	**3.0 miles** 3.0 miles 0 miles 0 miles	**2.9 miles** 1.8 - 2.9 miles 0 – 1.1 miles 0 miles	**2.9 miles** 2.3 - 2.9 miles 0 - 0.6 miles 0 miles	**3.0 miles** 2.4 - 3.0 miles 0 - 0.6 miles 0 miles	**3.0 miles** 2.4 - 3.0 miles 0 - 0.6 miles 0 miles
Major Obstacles	- Crossing over Caltrain and HSR corridor	- Constrained Caltrain and HSR corridor - Buildings adjoining Caltrain corridor	- Constrained Caltrain and HSR corridor - Buildings adjoining Caltrain corridor - Adjacent to Guadalupe River	- Adjacent to Guadalupe River	- Adjacent to Guadalupe River - Visual impacts to SAP Center	- Guadalupe River (requires bridges) - Constrained Caltrain and HSR corridor	- Guadalupe River (requires bridges) - Visual impacts to SAP Center	- Guadalupe River (requires bridges)	- Guadalupe River (requires bridges) - Visual impacts to SAP Center	- Guadalupe River (requires bridges) - Constrained Caltrain and HSR corridor	- Guadalupe River (requires bridges) - Visual impacts to SAP Center	- Guadalupe River (requires bridges)	- Guadalupe River (requires bridges) - Visual impacts to SAP Center
Travel Time	**7 minutes**					**7 minutes**				**7 minutes**			
River / Park Impacts	**3**- Major impact (acquisition of north end of park required)					**2**- Moderate impact (two river crossings required)				**2**- Moderate impact (two river crossings required)			
Community Impacts	**3**- Major impact (adjacent to residential communities for most of alignment)	**3**- Major impact (adjacent to residential communities for short segments)	**2**- Moderate impact (adjacent to residential communities for short segments)	**2**- Moderate impact (adjacent to residential communities for short segments)	**1**- Minor impacts (only adjacent to residential communities near park)	**1**- No impacts (only adjacent to residential communities near park)	**1**- No impacts (only adjacent to residential communities near park)	**2**- Moderate impact (adjacent to residential communities for one short segment)	**1**- No impacts (only adjacent to residential communities near park)	**1**- No impacts (only adjacent to residential communities near park)	**1**- No impacts (only adjacent to residential communities near park)	**2**- Moderate impact (adjacent to residential communities for one short segment)	**1**- No impacts (only adjacent to residential communities near park)
Network Expansion Opportunity	**1**- Easily expandable (short extension to Santa Clara from Coleman / I-880 feasible)					**2**- Expandable with some difficulty (long extension to Santa Clara from Diridon area feasible)				**2**- Expandable with some difficulty (long extension to Santa Clara from Diridon area feasible)			
OVERALL SCORE (1 = Good, 3 = Poor)	**2**	**3**	**3**	**3**	**1**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**

7.4 Observations

Considering all thirteen alignment alternatives together, all have comparable total alignment length and end-to-end travel times. However, Coleman Ave Option 5 (Autumn St – Santa Clara St) has several strengths compared to the other alternatives. Secondarily, Freeway Median Option 2 (Autumn St) and Freeway East Option 2 (Autumn St), have key strengths as well.

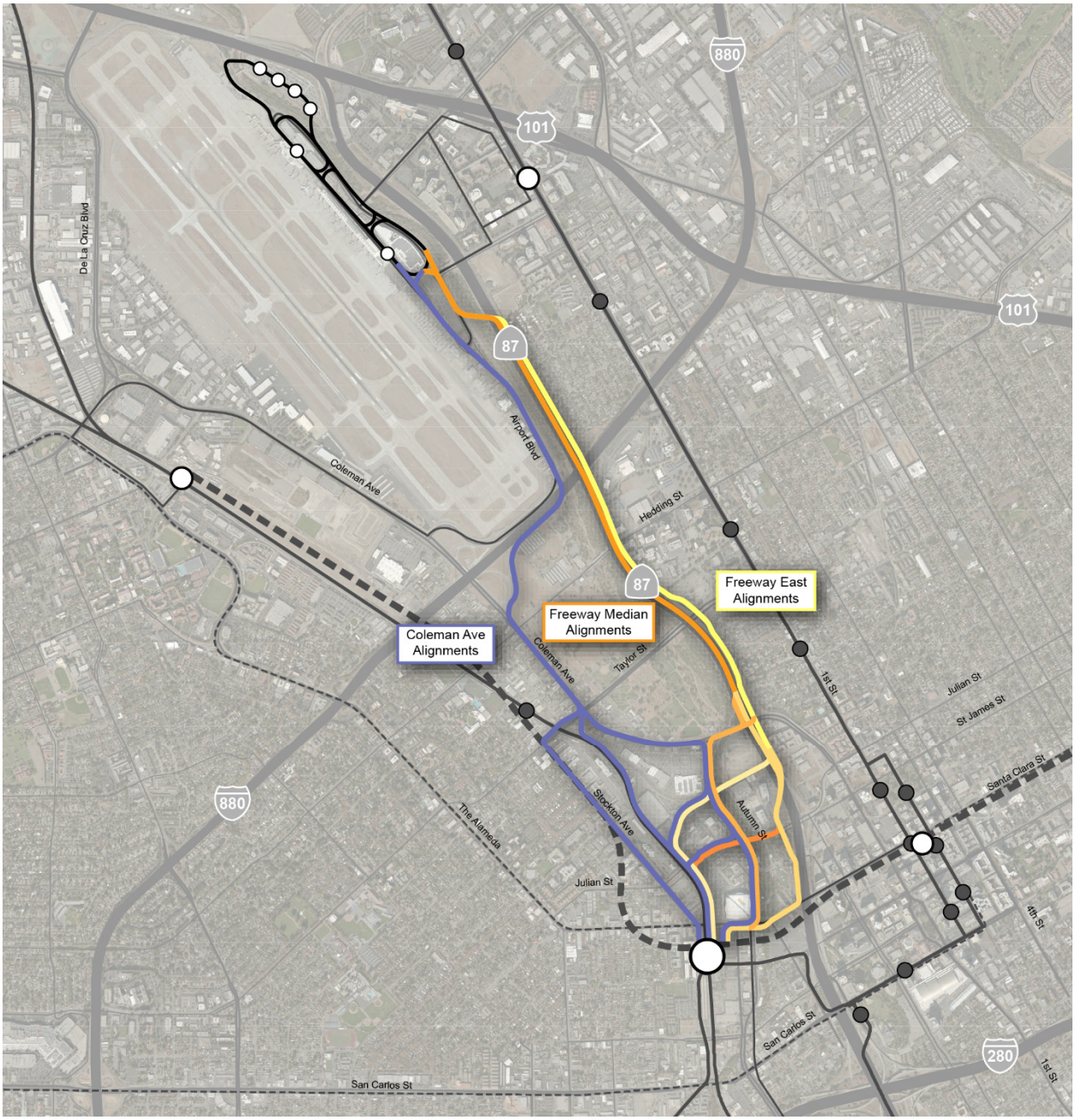
The Coleman Ave family of alternatives avoids many of the difficulties associated with the Freeway Median and Freeway East families of alternatives. Option 5 (Autumn St – Santa Clara St) is the most promising of the Coleman Ave sub-alternatives, owing to the availability of right-of-way from proposed roadway expansion projects. Option 2 is also somewhat promising, owing to the wide road right-of-way along Stockton Ave. However, Option 2 presents some challenges due to potential impacts to residential communities and the difficulty of navigating the Taylor St / Union Pacific Railroad undercrossing.

The Freeway Median and Freeway East alternatives are less promising, requiring extensive coordination with Caltrans to accommodate a new elevated AGT guideway within the freeway right-of-way and requiring two bridge crossings over the Guadalupe River. However, of the Freeway alternatives, Freeway Median Option 2 (Autumn St) and Freeway East Option 2 (Autumn St) have the greatest strengths. Much like Coleman Ave Option 5 (Autumn St – Santa Clara St), these two alternatives take advantage of rights-of-way created by the Coleman Ave Widening Project and the Autumn St Extension Project.

Three alignment alternatives are therefore recommended for further investigation/development (listed below and shown in Figure 48 below):

- Coleman Ave Option 5 (Autumn St – Santa Clara St)
- Freeway Median Option 2 (Autumn St)
- Freeway East Option 2 (Autumn St)

Figure 48: Alternatives Recommended for Further Development



8 Key Conclusions

The City of San José Automated Guideway Transit Study provides a high-level assessment of the feasibility of an Automated Guideway Transit (AGT) system between San José Diridon station, Mineta San José Airport (Airport), and other nearby destinations. This study did not include detailed ridership forecasting or cost estimating; as such, demand and cost estimates contained therein are rough-order-of-magnitude (ROM) estimates.

The following are the key conclusions from this study. Additional observations are described within each preceding chapter.

- There is potential sufficient demand to justify the construction and operation of an Automated Guideway Transit (AGT) system between Diridon Station and Airport. The AGT system would provide a convenient, grade-separated transit link between the Airport and the major regional transit hub in Santa Clara County.
- An AGT link to between the Airport and Diridon Station would directly connect the Airport regional passenger rail services including Caltrain, Capitol Corridor and ACE. The link could also connect future High-Speed Rail to the airport, as well as existing or future rental car and/or long term parking areas.
- The potential rider demand is comprised of a number of different traveler markets that were analyzed in this study.
    - Approximately half of the potential demand is from passengers making intra-airport trips (i.e., between the airport terminals, between the Airport terminals and long-term parking, and between Terminal A and the rental car facility at Terminal B).
    - Approximately one sixth of the potential demand would be from airport passengers or employees traveling between Diridon station and the Airport.
    - Approximately one third of the potential demand would be related to High-Speed Rail trips to/from Diridon station for connecting flights or access to parking or rental cars.
- The Base AGT system would increase accessibility by transit to the Airport. The proportion of airport passengers located within a 45-minute transit trip of the Airport would almost double from 9 percent to 16 percent. The percentage within a 1-hour transit trip of the Airport would increase from 33 percent to 45 percent. The increased accessibility suggests higher transit mode share.
- An Automated Transit Network would be the most appropriate AGT technology choice to serve the Diridon-to-Airport corridor, given the potential demand and characteristics of the market identified in this study. An Automated People Mover system could also be considered. However, an on-demand ATN system would provide a higher quality of service compared to fixed-schedule, all-stop service.
- The capital cost-effectiveness (measured in terms of capital cost per passenger) of an ATN-based system could be on par, or potentially better than that of recently-built, similar airport rail connector systems (e.g., Oakland Airport Connector).

- Several AGT alignments between Diridon and the Airport are conceptually feasible, despite a number of contextual challenges, and are suitable for further study. Two notable alignments arising from the evaluation exercise are:
    - An elevated alignment along Airport Blvd that crosses under the Nimitz Freeway (I-880), then rises to an elevated guideway along Coleman Ave and Autumn St; and
    - An elevated alignment that crosses the Guadalupe River to follow the Guadalupe Freeway (SR-87), then transitions to Autumn St via Coleman Ave.
- The Base AGT system between Diridon and the Airport could be expanded to serve additional activity centers in the subregion, namely Santa Clara, Downtown San José, and North San José. Such an Expanded AGT network would fill a general gap in the public transportation network around the Airport.
- ATN technology would be well-suited to serve the potential travel demand of an Expanded AGT network, providing fast, on-demand, point-to-point travel. The Expanded AGT network would be less cost-effective than the Base AGT system requiring proportionally greater capital investment for each new rider captured.
- The Base AGT Network would generate up to three times the demand than the alignment studied in the City's 2012 Airport-Area ATN report, which connected the Airport to North First Street Light Rail and the Santa Clara Caltrain/future BART station. The comparison excludes internal airport trips that both alignments would have served equally. A connection to Diridon would also enable the AGT Network to satisfy additional potential demand generated by high-speed rail service at Diridon station. Both the 2012 alignment and the Base AGT Network alignment would entail similar track mileage (9.6 single track miles for the Base AGT Network and 10.3 single track miles for the 2012 ATN alignment).

9 Appendix

9.1.1 Travel Time Calculation

Figures 49-53 below show calculated travel times to/from the San José Airport using different travel modes (Auto, Transit + AGT) in different analysis years (2015, 2030).

In the 2030 analysis year, the following regional transit improvements are assumed to be in operation:

- El Camino Real BRT
- Santa Clara – Alum Rock BRT
- Stevens Creek BRT
- Caltrain Peninsula Corridor Electrification Project (PCEP)
- Vasona LRT Extension
- BART Silicon Valley Extension to Diridon Station
- High-Speed Rail Phase 1 (San Francisco to Los Angeles)

Figure 49 below shows drive access times to the Airport in the AM peak period, given the existing roadway network (2015).

Figure 49: Drive Access Times to the San José Airport, AM Peak Period (2015)

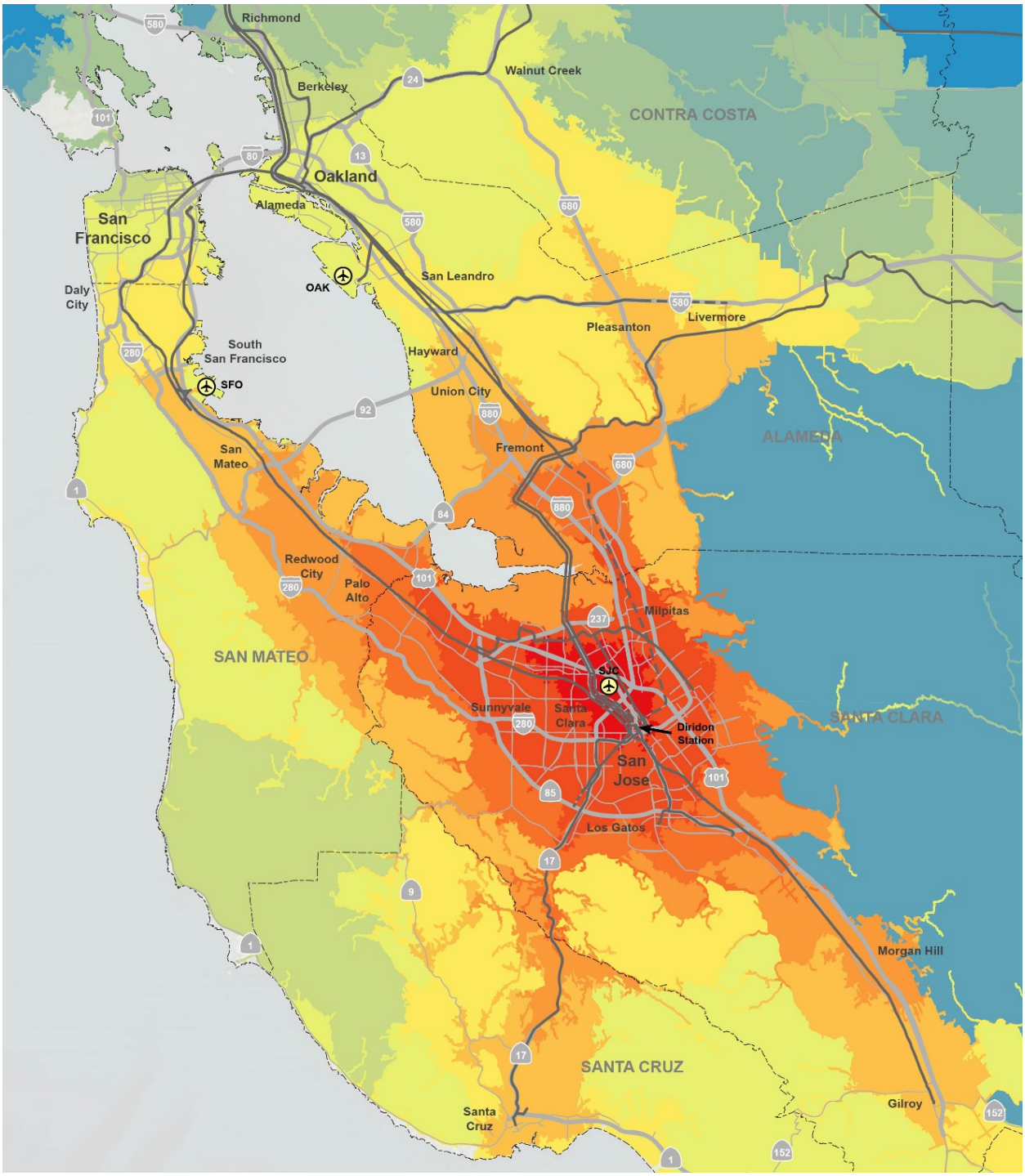


Figure 50 below shows transit access times to San José Airport in the AM peak period, given the existing transit network (2015).

Figure 50: Transit Access Times to San José Airport, AM Peak Period (2015)

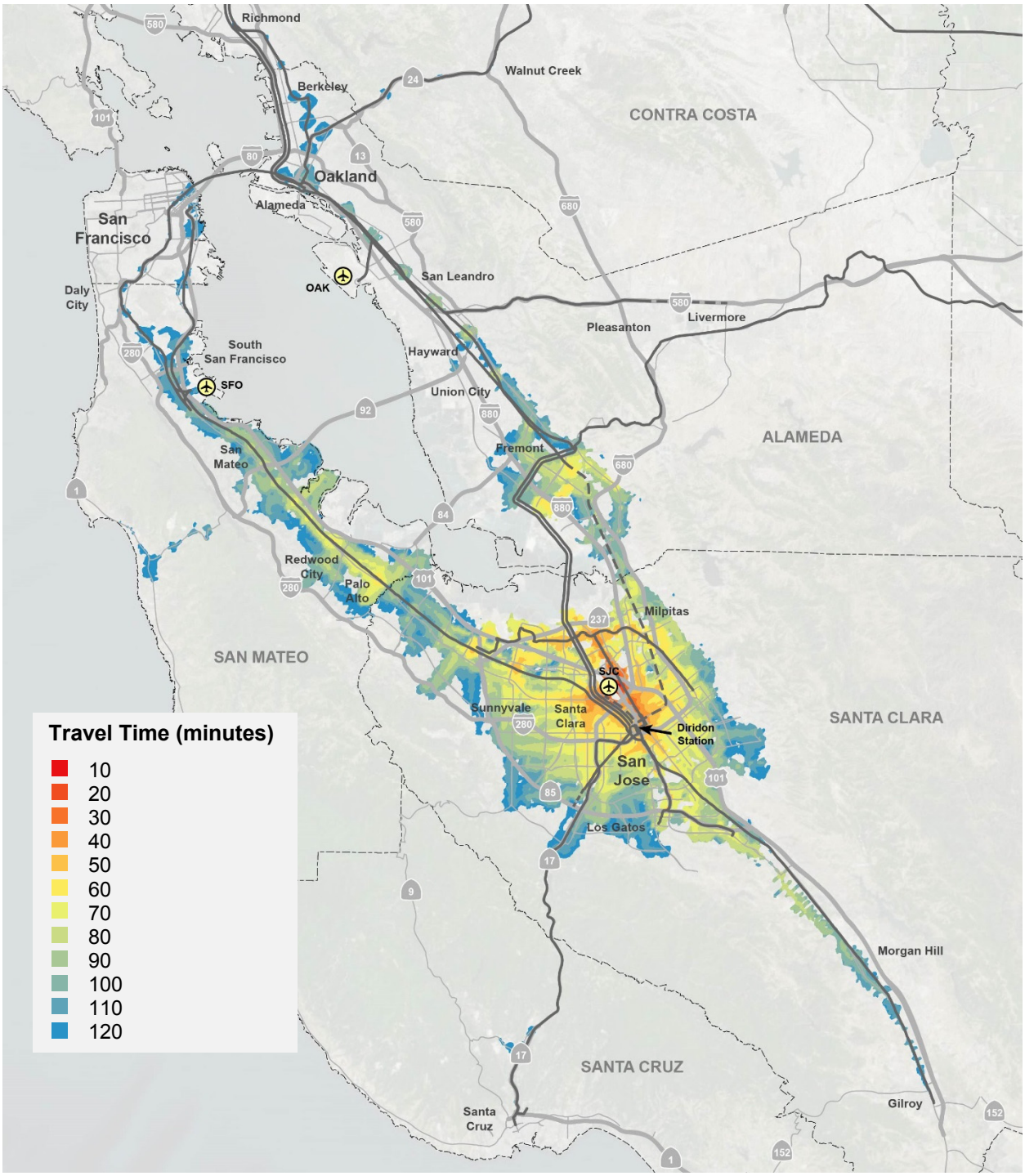


Figure 51 below shows transit access times to San José Airport in the AM peak period, given planned transit improvements (2030) and the proposed AGT system.

Figure 51: Transit and/or AGT Access Times, AM Peak Period (2030)

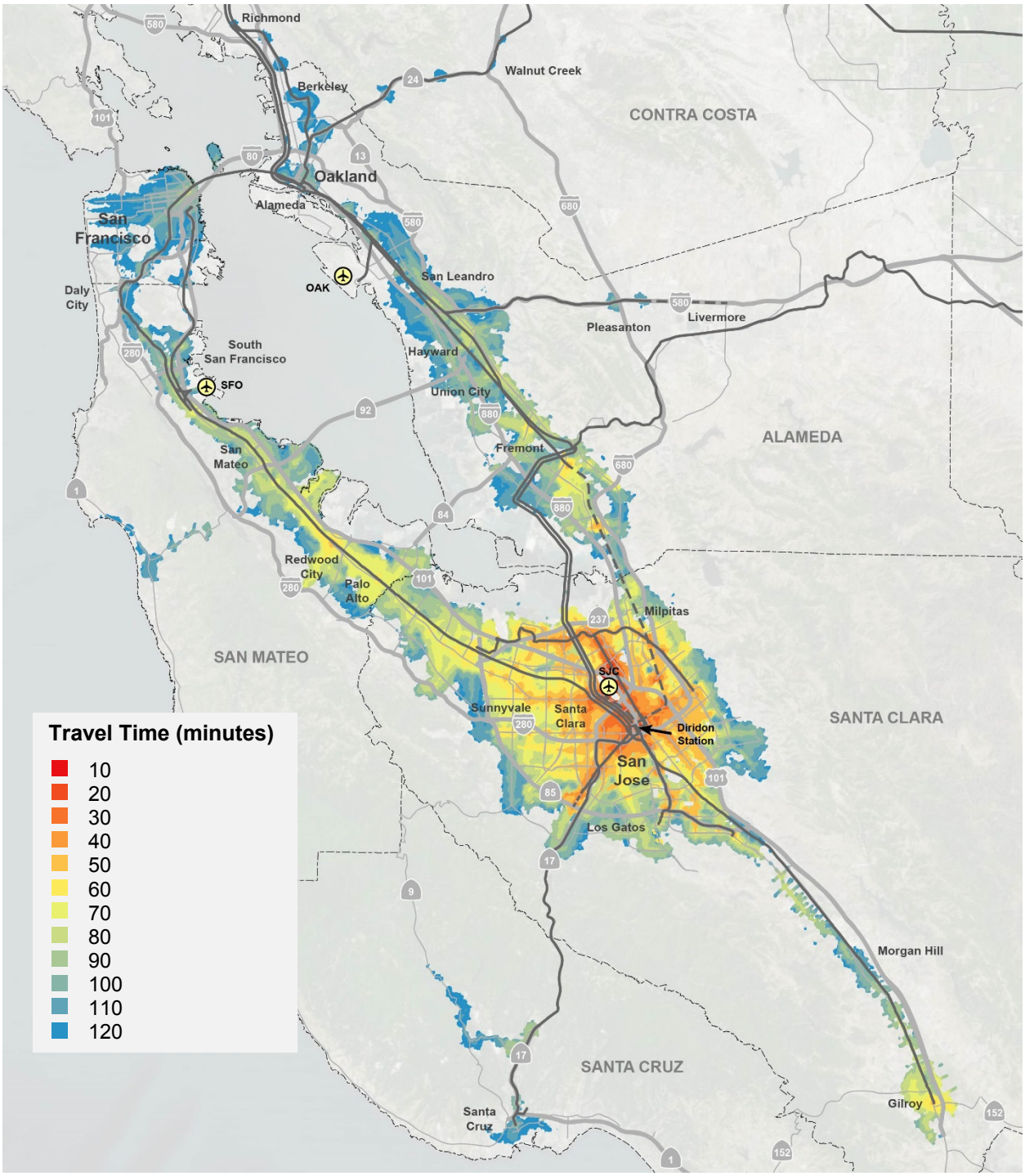


Figure 52 below shows the ratio of transit access times to the San José Airport to auto access times to Airport in the AM peak period, given the existing transit and roadway network. A high ratio indicates that transit is uncompetitive (i.e., a transit trip would take considerably longer than the equivalent auto trip). A lower ratio indicates that transit is more competitive with auto.

Figure 52: Transit Travel-Time-Competitiveness with Auto (2015)

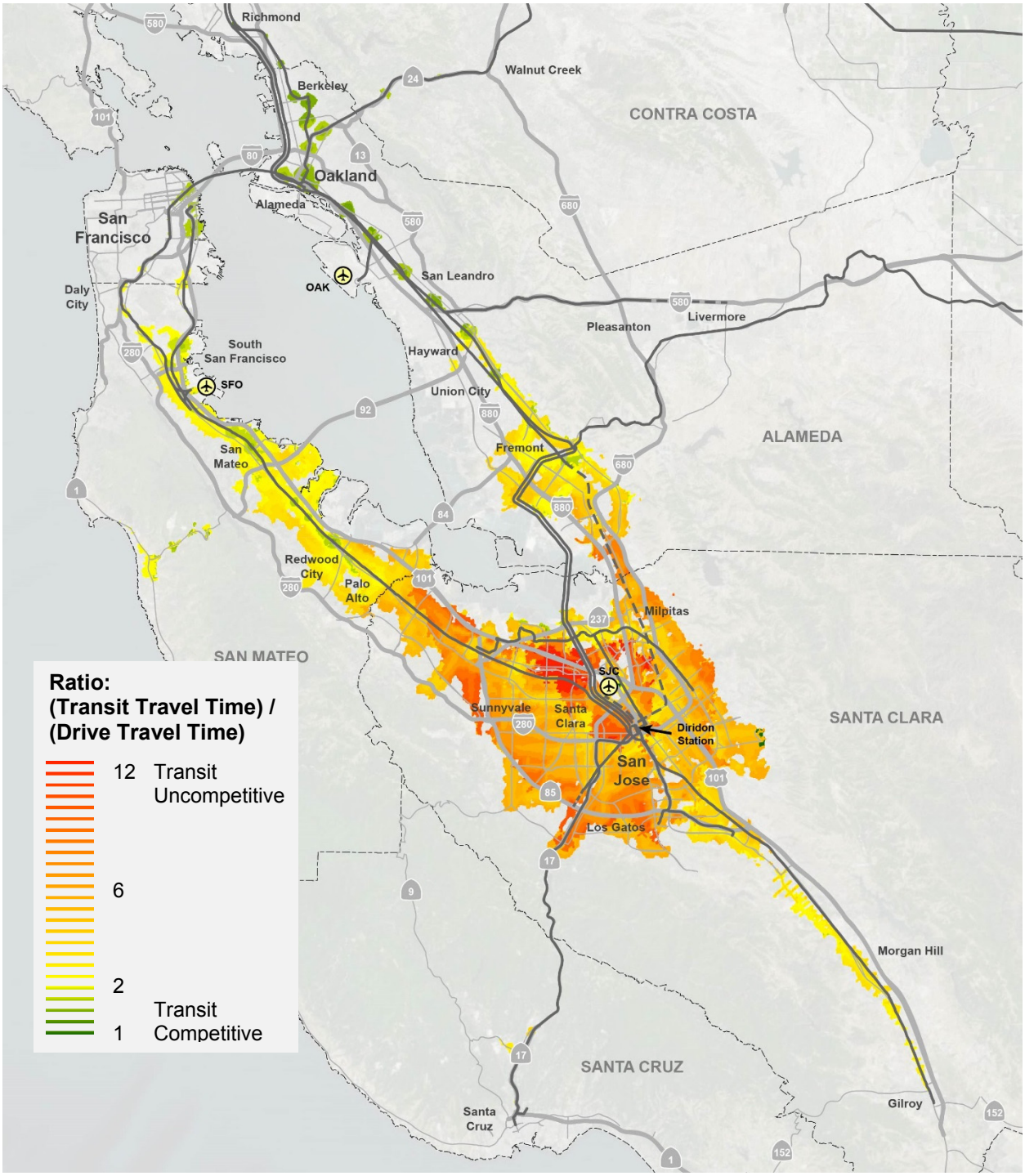


Figure 53 below shows the ratio of transit access times to San José Airport to auto access times to the Airport in the AM peak period, given planned transit improvements (2030) and the proposed AGT system. A high ratio indicates that transit is uncompetitive (i.e., a transit trip would take considerably longer than the equivalent auto trip). A lower ratio indicates that transit is more competitive with auto.

Figure 53: Transit-AGT Travel-Time-Competitiveness with Auto (2030)