APPENDIX G: TRAVEL MARKETS MEMO

SAN PABLO AVENUE CORRIDOR PROJECT

Memorandum

To: Carolyn Clevenger and Cathleen Sullivan, Alameda CTC

From: Francisco Martin and Nate Conable, Fehr & Peers

Date: October 18, 2017

Subject: **San Pablo Avenue Corridor Project Existing Conditions Report – Outline**

This memo presents the travel market assessment conducted for the Project.

Methodology

This section provides an overview of the travel market assessment methodology and zone structure used for data collection and processing.

Study Area Determination

The San Pablo Avenue Corridor Project evaluates San Pablo Avenue between the southern terminus in Downtown Oakland to Hilltop Drive (near the Hilltop Mall) in Richmond. The consultant team conducted a comprehensive multimodal evaluation of the project corridor based on existing data. The geographic unit of data collection varied depending on the type of data but included the entire length of San Pablo Avenue between Downtown Oakland and Hilltop Drive.

For the purposes of summarizing data and understanding variations in travel markets along the project corridor, San Pablo Avenue was divided into eight corridor sub-areas, referred to as "middle filters" throughout the Travel Market Assessment Chapter, based on San Pablo Avenue cross-sections and geographic elements. The eight middle filters cover the entire length of the project corridor and are not necessarily the sub-areas that are proposed for the evaluation of design concepts and alternatives; instead, the middle filter limits were used to summarize and present the origin-destination data and travel markets identified from the travel market assessment. An additional middle filter was provided on I-80 in order to compare origin-destination travel patterns between I-80 and San Pablo Avenue. **Figure G-1** presents the zone network.

Origin-Destination Data Collection

Existing auto and transit origin-destination patterns within the project study area were established using a combination of data sources. StreetLight Data auto origin-destination trip tables served as a starting point for understanding relative auto trip patterns, which were then factored based on a combination of travel demand model and traffic count data to establish an absolute measure of auto origin-destination patterns between each of the 50 study area zones.

Origin-destination data purchased from StreetLight Data was tagged to a geographic layer of 50 zones. The zone system was designed to understand trips originating in the corridor that are currently served by transit and trips that could be served by transit if

improvements were implemented. It was also designed to address potential markets for bicycle and pedestrian trips. The zone system was coordinated with the TAZ system from the Alameda CTC travel demand model and included the following types of areas:

- Areas within one half-mile of the San Pablo Avenue study corridor
- Neighborhood commercial areas along the San Pablo Avenue study corridor
- Areas within one quarter mile of each BART station along the San Pablo Avenue study corridor
- Additional detail in cities adjacent to the corridor (El Cerrito, Albany, Berkeley, Oakland, and Emeryville) including zones for UC Berkeley and Downtown Berkeley
- Employment centers in adjacent counties such as the San Francisco Financial District
- County boundaries
- Major transportation connections such as the Caldecott Tunnel

The development of the final zone system and middle filters was an iterative process between the consultant team and Alameda CTC that was completed with an email noting concurrence on the final zone system.

The final geographic layer of 50 zones and nine middle filters was provided to StreetLight Data. StreetLight Data tagged "origin-destination points" to the geographic layer and provide origin-destination trip tables based on GPS-enabled devices that provide the number of auto trips for each zone to zone origin-destination pair for all trip purposes that occur within the study area, including visitor and pass-through trips. Trip tables were then provided that index the number of trips between each zone that travel through each middle filter along the San Pablo Avenue study corridor. Each trip table provided 2,500 (50 zones by 50 zones) possible zone pairs and a separate trip table was provided for each middle filter, effectively providing three points of travel for each origin-destination zone pair (the origin location, the roadway location the person trip traveled through, and the destination location). Traffic counts and model "select-link" data was then used to factor indexed or "relative" trips to "absolute" trips.

Transit origin-destination patterns were established using bus AVL data to determine the number of bus transit patrons that board or alight along the corridor. BART boarding and alighting origin-destination data and home origin survey data was used to determine the total number of BART-related trips for patrons accessing BART stations within one half mile of each of the nine middle filters, the home origin of the patrons, and the trip destination of the patrons.

The next step in the process was to combine the existing auto and transit origin-destination data with additional data sources to establish the total corridor-wide person throughput by mode of travel for person trips travelling along each of the nine middle filters.

Traffic count, travel demand model, census, survey data, and transit ridership data were used to determine the existing mode of travel and to quantify the absolute magnitude of person trips by mode of travel, which were then stratified by trip type and mode of access. Transit mode of access data was then used to refine auto trip data from the Alameda CTC model such as park-and-ride and kiss-and-ride trips.

Advantaged of Mobile Device Data

Below is a bulleted discussion of the advantages of mobile device data over traditional data collection methods.

- Mobile device data is continuously collected and can be obtained for any length of time that has occurred in the past. This allows for the analysis of historical trends and seasonal or daily/weekly/monthly variation. Data collection does not require set up time or human transcribing of observed field data. Traditional methods of data collection typically rely on a single day or short period of data collection.

- Mobile device data vendors such as StreetLight Data continuously process data and provide a web application for fast and easy customization, analysis, and downloading of the data query.

- Mobile device data provides the actual origin and destination of inferred trips, rather than the location where the vehicle was observed as with traffic counts and Bluetooth or license plate capture technology.

- Mobile device data is passively collected, eliminating potential user input and transcription error.

- Mobile device data provides empirical origin-destination data, which can be cheaper, easier, and faster to obtain than similar data derived from more traditional methods such as surveys and travel demand models. In the case of travel demand models, we have found that the data collection methodology is more easily understood by the public.

- Since data is continuously collected and can be obtained for any length of time, extremely large sample sizes can be obtained for a relatively low cost per sample. Traditional methods such as surveys typically rely on a single day of data gathering and have very low response rates (typically experiences show a one to two percent response rates).

- Mobile device data is provided in a trip table format which is more suitable for comparison and integration with travel demand models.

- Origin-destination trip tables can be queried, aggregated and disaggregated to match desired level of analysis.

- GPS-based mobile device data provides a level of spatial resolution suitable for understanding users of specific roadway segments.

Limitations of Mobile Device Data

Below is a bulleted discussion of the limitations of mobile device data.

- Due to privacy concerns, the indexed trip values in the OD trip tables provided by StreetLight Data describe above represent "relative" rather than "absolute" trips. In other words, the tables do not provide the total number of trips that occur on a daily basis but provide the relative relationship of trips from each zone to every other zone in the geographic layer. Therefore, the mobile device data OD trip tables were used as a starting point due to their large sample size and high level of confidence in the GPS origin-destination data and refined using traffic count and model data to factor the relative trip data to represent a single day of absolute data.

- Analysis of mobile device data and determination of origin-destination points relies on computer algorithms to determine where a trip starts and ends rather than direct user input. Current algorithm parameters define the end of a trip and determine a trip's destination if the mobile device travels no more than five meters for a five minute period of time.

- Unable to directly measure information regarding trip purpose, trip frequency, characteristics of travel or demographics. However, much of this information can be inferred or supplemented with information from other sources once the origin zone is known.

- GPS-based mobile device data has a potential bias towards higher income persons as they have a higher likelihood of owning a vehicle with embedded GPS, a smartphone, or handheld GPS device.

Travel Market Assessment Methodology

The consultant team conducted a travel market assessment to establish the size of the auto, transit, and potential active mode travel markets in the San Pablo Avenue travel-shed and to describe the travel time and reliability characteristics of different components of the travel market (most critically, auto travelers and transit riders). By comparing the proposed characteristics of the travel experience of transit riders with the experience of those travelling via automobile, this analysis estimated transit market share and characterized necessary improvements to support additional transit usage. Likely travel markets for bicycle and pedestrian trips were also be identified to understand where to focus active mode investments.

Travel markets that are currently being served by transit were identified along with the number of trips being served by other modes, to help determine if there is a market for transit expansion in the form of reduced headways or the conversion to bus-rapid transit.

Travel markets that are primarily being served by auto were also be identified to determine if there is a market for transit expansion in the form of additional bus routes or a new bus-rapid transit line connecting the market areas. This analysis will help identify transit improvements that could be made to improve transit performance and increase transit ridership along San Pablo Avenue.

This travel market analysis will also help communicate to the public and to stakeholders the relative benefits and cost effectiveness of making near-term transit investments in the corridor, and it will create a useful framework for considering San Pablo Avenue transit plans over the longer term.

The first step in the process was to use baseline travel data to estimate the size of the current and potential travel markets along the corridor (most critically, auto travelers and transit riders). This analysis relied on origin-destination person trip data purchased from StreetLight Data that was tagged to a geographic layer of 50 zones for nine middle filters along the study corridor. Traffic count, travel demand model, census, and transit ridership data was then used to determine the existing mode of travel and to quantify the absolute magnitude of trips by mode of travel.

Using this data goals will be set for each segment of the study corridor in terms of person-throughput and transit mode share. An inquiry will then be made to determine whether the size of the potential transit market is great enough to meet person-throughput goals, i.e., can you get enough new transit riders to justify a transit investment giving greater priority to transit on roadways compared to private automobiles.

The second step in the process was to establish transit level of service to compete for ridership potential under existing conditions. Auto and transit travel times for key origin-destination pairs were measured using Google Maps, demographic data for key auto and transit origin zones was obtained from California Household Travel Survey (CHTS) data, auto reliability data was obtained from INRIX, and transit reliability and comfort level data was obtained from transit providers. A comparison of transit and auto travel times will be used to set transit travel time targets that would attract ridership sufficient to meet transit ridership goals and shift trips from general purpose travel lanes to transit in a prioritized facility.

The third step in the process will be to describe service design characteristics needed to achieve the established goals. Using the transit travel time target as a basis travel time to access the corridor and corridor running time will be allocated for each alternative. An inquiry will then be performed to determine whether the transit travel time allocations are actually feasible given expected vehicle technologies, road profile, median versus shoulder running, traffic volumes, etc. It will then be confirmed whether it is possible to design the alternatives (frequency; speeds; stop location and number; accessibility; etc.), so that they meet the established travel time targets; generate expected transit ridership; and contribute to a higher-performing roadway in terms of person throughput and transit mode share.

Origin-Destination Patterns

This section provides a summary of the existing auto and transit origin-destination patterns within the Project study area.

Auto Origin-Destination Data

To determine auto origin-destination patterns for the corridor, relative origin-destination data for auto trips was obtained from StreetLight Data. The data was obtained for eight middle filters along the study corridor and for a middle filter on I-80 north of University Avenue and tagged to a geographic layer of 50 zones. Traffic count and travel demand model data was then used to factor the relative data in order to determine the absolute magnitude of origin-destination auto trips within the project study area and for each of the nine middle filters.

StreetLight Data Origin-Destination Data

In order to infer the travel patterns and trip making characteristics of autos travelling along the nine middle filters, such as the origin and destination of individual trips, StreetLight Data purchased from INRIX movement and usage patterns in the form of activity data points. StreetLight Data then used algorithms to create trip distribution tables for trips traveling along these nine segments by first identifying mobile devices which were seen in a single location multiple times over a specified time interval and subsequently seen in a different location multiple times over a specified time interval. All of the sightings for the mobile device in a single location over this specified time interval were then combined to create an "origin-destination Point." The "origin-destination Points" of each mobile device were then paired to create a table of trips with origin and destination coordinate points as well as the observed time period. StreetLight Data then tagged the "origin-destination points" to a pre-determined zone system based on the origin and destination coordinate points.

Middle Filters

The middle filters were established by dividing the San Pablo Avenue project corridor into eight sub-areas between the southern terminus in Downtown Oakland and Hilltop Drive (near the Hilltop Mall) in Richmond. The eight middle filters cover the entire length of the study corridor and are not necessarily the sub-areas that are proposed for the evaluation of design concepts and alternatives; instead, the sub-area limits will be used to summarize and present the origin-destination data and travel markets identified from the travel market analysis. An additional middle filter was provided on I-80 in order to compare origin-destination travel patterns between I-80 and San Pablo Avenue.

The extents of the eight middle filters along the study corridor and the middle filter on I-80 are listed in **Table 1**.

Table 1 Middle Filters
Middle Filter Extents
Hilltop Drive to Road 20
Road 20 to Nevin Ave/I-80
Nevin Ave/I-80 to County Line
County Line to University Avenue
University Avenue to Ashby Avenue
Ashby Avenue to I-580
I-580 to Grand Avenue
Grand Avenue to Frank Ogawa Plaza
I-80 North of University Avenue
Notes:

Fehr & Peers provided StreetLight Data with the nine middle filters to isolate auto trips travelling along each sub-area. The resulting "origin-destination points" were then tagged to the 50-zone system.

Zone System

To quantify and capture the origin and destination of auto trips that occur along the project corridor, Fehr & Peers developed an initial zone system for the StreetLight Data "origin-destination points" associated with each of the nine middle filters to be tagged to. The zone system was provided to Alameda CTC to review and comment. The development of the final zone system was an iterative process between the consultant team and Alameda CTC that was completed with an email noting concurrence on the final 50-zone system.

The 50-zone system for the project study area is described in **Table 2** and shown on **Figure G-1.**

Table 2 Zone System		
Area Type	**Description**	**Zones**
Corridor Commercial Areas	Commercial areas along the corridor.	Downtown Oakland, Emeryville Home Depot Area, Emeryville Target Area, Berkeley Bowl Area, Berkeley University Ave Area, Albany Solano Ave Area, El Cerrito Plaza Area, Richmond Portola Dr Area, Richmond McBryde Area, San Pablo Town Center, San Pablo Church Lane Area, Contra Costa College, Hilltop Mall
Corridor BART Station Areas	Commercial areas surrounding BART stations along the corridor.	North Berkeley BART, El Cerrito BART, El Cerrito Del Norte BART
Corridor Half Mile Areas	Areas within one half mile of the corridor excluding corridor commercial and BART station areas.	Oakland Half Mile South, Oakland Half Mile North, Emeryville Half Mile, Berkeley West Half Mile, Berkeley East Half Mile, Richmond West Half Mile, Richmond East Half Mile, San Pablo Half Mile
Key Areas Outside the Corridor	Key areas located outside the corridor.	Downtown Berkeley, UC Berkeley, Bay Street Area, Jack London Square, San Francisco Financial District
Large Cities	City boundaries subdivided into smaller-sized zones for analysis excluding areas described above.	Pinole, San Pablo, West Richmond, East Richmond, East Berkeley, Emeryville, North Oakland, South Oakland, Alameda, West Oakland, West Berkeley, Cleveland Heights Oakland, Northwest Oakland
External Gateways	External gateways along major highway corridors develop to capture trips from outside the greater study area.	Carquinez Bridge, SR 4, Richmond Bridge, Bay Bridge, Caldecott Tunnel, I-880 South of Oakland, I-580 South of Oakland
Notes:		

Fehr & Peers provided StreetLight Data with the 50-zone system to which the "origin-destination points" were tagged. StreetLight Data then provided Fehr & Peers with auto trip table data in a tabular format nearly identical to that used by travel demand models. The trip tables, which represent a relative measure of travel from each zone to every other zone in the zone system, were provided for each of the nine middle filters.

Relative Auto Origin-Destination Trip Tables

The final 50-zone system and nine middle filters were provided to StreetLight Data. StreetLight Data tagged the "origin-destination points" for each of the nine middle filters to the 50-zone system and provide origin-destination trip tables based on GPS-enabled devices that provide the number of auto trips for each zone to zone origin-destination pair for all trip purposes that occur within the study area, including visitor and pass-through trips. Trip tables were provided that index the number of trips between each zone that travel through each middle filter. Each trip table provides 2,500 (50 zones by 50 zones) possible zone pairs and a separate trip table is provided for each middle filter, effectively providing three points of travel for each origin-destination zone pair (the origin location, the roadway segment the auto trip traveled through, and the destination location).

Data was purchased for one time period from January 2017 to June 2017 for days when school was in session and only mid-week days (Tuesday through Thursday) were analyzed. This ensures the data is consistent with the Alameda CTC model outputs as travel demand models are typically developed to forecast an average mid-week day when school is in session from a specified year, and traffic count data which is collected on a mid-week day when school is in session.

The table of trips provided by StreetLight Data was derived from approximately 15 million indexed "origin-destination points" from a sample of approximately 4.2 million personal vehicles observed in the study area over the six-month analysis period. The tabular origin-destination data was stratified by day of week, time of day, and vehicle type (personal automobile and commercial vehicle).

Table 3 provides a summary of the total indexed auto trips observed travelling through each of the nine middle filters in the southbound direction during the AM (6 AM to 10 AM) and PM (3 PM to 7 PM) peak periods.

Table 3 StreetLight Data Indexed Auto Trips – Southbound		
Segment	**AM Peak Period (6 AM to 10 AM)**	**PM Peak Period (3 PM to 7 PM)**
Hilltop Drive to Road 20	1,898	1,099
Road 20 to Nevin Ave/I-80	37,361	26,781
Nevin Ave/I-80 to County Line	4,783	3,684
County Line to University Avenue	7,301	5,688
University Avenue to Ashby Avenue	5,392	5,262
Ashby Avenue to I-580	7,445	9,728
I-580 to Grand Avenue	5,878	6,156
Grand Avenue to Frank Ogawa Plaza	6,815	3,927
I-80 North of University Avenue	73,200	48,261
Notes:		

As shown in **Table 3**, the number of southbound indexed auto trips ranges from approximately 2,000 to 73,000 in the AM peak period and from 1,000 to 48,000 in the PM peak period. Additionally, the southbound AM peak period indexes are generally higher than the southbound PM peak period indexes, indicating a greater magnitude of travel in the southbound direction in the AM peak period.

Table 4 provides a summary of the total indexed auto trips observed travelling through each of the nine middle filters in the northbound direction during the AM (6 AM to 10 AM) and PM (3 PM to 7 PM) peak periods.

Table 4 StreetLight Data Indexed Auto Trips – Northbound		
Segment	**AM Peak Period (6 AM to 10 AM)**	**PM Peak Period (3 PM to 7 PM)**
Road 20 to Hilltop Drive	708	3,413
Nevin Ave/I-80 to Road 20	20,512	40,404
County Line to Nevin Ave/I-80	2,064	6,290
University Avenue to County Line	2,789	10,943
Ashby Avenue to University Avenue	2,691	8,037
I-580 to Ashby Avenue	10,573	14,475
Grand Avenue to I-580	2,247	5,396
Frank Ogawa Plaza to Grand Avenue	849	3,663
I-80 North of University Avenue	39,217	73,809
Notes:		

As shown in **Table 4**, the number of northbound indexed auto trips ranges from approximately 700 to 39,000 in the AM peak period and from 3,000 to 74,000 in the PM peak period. Additionally, the northbound PM peak period indexes are generally higher than the northbound AM peak period indexes, indicating a greater magnitude of travel in the northbound direction in the PM peak period.

Traffic counts and "select-link" model data were then used to factor the StreetLight Data indexed or "relative" auto trips to "absolute" auto trips. The factoring and analysis focused on the AM peak period for the determination of key origin-destination patterns for the travel market assessment given the AM peak period is generally comprised of a higher percentage of work-related trips than the PM peak period. Additionally, a household member's modal decision in the morning is generally more influential on the modal decision for trips throughout the day than during any other time period. However, PM peak period data was pulled for select metrics such as short distance trips that may shift to walk and bike and trips to the commercial areas along San Pablo Avenue as commercial areas generally generate more trips in the afternoon peak period than the morning peak period.

Select-Link Model Data

In order to determine the absolute number of trips made by individual autos travelling along the corridor and along each of the nine middle filters in the AM peak period, a "select-link" analysis was performed using the latest version of the validated base year (2010) Alameda CTC Model obtained from Alameda CTC. A "select-link" analysis using a travel demand model such as the Alameda CTC model is very similar to the middle filter analysis conducted by StreetLight Data in that they both isolate trips travelling along selected roadway segments and provided the origin and destination of those trips by time period. The primary difference is the source of travel data: observed trips made by users with mobile devices versus trips forecasted by a travel demand model that has been validated throughout its four primary steps.

As mentioned previously, the origin-destination data provided by StreetLight Data is based on a sample of observed trips that requires factoring based on a source that can provide an absolute magnitude of individual autos travelling along each middle filter. Unfortunately, traffic counts alone are unable to provide this as adding up traffic counts on individual roadway segments comprising the study segment counts some vehicles multiple times and thus overstates the total number of individual autos. Traffic counts therefore need to be substituted with some measure of auto travel that is able to track and quantify individual autos as they travel each segment. A "select-link" model analysis using a validated model is able to provide this information and can be combined with traffic count data to provide a more accurate measure of individual autos travelling along the corridor and each of the nine middle filters.

Table 5 provides a summary of the "select-link" auto analysis conducted for the southbound AM peak period using the Alameda CTC model. The "select-link" analysis provided the total number of auto trips stratified by vehicle mode for each of the nine middle filters.

Table 5 Alameda CTC Model Select-Link Auto Data – Southbound AM Peak Period					
Segment	**Drive Alone**	**High-Occupancy Vehicle**	**Park-and-Ride**	**Kiss-and-Ride**	**Total Auto Trips**
Hilltop Drive to Road 20	4,945	687	150	40	5,821
Road 20 to Nevin Ave/I-80	5,597	1,040	3,637	1,048	11,322
Nevin Ave/I-80 to County Line	5,933	965	4,121	1,369	12,388
County Line to University Avenue	7,228	1,171	131	180	8,711
University Avenue to Ashby Avenue	3,123	363	44	28	3,558
Ashby Avenue to I-580	3,014	396	211	64	3,684
I-580 to Grand Avenue	2,210	308	36	18	2,572
Grand Avenue to Frank Ogawa Plaza	2,130	394	0	0	2,525
I-80 North of University Avenue	28,528	6,749	0	0	35,278
Notes:					

As shown in **Table 5**, the total number of individual auto trips through each "select-link" segment generally decreases as you approach the southern terminus in downtown Oakland, suggesting trip dispersion as you travel southbound.

Table 6 provides a summary of the "select-link" auto analysis conducted for the northbound AM peak period using the Alameda CTC model. The "select-link" analysis provided the total number of auto trips stratified by vehicle mode for each of the nine middle filters.

Table 6 Alameda CTC Model Select-Link Auto Data – Northbound AM Peak Period					
Segment	**Drive Alone**	**High-Occupancy Vehicle**	**Park-and-Ride**	**Kiss-and-Ride**	**Total Auto Trips**
Road 20 to Hilltop Drive	1,568	435	0	1	2,003
Nevin Ave/I-80 to Road 20	4,691	994	0	134	5,819
County Line to Nevin Ave/I-80	3,853	660	660	314	5,486
University Avenue to County Line	3,749	574	595	187	5,104
Ashby Avenue to University Avenue	2,804	337	56	28	3,225
I-580 to Ashby Avenue	3,416	502	28	63	4,009
Grand Avenue to I-580	1,700	249	18	18	1,985
Frank Ogawa Plaza to Grand Avenue	1,291	125	0	0	1,417
I-80 North of University Avenue	22,868	3,158	0	1	26,026
Notes: 1. Notes.					

As shown in **Table 6**, the total number of individual auto trips through each "select-link" segment generally increases as you approach the northern terminus near the Hilltop Mall, suggesting trip accumulation as you travel northbound.

Traffic Counts

As previously stated, a "select-link" model analysis using a validated model is able to be combined with traffic count data to provide a relatively accurate measure of individual autos travelling along the corridor and each of the nine middle filters. Although travel models are calibrated and validated throughout their development, a countywide model such as the Alameda CTC model is validated at the county-level and may not be appropriate to apply at the corridor-level without refinement. Therefore, a comparison of base year (2010) model link volumes to 2016 traffic count data was performed to determine the reasonableness of the model data and whether refinement was necessary.

Table 7 provides a comparison of the summation of traffic counts to the summation of model link volumes at the same locations along the nine middle filters for the southbound AM and northbound AM directions. The expectation was that the base year (2010) model would underestimate 2016 counted volumes by 12 to 24 percent given the amount of land use and economic growth that occurred from 2010 to 2016, estimated at around one to two percent per year.

Table 7 Alameda CTC Model Traffic Count Comparison – AM Peak Period						
Segment	**SB Model**	**SB Count**	**SB Variance**	**NB Model**	**NB Count**	**NB Variance**
Hilltop Drive to Road 20	8,860	7,200	23%	1,732	4,200	-59%
Road 20 to Nevin Ave/I-80	21,205	23,000	-8%	11,441	11,800	-3%
Nevin Ave/I-80 to County Line	10,556	14,700	-28%	5,164	5,200	-1%
County Line to University Avenue	8,566	11,800	-27%	3,211	3,700	-13%
University Avenue to Ashby Avenue	2,356	3,300	-29%	1,652	2,100	-21%
Ashby Avenue to I-580	9,257	16,700	-45%	8,367	15,300	-45%
I-580 to Grand Avenue	5,267	7,200	-27%	4,730	5,000	-5%
Grand Avenue to Frank Ogawa Plaza	963	1,100	-12%	1,150	1,300	-12%
I-80 North of University Avenue	29,405	22,607	30%	22,890	29,709	-23%
Notes:						

As shown in **Table 7**, as expected, the model generally underestimates travel demand through the study corridor with the variance between the summation of model volumes and the summation of traffic counts ranging from one percent to 59 percent. These variances seem reasonable given the length and complexity of the corridor and the 2010 model data to 2016 traffic counts comparison. Based on these results it was determined that no additional static model validation was necessary and that the differences in forecasted to counted traffic volumes could be reasonably accounted for by factoring the "select-link" model data based on the traffic count to model volume ratio at each of the nine "select-link" locations.

Table 8 provides the traffic count to model volume ratios that were applied to the model "select-link" data to obtain a refined estimate of individual autos travelling along the corridor and each of the nine "select-link" locations. The resulting factored model "select-link" auto trip totals were then used as control totals to factor the StreetLight Data indexed or "relative" auto trips to "absolute" auto trips for the nine middle filters.

Table 8 Ratio of Model Link-Level Volumes to Traffic Count Volumes by Segment		
Segment	**Southbound AM**	**Northbound AM**
Hilltop Drive to Road 20	0.8	2.4
Road 20 to Nevin Ave/I-80	1.1	1.0
Nevin Ave/I-80 to County Line	1.4	1.0
County Line to University Avenue	1.4	1.2
University Avenue to Ashby Avenue	1.4	1.3
Ashby Avenue to I-580	1.8	1.8
I-580 to Grand Avenue	1.4	1.1
Grand Avenue to Frank Ogawa Plaza	1.1	1.1
I-80 North of University Avenue	0.83	0.88
Notes:		

Final Auto Origin-Destination Trip Tables

Auto origin-destination patterns for the corridor were determined using relative origin-destination data provided by StreetLight Data for eight middle filters along the study corridor and for a middle filter on I-80 north of University Avenue. The relative data was then factored based on a combination of travel demand model and traffic count data to determine the absolute magnitude of origin-destination auto trips within the Project study area and for each of the nine middle filters.

Table 9 provides the resulting factored StreetLight Data auto trips for each of the nine middle filters and the indexed or "relative" auto trips provided by StreetLight Data comparison.

Table 9 Factored StreetLight Data Auto Data – AM Peak Period (6 AM to 10 AM)				
Segment	Southbound		Northbound	
	Indexed	Absolute	Relative	Absolute
Road 20 to Hilltop Drive	1,898	4,861	708	4,976
Nevin Ave/I-80 to Road 20	37,361	12,077	20,512	6,019
County Line to Nevin Ave/I-80	4,783	17,550	2,064	5,624
University Avenue to County Line	7,301	12,131	2,789	6,012
Ashby Avenue to University Avenue	5,392	5,028	2,691	4,166
I-580 to Ashby Avenue	7,445	6,716	10,573	7,436
Grand Avenue to I-580	5,878	3,588	2,247	2,132
Frank Ogawa Plaza to Grand Avenue	6,815	2,892	849	1,720
I-80 North of University Avenue	73,200	29,028	39,217	22,599
Notes:				

As shown in **Table 9**, the ratio of indexed trips to final absolute trips varies between middle filters. This level of variance was expected given not only the length and complexity of the corridor but also the scale of the zone system (which through the use of external gateways captures roughly the entirety of the Bay Area) and the later finding that San Pablo Avenue is utilized by trips from all over the Bay Area where sampling rates vary.

As stated under the advantages and limitations of mobile device data sections, StreetLight Data provides origin-destination data for a sample of trips and that sampling rates vary by geographic area due to geographical differences, varying GPS-enabled device ownership rates, and varying carrier penetration rates. For instance, higher income persons tend to own more GPS-enabled devices while coverage tends to vary between GPS carriers such as INRIX and their competitors. StreetLight Data has indicated a trend towards higher sampling rates in more urban areas such as San Francisco where sampling rates can exceed 10 percent. Areas with lower incomes or where geography limits coverage tend to have much lower sampling rates in the range of 3 to 5 percent. These differences in sampling rates can result in variations in sampling rates along individual corridors which can be exacerbated if the origins and destination of trips vary significantly. For instance, as shown in the next section, our origin-odestination analysis of Nevin Ave/I-80 to Road 20 indicated the segment has the highest percentage of trips interacting with San Francisco while Frank Ogawa Plaza to Grand Avenue has the highest percentage of trips

interacting with Downtown Oakland, possibly explaining the higher sampling rates along these corridors.

Auto Origin-Destination Patterns

This section provides a summary of the existing auto origin-destination patterns within the Project study area derived from the final absolute auto origin-destination data estimated from the combination of relative StreetLight Data origin-destination trip tables, model "select-link" data, and traffic counts. This section also provides answers to key questions such as "Who is coming to the corridor by auto?"

Corridor-Wide Auto Trip Types

In order to determine the absolute number of corridor-wide auto trips, an additional model "select-link" analysis was performed on the entire study corridor to obtain a model estimate of the total number of trips made by individual autos travelling along the corridor in the AM peak period. The "select-link" analysis resulted in approximately 57,000 vehicle trips utilizing the San Pablo Avenue study corridor under 2010 conditions in the AM peak period.

A comparison of base year (2010) model link volumes to 2016 traffic count data was then performed and indicated that the 2010 model volumes were approximately 22% lower than 2016 traffic counts, a reasonable amount given the amount of land use and economic growth that occurred from 2010 to 2016.

A traffic count to model volume ratio was then applied to corridor-wide origin-destination trip tables to produce a corridor-wide AM peak period auto trip table. Similar to the middle filter trip tables, the corridor-wide AM peak period auto trip table provides 2,500 (50 zones by 50 zones) possible zone pairs for auto trips that travel along any sub-area of the San Pablo Avenue project corridor.

In order to determine the types of trips that occur along the San Pablo Avenue project corridor, the 50-zone by 50-zone trip tables were aggregated based on the area types described in **Table 2**. The resulting aggregated trip tables provided a stratification of auto trips by the following trip types.

- Corridor to corridor trips - defined as trips that start and end within one half mile of the corridor
- Corridor to other trips – defined as trips that start within one half mile of the corridor and end more than one half mile away from the corridor
- Other to corridor trips – defined as trips that start more than one half mile away from the corridor and end within one half mile of the corridor
- Pass-through trips – defined as trips that do not start or end within one half mile of the corridor

Model "select-link" data regarding auto mode of travel was also applied to estimate the following auto modes of travel for the corridor (refined later using transit-specific data).

- Drive Alone
- High-Occupancy Vehicle
- Park-and-Ride
- Kiss-and-Ride

Table 10 provides a summary of corridor-wide auto trips in both direction during the AM peak period stratified by auto trip type and auto mode of travel.

Table 10
Existing Corridor-Wide Auto Trip Types – Both Directions AM Peak Period

Trip Type	Trips	Percent of Trips
Vehicle Trips	74,000	100%
Corridor to Corridor	13,620	18%
Corridor to Other	15,453	21%
Other to Corridor	21,548	29%
Pass-Through	23,379	32%
Gateway to Gateway	3,716	16%
Gateway to Area	10,642	46%
Area to Area	9,021	39%
Drive Alone	55,696	75%
High-Occupancy Vehicle	9,072	12%
Park-and-Ride	4,630	6%
Kiss-and-Ride	4,602	6%
Notes:		

As shown in **Table 10**, approximately 74,000 auto trips travel along the San Pablo Avenue study corridor in the 4-hour AM peak period with approximately 18 percent starting and ending within the half mile study corridor and 32 percent passing through. Additionally, approximately 75 percent of auto trips have a single occupant, 12 percent have multiple occupants, and 12 percent are interacting with transit.

The following sections with accompanying tables provide additional origin-destination pattern information for auto trips that travel along San Pablo Avenue through the study corridor. The information is derived from the final absolute auto origin-destination trip tables discussed above through aggregation of data, analysis of row and column totals, and analysis of data for specific area types such as pass-through trips and trip to/from each area type. The data is also used to answer key questions that help provide an understanding of existing travel markets that are discussed in detail in the Existing Travel Markets section. The full 50 by 50 trips tables for each of the nine middle filters are provided in **Appendix A**.

Auto Trip Types by Middle Filter

Table 11 provides a summary of auto trips in the southbound direction during the AM peak period stratified by auto trip type.

Table 11
Auto Trip Types by Middle Filter – Southbound AM Peak Period

Middle Filter	Auto Trips	Corridor to Corridor	Corridor to Other	Other to Corridor	Pass-Through
Hilltop Drive to Road 20	4,861	488	405	1,864	2,104
Road 20 to Nevin Ave/I-80	12,077	630	752	3,352	7,343
Nevin Ave/I-80 to County Line	17,550	3,950	3,986	5,968	3,646
County Line to University Avenue	12,131	3,606	3,710	2,715	2,101
University Avenue to Ashby Avenue	5,028	1,567	1,488	1,276	696
Ashby Avenue to I-580	6,716	1,325	2,631	877	1,884
I-580 to Grand Avenue	3,588	776	324	1,983	506
Grand Avenue to Frank Ogawa Plaza	2,892	279	110	2,005	497
I-80 North of University Avenue	29,028	1,180	4,744	5,703	17,401

Notes:

As shown in **Table 11**, the middle filter of San Pablo Avenue from Nevin Ave/I-80 to County Line is the sub-area of San Pablo Avenue with the highest number of total auto trips and auto trips starting and/or ending within one half mile of San Pablo Avenue while the middle filter from Road 20 to Nevin Ave/I-80 has the highest number of pass-through auto trips.

Table 12 provides a summary of auto trips in the northbound direction during the AM peak period stratified by auto trip type.

Table 12
Auto Trip Types by Middle Filter – Northbound AM Peak Period

Middle Filter	Auto Trips	Corridor to Corridor	Corridor to Other	Other to Corridor	Pass-Through
Road 20 to Hilltop Drive	4,976	720	1,170	1,619	1,467
Nevin Ave/I-80 to Road 20	6,019	167	1,041	278	4,533
County Line to Nevin Ave/I-80	5,624	1,348	1,986	847	1,443
University Avenue to County Line	6,012	1,235	1,381	1,587	1,809
Ashby Avenue to University Avenue	4,166	1,329	931	1,236	670
I-580 to Ashby Avenue	7,436	641	692	3,312	2,791
Grand Avenue to I-580	2,132	464	265	715	687
Frank Ogawa Plaza to Grand Avenue	1,720	418	623	338	340
I-80 North of University Avenue	22,599	566	2,476	2,716	16,840

Notes:

As shown in **Table 12**, the middle filter of San Pablo Avenue from I-580 to Ashby Avenue is the sub-area of San Pablo Avenue with the highest number of total auto trips, the middle filter from University Avenue to County Line has the highest number of auto trips starting and/or ending within one half mile of San Pablo Avenue, and the middle filter from Nevin Ave/I-80 to Road 20 has the highest number of pass-through auto trips.

Table 13 provides a summary of auto trips in the southbound direction during the AM peak period stratified by auto trip type percentage.

Table 13
Auto Trip Type Percentages by Middle Filter – Southbound AM Peak Period

Middle Filter	Corridor to Corridor	Corridor to Other	Other to Corridor	Pass-Through
Hilltop Drive to Road 20	10%	8%	38%	43%
Road 20 to Nevin Ave/I-80	5%	6%	28%	61%
Nevin Ave/I-80 to County Line	23%	23%	34%	21%
County Line to University Avenue	30%	31%	22%	17%
University Avenue to Ashby Avenue	31%	30%	25%	14%
Ashby Avenue to I-580	20%	39%	13%	28%
I-580 to Grand Avenue	22%	9%	55%	14%
Grand Avenue to Frank Ogawa Plaza	10%	4%	69%	17%
I-80 North of University Avenue	4%	16%	20%	60%

Notes:
2. Notes.

As shown in **Table 13**, the middle filter of San Pablo Avenue from University Avenue to Ashby Avenue is the sub-area of San Pablo Avenue with the highest percentage of corridor to corridor auto trips while the middle filter from Road 20 to Nevin Ave/I-80 has the highest percentage of pass-through auto trips.

Table 14 provides a summary of auto trips in the northbound direction during the AM peak period stratified by auto trip type percentage.

Table 14
Vehicle Trip Type Percentages by Middle Filter – Northbound AM Peak Period

Middle Filter	Corridor to Corridor	Corridor to Other	Other to Corridor	Pass-Through
Road 20 to Hilltop Drive	14%	24%	33%	29%
Nevin Ave/I-80 to Road 20	3%	17%	5%	75%
County Line to Nevin Ave/I-80	24%	35%	15%	26%
University Avenue to County Line	21%	23%	26%	30%
Ashby Avenue to University Avenue	32%	22%	30%	16%
I-580 to Ashby Avenue	9%	9%	45%	38%
Grand Avenue to I-580	22%	12%	34%	32%
Frank Ogawa Plaza to Grand Avenue	24%	36%	20%	20%
I-80 North of University Avenue	3%	11%	12%	75%

Notes:

As shown in **Table 14**, the middle filter of San Pablo Avenue from Ashby Avenue to University Avenue is the sub-area of San Pablo Avenue with the highest percentage of corridor to corridor auto trips while the middle filter from Nevin Ave/I-80 to Road 20 has the highest percentage of pass-through auto trips.

Auto Pass-Through Trip Types by Middle Filter

Table 15 provides a summary of pass-through auto trips in the southbound direction during the AM peak period stratified by pass-through trip type.

Table 15
Pass-Through Trip Types by Middle Filter – Southbound AM Peak Period

Middle Filter	Pass-Through Trips	Gateway to Gateway		Gateway to Area		Area to Area	
Hilltop Drive to Road 20	2,104	58	3%	493	23%	1,553	74%
Road 20 to Nevin Ave/I-80	7,343	2,118	29%	2,931	40%	2,294	31%
Nevin Ave/I-80 to County Line	3,646	224	6%	1,591	44%	1,830	50%
County Line to University Avenue	2,101	108	5%	976	46%	1,016	48%
University Avenue to Ashby Avenue	696	38	5%	360	52%	299	43%
Ashby Avenue to I-580	1,884	68	4%	1,301	69%	514	27%
I-580 to Grand Avenue	506	67	13%	352	70%	87	17%
Grand Avenue to Frank Ogawa Plaza	497	29	6%	283	57%	185	37%
I-80 North of University Avenue	17,401	4,111	24%	8,463	49%	4,827	28%

Notes:

As shown in **Table 15**, the Middle Filter of San Pablo Avenue from Road 20 to Nevin Ave/I-80 is the sub-area of San Pablo Avenue with the highest number of gateway to gateway, gateway to area, and area to area pass-through trips.

Table 16 provides a summary of pass-through auto trips in the northbound direction during the AM peak period stratified by pass-through trip type.

Table 16
Pass-Through Trip Types by Middle Filter – Northbound AM Peak Period

Middle Filter	Pass-Through Trips	Gateway to Gateway		Gateway to Area		Area to Area	
Road 20 to Hilltop Drive	1,467	0	0%	893	61%	574	39%
Nevin Ave/I-80 to Road 20	4,533	2,139	47%	1,626	36%	768	17%
County Line to Nevin Ave/I-80	1,443	0	0%	792	55%	651	45%
University Avenue to County Line	1,809	38	2%	922	51%	848	47%
Ashby Avenue to University Avenue	670	11	2%	151	23%	509	76%
I-580 to Ashby Avenue	2,791	187	7%	1,711	61%	894	32%
Grand Avenue to I-580	687	61	9%	324	47%	302	44%
Frank Ogawa Plaza to Grand Avenue	340	22	6%	94	28%	224	66%
I-80 North of University Avenue	16,840	6,386	38%	7,763	46%	2,691	16%

Notes:

As shown in **Table 16**, the Middle Filter of San Pablo Avenue from Nevin Ave/I-80 to Road 20 is the sub-area of San Pablo Avenue with the highest number of gateway to gateway while I-580 to Ashby Avenue has the highest number of gateway to area trips, and area to area pass-through trips.

Auto Mode of Travel by Middle Filter

Table 17 provides a summary of auto trips in the southbound direction during the AM peak period stratified by auto mode of travel.

Table 17
Auto Mode of Travel by Middle Filter – Southbound AM Peak Period

Middle Filter	Auto Trips	Drive Alone	High-Occupancy Vehicle	Park-and-Ride	Kiss-and-Ride
Hilltop Drive to Road 20	4,861	4,268	593	0	0
Road 20 to Nevin Ave/I-80	12,077	9,174	1,705	622	576
Nevin Ave/I-80 to County Line	17,550	11,446	1,862	2,456	1,786
County Line to University Avenue	12,131	9,676	1,567	550	339
University Avenue to Ashby Avenue	5,028	4,504	523	0	0
Ashby Avenue to I-580	6,716	4,435	582	736	963
I-580 to Grand Avenue	3,588	3,149	439	0	0
Grand Avenue to Frank Ogawa Plaza	2,892	1,699	315	146	732
I-80 North of University Avenue	29,028	23,475	5,554	0	0

Notes:

As shown in **Table 17**, the Middle Filter of San Pablo Avenue from Nevin Ave/I-80 to County Line is the sub-area of San Pablo Avenue with the highest number of total auto trips, drive alone auto trips, high-occupancy vehicle auto trips, and transit-related auto trips. Additionally, only three of the San Pablo Avenue middle filters do not have any transit-related auto trips.

Table 18 provides a summary of auto trips in the northbound direction during the AM peak period stratified by auto mode of travel.

Table 18
Auto Mode by Middle Filter – Northbound AM Peak Period

Middle Filter	Auto Trips	Drive Alone	High-Occupancy Vehicle	Park-and-Ride	Kiss-and-Ride
Road 20 to Hilltop Drive	4,976	3,896	1,080	0	0
Nevin Ave/I-80 to Road 20	6,019	4,965	1,052	1	1
County Line to Nevin Ave/I-80	5,624	4,763	815	27	20
University Avenue to County Line	6,012	5,201	796	10	6
Ashby Avenue to University Avenue	4,166	3,719	447	0	0
I-580 to Ashby Avenue	7,436	6,359	934	62	81
Grand Avenue to I-580	2,132	1,859	273	0	0
Frank Ogawa Plaza to Grand Avenue	1,720	1,459	141	20	100
I-80 North of University Avenue	22,599	19,856	2,742	0	0

Notes:

As shown in **Table 18**, the Middle Filter of San Pablo Avenue from I-580 to Ashby Avenue is the sub-area of San Pablo Avenue with the highest number of total auto trips, drive alone auto trips, and transit-related auto trips while the Middle Filter from Road 20 to Hilltop Drive has the highest number of high-occupancy vehicle trips. Additionally, only three of the San Pablo Avenue middle filters do not have any transit-related auto trips.

Table 19 provides a summary of auto trips in the southbound direction during the AM peak period stratified by auto mode of travel percentage.

Table 19
Auto Mode Percentages by Middle Filter – Southbound AM Peak Period

Middle Filter	Drive Alone	High-Occupancy Vehicle	Park-and-Ride	Kiss-and-Ride
Hilltop Drive to Road 20	88%	12%	0%	0%
Road 20 to Nevin Ave/I-80	76%	14%	5%	5%
Nevin Ave/I-80 to County Line	65%	11%	14%	10%
County Line to University Avenue	80%	13%	5%	3%
University Avenue to Ashby Avenue	90%	10%	0%	0%
Ashby Avenue to I-580	66%	9%	11%	14%
I-580 to Grand Avenue	88%	12%	0%	0%
Grand Avenue to Frank Ogawa Plaza	59%	11%	5%	25%
I-80 North of University Avenue	81%	19%	0%	0%

Notes:
3. Notes.

As shown in **Table 19**, the Middle Filter of San Pablo Avenue from University Avenue to Ashby Avenue is the sub-area of San Pablo Avenue with the highest percentage of drive alone trips and one of three middle filters without any transit-related auto trips.

Table 20 provides a summary of auto trips in the northbound direction during the AM peak period stratified by auto mode of travel percentage.

Table 20
Auto Mode Percentages by Middle Filter – Northbound AM Peak Period

Middle Filter	Drive Alone	High-Occupancy Vehicle	Park-and-Ride	Kiss-and-Ride
Road 20 to Hilltop Drive	78%	22%	0%	0%
Nevin Ave/I-80 to Road 20	83%	17%	0%	0%
County Line to Nevin Ave/I-80	85%	14%	0%	0%
University Avenue to County Line	87%	13%	0%	0%
Ashby Avenue to University Avenue	89%	11%	0%	0%
I-580 to Ashby Avenue	86%	13%	1%	1%
Grand Avenue to I-580	87%	13%	0%	0%
Frank Ogawa Plaza to Grand Avenue	85%	8%	1%	6%
I-80 North of University Avenue	88%	12%	0%	0%

Notes:
1. Notes.

As shown in **Table 20**, the Middle Filter of San Pablo Avenue from Ashby Avenue to University Avenue is the sub-area of San Pablo Avenue with the highest percentage of drive alone trips. Additionally, the high-occupancy vehicle auto mode of travel percentage generally decreased as you travel from north to south.

Key Auto Origin-Destination Patterns for Travel Market Assessment

The final absolute auto origin-destination trip tables were then utilized to answer key questions regarding the travel market of auto trips that travel corridor-wide and along each of the nine middle filters. The goal of this analysis was to gain an understanding of major auto origin and destination zones as well as major auto origin-destination pairs in order to establish existing travel markets. The following questions were answered as part of this analysis and the findings are discussed below.

- Where do trips originate that travel along the San Pablo Avenue study corridor?
- What is the destination of trips that travel along the San Pablo Avenue study corridor?
- What are the top origin-destination travel patterns for trips that travel along the San Pablo Avenue study corridor?
- Where do trips with a destination in the half mile study corridor come from?
- Where do trips that originate in the half mile study corridor travel to?
- Where do trips passing through the corridor start and end?
- Who is coming to San Pablo Avenue commercial areas?
- How many auto trips could potentially shift their mode of travel to walking and biking?

The answers to these questions will be analyzed and integrated with similar transit-oriented questions in the Existing Travel Markets section to establish existing auto and transit travel markets along the corridor. Travel markets that are currently being served by transit will be identified along with the number of trips being served by other modes, to help determine if there is a market for transit expansion in the form of reduced headways or the conversion to bus-rapid transit. Travel markets that are primarily being served by auto will also be identified to determine if there is a market for transit expansion in the form of additional bus routes or a new bus-rapid transit line connecting the market areas. This analysis will help identify transit improvements that could be made to improve transit performance and increase transit ridership along San Pablo Avenue.

Top Auto Trip Origins

Table 21 provides a list of the top three auto trip origin zones in the southbound direction during the AM peak period. Auto trip origins will be discussed and compared to transit trip origins in the Existing Travel Markets section.

Table 21
Top Auto Trip Origins by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	1,778	37%	Pinole	1,563	32%	San Pablo	718	15%	San Pablo Half Mile
Road 20 to Nevin Ave/I-80	4,522	37%	Carquinez Bridge	3,262	27%	Pinole	3,068	25%	San Pablo
Nevin Ave/I-80 to County Line	2,937	17%	Pinole	2,637	15%	Richmond West Half Mile	1,834	10%	San Pablo
County Line to University Avenue	2,495	21%	Berkeley East Half Mile	1,483	12%	Berkeley West Half Mile	1,205	10%	West Richmond
University Avenue to Ashby Avenue	1,302	26%	Berkeley East Half Mile	762	15%	East Berkeley	701	14%	Berkeley West Half Mile
Ashby Avenue to I-580	1,416	21%	East Berkeley	1,163	17%	Berkeley East Half Mile	916	14%	Emeryville Half Mile
I-580 to Grand Avenue	1,306	36%	Bay Bridge	399	11%	Richmond Bridge	269	8%	Berkeley West Half Mile
Grand Avenue to Frank Ogawa Plaza	639	22%	Bay Bridge	491	17%	Caldecott Tunnel	321	11%	South Oakland
I-80 North of University Avenue	7,084	24%	Richmond Bridge	4,870	17%	Carquinez Bridge	3,575	12%	West Richmond
Notes:									

Table 22 provides a list of the top three auto trip origin zones in the northbound direction during the AM peak period. Auto trip origins will be discussed and compared to transit trip origins in the Existing Travel Markets section.

Table 22
Top Auto Trip Origins by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	1,453	29%	San Pablo	1,453	29%	West Richmond	1,391	28%	San Pablo Half Mile
Nevin Ave/I-80 to Road 20	2,331	39%	Bay Bridge	596	10%	East Berkeley	316	5%	West Richmond
County Line to Nevin Ave/I-80	1,036	18%	Richmond East Half Mile	936	17%	East Richmond	914	16%	East Berkeley
University Avenue to County Line	1,728	29%	East Berkeley	891	15%	Berkeley East Half Mile	550	9%	Berkeley West Half Mile
Ashby Avenue to University Avenue	591	14%	Berkeley Bowl Area	538	13%	Berkeley West Half Mile	446	11%	Emeryville Half Mile
I-580 to Ashby Avenue	1,918	26%	Caldecott Tunnel	1,049	14%	Bay Bridge	838	11%	Northwest Oakland
Grand Avenue to I-580	461	22%	Downtown Oakland	366	17%	I-880 South of Oakland	300	14%	South Oakland
Frank Ogawa Plaza to Grand Avenue	997	58%	Downtown Oakland	168	10%	South Oakland	74	4%	North Oakland
I-80 North of University Avenue	6,597	29%	Bay Bridge	2,837	13%	Caldecott Tunnel	1,646	7%	South Oakland

Notes:

Top Auto Trip Destinations

Table 23 provides a list of the top three auto trip destination zones in the southbound direction during the AM peak period. Auto trip destinations will be discussed and compared to transit trip destinations in the Existing Travel Markets section.

Table 23
Top Auto Trip Destinations by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	1,143	24%	West Richmond	716	15%	San Pablo Half Mile	359	7%	Richmond BART
Road 20 to Nevin Ave/I-80	2,969	25%	Bay Bridge	861	7%	Richmond West Half Mile	772	6%	Berkeley West Half Mile
Nevin Ave/I-80 to County Line	1,845	11%	El Cerrito BART	1,765	10%	East Berkeley	1,327	8%	Berkeley West Half Mile
County Line to University Avenue	2,314	19%	Berkeley West Half Mile	1,275	11%	Bay Bridge	1,159	10%	East Berkeley
University Avenue to Ashby Avenue	880	18%	Emeryville Half Mile	699	14%	Berkeley West Half Mile	495	10%	Bay Bridge
Ashby Avenue to I-580	1,607	24%	Bay Bridge	660	10%	Northwest Oakland	642	10%	Downtown Oakland
I-580 to Grand Avenue	2,473	69%	Downtown Oakland	309	9%	Oakland Half Mile South	212	6%	I-880 South of Oakland
Grand Avenue to Frank Ogawa Plaza	2,256	78%	Downtown Oakland	177	6%	Jack London Square	106	4%	I-880 South of Oakland
I-80 North of University Avenue	6,798	23%	Bay Bridge	2,281	8%	Emeryville	2,188	8%	Downtown Oakland

Notes:

Table 24 provides a list of the top three auto trip destination zones in the northbound direction during the AM peak period. Auto trip destinations will be discussed and compared to transit trip destinations in the Existing Travel Markets section.

Table 24
Top Auto Trip Destinations by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	1,177	24%	Hilltop Mall	969	19%	San Pablo Half Mile	920	18%	Pinole
Nevin Ave/I-80 to Road 20	3,403	57%	Carquinez Bridge	1,174	20%	Pinole	659	11%	SR 4
County Line to Nevin Ave/I-80	1,370	24%	West Richmond	817	15%	Richmond Bridge	800	14%	Richmond West Half Mile
University Avenue to County Line	1,037	17%	Berkeley West Half Mile	967	16%	Richmond Bridge	461	8%	West Richmond
Ashby Avenue to University Avenue	1,333	32%	Berkeley West Half Mile	606	15%	East Berkeley	408	10%	Berkeley East Half Mile
I-580 to Ashby Avenue	1,676	23%	Emeryville Half Mile	904	12%	Berkeley West Half Mile	778	10%	East Berkeley
Grand Avenue to I-580	330	15%	Emeryville Half Mile	269	13%	Emeryville Home Depot Area	264	12%	Emeryville
Frank Ogawa Plaza to Grand Avenue	354	21%	Downtown Oakland	200	12%	Northwest Oakland	162	9%	Oakland Half Mile South
I-80 North of University Avenue	5,975	26%	Carquinez Bridge	5,859	26%	Richmond Bridge	4,324	19%	West Richmond
Notes:									

Top Auto Trip Origin-Destination Pairs

Table 25 provides a list of the top three auto trip origin-destination pairs in the southbound direction during the AM peak period. Auto trip origin-destination pairs will be discussed and compared to transit trip origin-destinations pairs in the Existing Travel Markets section.

Table 25
Top Auto Trip Origin-Destination Pairs by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	534	11%	Pinole to West Richmond	303	6%	San Pablo to West Richmond	286	6%	San Pablo to Northwest Oakland
Road 20 to Nevin Ave/I-80	1,753	15%	Carquinez Bridge to Bay Bridge	555	5%	Pinole to Bay Bridge	430	4%	San Pablo to Bay Bridge
Nevin Ave/I-80 to County Line	637	4%	Richmond West Half Mile to West Oakland	571	3%	Richmond Portola Dr Area to East Berkeley	546	3%	Richmond Bridge to El Cerrito BART
County Line to University Avenue	551	5%	Berkeley East Half Mile to Bay Bridge	475	4%	Berkeley East Half Mile to Emeryville Half Mile	452	4%	East Berkeley to Berkeley West Half Mile
University Avenue to Ashby Avenue	373	7%	Berkeley East Half Mile to South Oakland	326	6%	Berkeley East Half Mile to Emeryville Half Mile	281	6%	East Berkeley to Berkeley West Half Mile
Ashby Avenue to I-580	640	10%	East Berkeley to Bay Bridge	406	6%	Berkeley East Half Mile to Bay Bridge	374	6%	Berkeley East Half Mile to South Oakland

Table 25
Top Auto Trip Origin-Destination Pairs by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
I-580 to Grand Avenue	1,005	28%	Bay Bridge to Downtown Oakland	272	8%	Richmond Bridge to Downtown Oakland	177	5%	Berkeley West Half Mile to Downtown Oakland
Grand Avenue to Frank Ogawa Plaza	541	19%	Bay Bridge to Downtown Oakland	420	15%	Caldecott Tunnel to Downtown Oakland	249	9%	South Oakland to Downtown Oakland
I-80 North of University Avenue	2,108	7%	Carquinez Bridge to Bay Bridge	864	3%	Richmond Bridge to Downtown Oakland	735	3%	East Berkeley to Bay Bridge

Notes:

Table 26 provides a list of the top three auto trip origin-destination pairs in the northbound direction during the AM peak period. Auto trip origin-destination pairs will be discussed and compared to transit trip origin-destinations pairs in the Existing Travel Markets section.

Table 26
Top Auto Trip Origin-Destination Pairs by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	851	17%	West Richmond to Hilltop Mall	706	14%	San Pablo to Carquinez Bridge	561	11%	San Pablo Half Mile to Pinole
Nevin Ave/I-80 to Road 20	1,742	29%	Bay Bridge to Carquinez Bridge	355	6%	Bay Bridge to Pinole	211	4%	East Berkeley to Carquinez Bridge
County Line to Nevin Ave/I-80	553	10%	Richmond East Half Mile to West Richmond	269	5%	East Richmond to West Richmond	258	5%	East Berkeley to Richmond Bridge
University Avenue to County Line	425	7%	East Berkeley to Berkeley West Half Mile	425	7%	East Berkeley to Richmond Bridge	195	3%	East Berkeley to West Richmond
Ashby Avenue to University Avenue	274	7%	Berkeley Bowl Area to Berkeley West Half Mile	236	6%	Berkeley West Half Mile to East Berkeley	166	4%	Caldecott Tunnel to Berkeley West Half Mile
I-580 to Ashby Avenue	740	10%	Caldecott Tunnel to Emeryville Half Mile	384	5%	Bay Bridge to East Berkeley	340	5%	Bay Bridge to UC Berkeley
Grand Avenue to I-580	121	6%	South Oakland to Emeryville Half Mile	121	6%	South Oakland to Emeryville Half Mile	99	5%	Downtown Oakland to Berkeley West Half Mile

Table 26
Top Auto Trip Origin-Destination Pairs by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Frank Ogawa Plaza to Grand Avenue	162	9%	Downtown Oakland to Downtown Oakland	106	6%	Downtown Oakland to Northwest Oakland	98	6%	Downtown Oakland to Bay Bridge
I-80 North of University Avenue	3,496	15%	Bay Bridge to Carquinez Bridge	1,403	6%	Caldecott Tunnel to Richmond Bridge	1,000	4%	Bay Bridge to West Richmond

Notes:
1. Notes.

Who is coming to the Corridor by Auto?

Table 27 provides a list of the top three auto trip origins for trips that are coming to the San Pablo Avenue half mile study corridor in the southbound direction during the AM peak period.

Table 27
Who is coming to the Corridor by Auto by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	488	21%	Corridor	840	45%	Pinole	779	42%	San Pablo
Road 20 to Nevin Ave/I-80	630	16%	Corridor	1,211	36%	Pinole	1,108	33%	San Pablo
Nevin Ave/I-80 to County Line	3,950	40%	Corridor	1,978	33%	Pinole	1,248	21%	West Richmond
County Line to University Avenue	3,606	57%	Corridor	674	25%	East Berkeley	664	24%	West Richmond
University Avenue to Ashby Avenue	1,567	55%	Corridor	598	47%	East Berkeley	227	18%	West Richmond
Ashby Avenue to I-580	1,325	60%	Corridor	310	35%	East Berkeley	159	18%	Bay Street Area
I-580 to Grand Avenue	776	28%	Corridor	1,100	54%	Bay Bridge	302	15%	Richmond Bridge
Grand Avenue to Frank Ogawa Plaza	279	12%	Corridor	541	27%	Bay Bridge	423	21%	Caldecott Tunnel
I-80 North of University Avenue	1,180	17%	Corridor	2,250	39%	Richmond Bridge	917	16%	West Richmond

Notes:

As shown in **Table 27**, the percentage of auto trips coming to the corridor from within the corridor ranges from 12 percent to 60 percent, indicating that San Pablo Avenue is heavily utilized, especially through Berkeley and Emeryville, for southbound inter-corridor trips that could be served by transit along San Pablo Avenue.

Table 28 provides a list of the top three auto trip origins for trips that are coming to the San Pablo Avenue half mile study corridor in the northbound direction during the AM peak period.

Table 28
Who is coming to the Corridor by Auto by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	720	31%	Corridor	1,149	71%	West Richmond	415	26%	San Pablo
Nevin Ave/I-80 to Road 20	167	37%	Corridor	80	29%	East Berkeley	47	17%	Bay Bridge
County Line to Nevin Ave/I-80	1,348	61%	Corridor	312	37%	East Richmond	252	30%	East Berkeley
University Avenue to County Line	1,235	44%	Corridor	743	47%	East Berkeley	127	8%	UC Berkeley
Ashby Avenue to University Avenue	1,329	52%	Corridor	261	21%	East Berkeley	256	21%	Northwest Oakland
I-580 to Ashby Avenue	641	16%	Corridor	1,436	43%	Caldecott Tunnel	506	15%	Northwest Oakland
Grand Avenue to I-580	464	39%	Corridor	234	33%	South Oakland	121	17%	Caldecott Tunnel
Frank Ogawa Plaza to Grand Avenue	418	55%	Corridor	88	26%	South Oakland	52	15%	Alameda
I-80 North of University Avenue	566	17%	Corridor	595	21%	Bay Bridge	408	15%	North Oakland

Notes:

As shown in **Table 28**, the percentage of auto trips coming to the corridor from within the corridor ranges from 16 percent to 61 percent, indicating that San Pablo Avenue is heavily utilized, especially through Berkeley and El Cerrito, for northbound inter-corridor trips that could be served by transit along San Pablo Avenue.

Where are Corridor Trips going to by Auto?

Table 29 provides a list of the top three auto trip destinations for trips that are leaving the San Pablo Avenue half mile study corridor in the southbound direction during the AM peak period.

Table 29
Where are Corridor Trip going to by Auto by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	488	53%	Corridor	162	38%	West Richmond	63	15%	San Pablo
Road 20 to Nevin Ave/I-80	630	44%	Corridor	201	25%	Bay Bridge	90	11%	West Berkeley
Nevin Ave/I-80 to County Line	3,950	50%	Corridor	1,215	30%	East Berkeley	691	17%	West Oakland
County Line to University Avenue	3,606	49%	Corridor	796	21%	East Berkeley	710	19%	Bay Bridge
University Avenue to Ashby Avenue	1,567	51%	Corridor	413	27%	South Oakland	282	19%	Bay Bridge
Ashby Avenue to I-580	1,325	33%	Corridor	646	24%	Bay Bridge	508	19%	South Oakland
I-580 to Grand Avenue	776	71%	Corridor	115	36%	I-880 South of Oakland	64	20%	Northwest Oakland
Grand Avenue to Frank Ogawa Plaza	279	72%	Corridor	29	26%	I-880 South of Oakland	21	19%	Alameda
I-80 North of University Avenue	1,180	19%	Corridor	1,481	29%	Bay Bridge	574	11%	Emeryville

Notes:

As shown in **Table 29**, the percentage of auto trips from within the corridor going to another area of the corridor ranges from 33 percent to 72 percent. A comparison to trips coming to the corridor indicates that the San Pablo Avenue study corridor imports more trips than it exports in the southbound direction.

Table 30 provides a list of the top three auto trip destinations for trips that are leaving the San Pablo Avenue half mile study corridor in the northbound direction during the AM peak period.

Table 30
Where are Corridor Trips going to by Auto by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	720	38%	Corridor	671	57%	Pinole	394	34%	San Pablo
Nevin Ave/I-80 to Road 20	167	14%	Corridor	379	36%	Carquinez Bridge	253	24%	SR 4
County Line to Nevin Ave/I-80	1,348	40%	Corridor	933	47%	West Richmond	328	17%	Richmond Bridge
University Avenue to County Line	1,235	47%	Corridor	330	24%	Richmond Bridge	212	15%	East Berkeley
Ashby Avenue to University Avenue	1,329	59%	Corridor	495	53%	East Berkeley	87	9%	West Berkeley
I-580 to Ashby Avenue	641	47%	Corridor	188	26%	East Berkeley	107	15%	Bay Bridge
Grand Avenue to I-580	464	64%	Corridor	39	15%	Pinole	33	12%	Richmond Bridge
Frank Ogawa Plaza to Grand Avenue	418	39%	Corridor	114	18%	Northwest Oakland	98	15%	Bay Bridge
I-80 North of University Avenue	566	19%	Corridor	709	29%	Richmond Bridge	581	23%	West Richmond
Notes:									

As shown in **Table 30**, the percentage of auto trips from within the corridor going to another area of the corridor ranges from 14 percent to 64 percent. A comparison to trips coming to the corridor indicates that the San Pablo Avenue study corridor imports roughly as many trips as it exports in the northbound direction but it varies by segment.

Where do Pass-Through Auto Trips Start?

Table 31 provides a list of the top three origins of auto trips passing through the corridor in the southbound direction during the AM peak period.

Table 31
Where do Pass-Through Auto Trips Start by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	928	44%	Pinole	774	37%	San Pablo	195	9%	Carquinez Bridge
Road 20 to Nevin Ave/I-80	3,248	44%	Carquinez Bridge	1,893	26%	Pinole	1,869	25%	San Pablo
Nevin Ave/I-80 to County Line	1,125	31%	San Pablo	908	25%	Pinole	416	11%	Carquinez Bridge
County Line to University Avenue	541	26%	West Richmond	370	18%	East Richmond	306	15%	East Berkeley
University Avenue to Ashby Avenue	151	22%	East Berkeley	103	15%	East Richmond	83	12%	West Richmond
Ashby Avenue to I-580	886	47%	East Berkeley	146	8%	South Oakland	138	7%	Bay Street Area
I-580 to Grand Avenue	206	39%	Bay Bridge	97	18%	Richmond Bridge	37	7%	Carquinez Bridge
Grand Avenue to Frank Ogawa Plaza	98	19%	Bay Bridge	74	14%	North Oakland	68	13%	Caldecott Tunnel
I-80 North of University Avenue	4,808	28%	Richmond Bridge	3,617	21%	Carquinez Bridge	2,555	15%	West Richmond

Notes:

Table 32 provides a list of the top three origins of auto trips passing through the corridor in the northbound direction during the AM peak period.

Table 32
Where do Pass-Through Auto Trips Start by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	1,038	71%	San Pablo	305	21%	West Richmond	125	8%	Pinole
Nevin Ave/I-80 to Road 20	2,283	47%	Bay Bridge	516	11%	East Berkeley	327	7%	SF Financial District
County Line to Nevin Ave/I-80	662	46%	East Berkeley	624	43%	East Richmond	33	2%	Bay Bridge
University Avenue to County Line	986	55%	East Berkeley	254	14%	UC Berkeley	243	13%	Downtown Berkeley
Ashby Avenue to University Avenue	247	36%	Bay Street Area	123	18%	East Berkeley	69	10%	North Oakland
I-580 to Ashby Avenue	939	33%	Bay Bridge	464	16%	Caldecott Tunnel	324	12%	Northwest Oakland
Grand Avenue to I-580	265	39%	I-880 South of Oakland	132	19%	Alameda	66	10%	South Oakland
Frank Ogawa Plaza to Grand Avenue	80	24%	South Oakland	46	14%	Cleveland Heights Oakland	44	13%	North Oakland
I-80 North of University Avenue	5,999	34%	Bay Bridge	2,495	14%	Caldecott Tunnel	1,326	8%	South Oakland

Notes:

Where do Pass-Through Auto Trips End?

Table 33 provides a list of the top three destinations of auto trips passing through the corridor in the southbound direction during the AM peak period.

Table 33
Where do Pass-Through Auto Trips End by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20	981	46%	West Richmond	314	15%	Northwest Oakland	137	6%	San Pablo
Road 20 to Nevin Ave/I-80	2,768	35%	Bay Bridge	666	8%	SF Financial District	622	8%	West Richmond
Nevin Ave/I-80 to County Line	832	22%	Bay Bridge	550	15%	East Berkeley	300	8%	East Richmond
County Line to University Avenue	565	26%	Bay Bridge	363	17%	East Berkeley	169	8%	Bay Street Area
University Avenue to Ashby Avenue	213	29%	Bay Bridge	117	16%	Northwest Oakland	99	14%	East Berkeley
Ashby Avenue to I-580	961	45%	Bay Bridge	253	12%	SF Financial District	213	10%	Northwest Oakland
I-580 to Grand Avenue	141	28%	Jack London Square	97	19%	I-880 South of Oakland	91	18%	Northwest Oakland
Grand Avenue to Frank Ogawa Plaza	155	31%	Jack London Square	85	17%	Alameda	77	15%	I-880 South of Oakland
I-80 North of University Avenue	5,317	28%	Bay Bridge	1,707	9%	Emeryville	1,433	8%	South Oakland

Notes:

Table 34 provides a list of the top three destinations of auto trips passing through the corridor in the northbound direction during the AM peak period.

Table 34
Where do Pass-Through Auto Trips End by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive	706	48%	Carquinez Bridge	249	17%	Pinole	221	15%	San Pablo
Nevin Ave/I-80 to Road 20	2,814	62%	Carquinez Bridge	905	20%	Pinole	429	9%	San Pablo
County Line to Nevin Ave/I-80	488	34%	Richmond Bridge	437	30%	West Richmond	220	15%	Carquinez Bridge
University Avenue to County Line	637	35%	Richmond Bridge	288	16%	West Richmond	241	13%	Carquinez Bridge
Ashby Avenue to University Avenue	152	23%	Downtown Berkeley	119	18%	UC Berkeley	105	16%	East Berkeley
I-580 to Ashby Avenue	575	20%	East Berkeley	363	13%	UC Berkeley	338	12%	Emeryville
Grand Avenue to I-580	250	36%	Emeryville	187	27%	Bay Street Area	64	9%	Richmond Bridge
Frank Ogawa Plaza to Grand Avenue	86	25%	Northwest Oakland	70	20%	East Berkeley	36	10%	Bay Bridge
I-80 North of University Avenue	5,131	30%	Richmond Bridge	5,050	30%	Carquinez Bridge	3,609	21%	West Richmond

Notes:

Who is coming to San Pablo Avenue Commercial Areas?

Table 35 provides a list of the top three auto trip origins for trips that are coming to each of the 13 San Pablo Avenue commercial areas and three BART station areas located within the San Pablo Avenue half mile study corridor regardless of direction during the AM peak period.

Table 35
Who is coming to San Pablo Avenue Commercial Areas? – AM Peak Period

Commercial Area	First Highest		Second Highest		Third Highest	
Downtown Oakland	22%	Bay Bridge	17%	Caldecott Tunnel	11%	South Oakland
Emeryville Home Depot Area	21%	East Berkeley	18%	Caldecott Tunnel	12%	Berkeley Bowl Area
Emeryville Target Area	36%	South Oakland	26%	Caldecott Tunnel	7%	Emeryville Half Mile
Berkeley Bowl Area	45%	East Berkeley	8%	Caldecott Tunnel	6%	Emeryville Half Mile
Berkeley University Ave Area	21%	Emeryville Home Depot Area	11%	South Oakland	11%	South Oakland
Albany Solano Ave Area	29%	Pinole	25%	East Berkeley	16%	East Richmond
El Cerrito Plaza Area	22%	East Richmond	19%	Pinole	6%	El Cerrito Del Norte BART
Richmond Portola Dr Area	19%	West Richmond	14%	El Cerrito Del Norte BART	12%	Richmond West Half Mile
Richmond McBryde Area	30%	San Pablo Half Mile	13%	Pinole	7%	San Pablo Town Center
San Pablo Town Center	14%	Richmond West Half Mile	11%	East Berkeley	11%	East Berkeley

Table 35 Who is coming to San Pablo Avenue Commercial Areas? – AM Peak Period						
Commercial Area	**First Highest**		**Second Highest**		**Third Highest**	
San Pablo Church Lane Area	24%	San Pablo Half Mile	14%	San Pablo Town Center	14%	San Pablo Town Center
Contra Costa College	28%	Pinole	27%	San Pablo Half Mile	18%	San Pablo
Hilltop Mall	72%	West Richmond	15%	San Pablo Half Mile	10%	San Pablo
North Berkeley BART	33%	Berkeley West Half Mile	22%	Richmond West Half Mile	20%	West Richmond
El Cerrito BART	27%	Richmond Bridge	25%	West Richmond	15%	Pinole
El Cerrito Del Norte BART	14%	San Pablo	13%	Pinole	12%	Richmond East Half Mile
Notes:						

Table 36 provides a list of the top three auto trip origins for trips that are coming to each of the 13 San Pablo Avenue commercial areas and three BART station areas located within the San Pablo Avenue half mile study corridor regardless of direction during the PM peak period.

Table 36
Who is coming to San Pablo Avenue Commercial Areas? – PM Peak Period

Commercial Area	First Highest		Second Highest		Third Highest	
Downtown Oakland	10%	Bay Bridge	9%	Northwest Oakland	7%	Downtown Oakland
Emeryville Home Depot Area	18%	East Berkeley	12%	Emeryville Half Mile	10%	Berkeley West Half Mile
Emeryville Target Area	15%	Emeryville Half Mile	12%	East Berkeley	10%	Berkeley Bowl Area
Berkeley Bowl Area	29%	East Berkeley	12%	Berkeley West Half Mile	8%	Bay Bridge
Berkeley University Ave Area	20%	Emeryville Half Mile	10%	Berkeley Bowl Area	9%	Northwest Oakland
Albany Solano Ave Area	20%	Berkeley West Half Mile	13%	East Berkeley	9%	El Cerrito BART
El Cerrito Plaza Area	17%	West Richmond	14%	East Berkeley	10%	Richmond West Half Mile
Richmond Portola Dr Area	13%	Richmond West Half Mile	13%	Richmond West Half Mile	9%	West Richmond
Richmond McBryde Area	17%	Richmond West Half Mile	13%	San Pablo Half Mile	9%	West Richmond
San Pablo Town Center	11%	Richmond West Half Mile	10%	San Pablo Half Mile	7%	West Richmond
San Pablo Church Lane Area	23%	El Cerrito Del Norte BART	11%	West Richmond	7%	San Pablo Town Center

Table 36 Who is coming to San Pablo Avenue Commercial Areas? – PM Peak Period						
Commercial Area	**First Highest**		**Second Highest**		**Third Highest**	
Contra Costa College	21%	Richmond West Half Mile	18%	Hilltop Mall	18%	Hilltop Mall
Hilltop Mall	29%	West Richmond	24%	San Pablo Half Mile	18%	San Pablo
North Berkeley BART	30%	Berkeley West Half Mile	15%	West Richmond	10%	Richmond West Half Mile
El Cerrito BART	26%	West Richmond	12%	Richmond Bridge	11%	Richmond West Half Mile
El Cerrito Del Norte BART	12%	Richmond West Half Mile	11%	West Richmond	10%	El Cerrito BART
Notes:						

Table 37 provides a summary of auto trips to each of the 13 San Pablo Avenue commercial areas and three BART station areas located within the San Pablo Avenue half mile study corridor by area type regardless of direction during the AM peak period.

Table 37
Who is coming to San Pablo Avenue Commercial Areas? – AM Peak Period

Commercial Area	Other Corridor Commercial Areas	Corridor BART Station Areas	Corridor Half Mile Areas	Areas Outside the Corridor Half Mile	Large Cities	External Gateways
Downtown Oakland	9%	0%	8%	2%	32%	49%
Emeryville Home Depot Area	14%	1%	14%	4%	45%	22%
Emeryville Target Area	7%	0%	9%	2%	55%	27%
Berkeley Bowl Area	6%	3%	16%	2%	56%	17%
Berkeley University Ave Area	33%	0%	20%	7%	34%	7%
Albany Solano Ave Area	5%	2%	16%	0%	71%	5%
El Cerrito Plaza Area	15%	11%	18%	0%	53%	4%
Richmond Portola Dr Area	3%	15%	26%	2%	48%	6%
Richmond McBryde Area	7%	0%	43%	6%	38%	7%
San Pablo Town Center	11%	16%	18%	0%	31%	24%
San Pablo Church Lane Area	38%	0%	24%	0%	26%	12%
Contra Costa College	10%	0%	27%	0%	45%	18%
Hilltop Mall	2%	0%	15%	0%	82%	0%

Table 37 Who is coming to San Pablo Avenue Commercial Areas? – AM Peak Period						
Commercial Area	**Other Corridor Commercial Areas**	**Corridor BART Station Areas**	**Corridor Half Mile Areas**	**Areas Outside the Corridor Half Mile**	**Large Cities**	**External Gateways**
North Berkeley BART	2%	3%	61%	0%	31%	2%
El Cerrito BART	1%	4%	17%	0%	50%	28%
El Cerrito Del Norte BART	10%	10%	26%	1%	45%	7%
Notes: 1. Notes.						

Table 38 provides a summary of auto trips to each of the 13 San Pablo Avenue commercial areas and three BART station areas located within the San Pablo Avenue half mile study corridor by area type regardless of direction during the PM peak period.

Table 38
Who is coming to San Pablo Avenue Commercial Areas? – PM Peak Period

Commercial Area	Other Corridor Commercial Areas	Corridor BART Station Areas	Corridor Half Mile Areas	Areas Outside the Corridor Half Mile	Large Cities	External Gateways
Downtown Oakland	18%	0%	17%	7%	35%	21%
Emeryville Home Depot Area	13%	0%	25%	17%	35%	9%
Emeryville Target Area	10%	3%	33%	15%	32%	7%
Berkeley Bowl Area	9%	6%	19%	9%	39%	18%
Berkeley University Ave Area	22%	2%	36%	6%	21%	12%
Albany Solano Ave Area	19%	12%	34%	4%	21%	10%
El Cerrito Plaza Area	8%	9%	22%	2%	51%	9%
Richmond Portola Dr Area	13%	13%	24%	3%	39%	9%
Richmond McBryde Area	11%	2%	48%	0%	30%	9%
San Pablo Town Center	17%	5%	32%	4%	26%	16%
San Pablo Church Lane Area	13%	23%	26%	0%	31%	7%
Contra Costa College	39%	0%	32%	0%	29%	0%
Hilltop Mall	17%	1%	28%	0%	50%	5%

Table 38 Who is coming to San Pablo Avenue Commercial Areas? – PM Peak Period						
Commercial Area	**Other Corridor Commercial Areas**	**Corridor BART Station Areas**	**Corridor Half Mile Areas**	**Areas Outside the Corridor Half Mile**	**Large Cities**	**External Gateways**
North Berkeley BART	6%	3%	53%	0%	28%	11%
El Cerrito BART	10%	7%	26%	0%	39%	17%
El Cerrito Del Norte BART	16%	13%	24%	1%	38%	8%
Notes:						

Transit Origin-Destination Data

To determine transit origin-destination patterns for the corridor, a combination of transit ridership and survey data was analyzed for the San Pablo Avenue study area.

To understand BART activity along the project corridor, two datasets were used: (1) BART ridership and origin-destination data and (2) BART station profile survey data. The ridership data was provided by BART for the period between April 1st, 2017 and May 31st, 2017. The data was post-processed to obtain average morning, evening, and daily ridership and origin-destination patterns and aggregated to the eight San Pablo Avenue middle filters based as described below.

- Grand Avenue to Frank Ogawa Plaza (Middle Filter 1) – 12th Street and 19th Street
- Ashby Avenue to I-580 (Middle Filter 3) – Ashby and MacArthur
- Road 20 to Nevin Ave/I-80 (Middle Filter 5) – North Berkeley
- Nevin Ave/I-80 to County Line (Middle Filter 6) – El Cerrito Del Norte and El Cerrito Plaza
- County Line to University Avenue (Middle Filter 7) – Richmond

The station profile survey data was provided by BART and was collected in 2015. This data was used to understand vehicle ownership and income levels, mode of access, and home locations of BART passengers at the eight BART stations listed above. To simplify analysis and address data limitations, it was assumed all morning peak period trips were home-based trips.

To understand bus ridership along the corridor, AC Transit APC data for the period between April 1st, 2017 and May 31st, 2017 was used. APC data for routes that run along San Pablo Avenue, or on parallel facilities within one half mile, was post-processed to understand boardings, alightings, and average and maximum load at stops along each middle filter.

AC Transit Survey data and MTC Clipper Card data were obtained and investigated but not used due to data limitations.

Key Transit Origin-Destination Patterns for Travel Market Assessment

The transit origin-destination data was then utilized to answer key questions regarding the travel market of transit trips that travel corridor-wide and within a half mile of the nine middle filters. The goal of this analysis was to gain an understanding of major transit origin and destination zones as well as major transit origin-destination pairs in order to establish existing travel markets. The following questions were answered as part of this analysis and the findings are discussed below.

- Where do BART patrons who access BART within one half mile of the San Pablo Avenue study corridor live?

- What are the destinations of BART trips that begin within one half mile of the San Pablo Avenue study corridor?

As discussed above, the answers to these questions will be analyzed and integrated with similar auto-oriented questions in the Existing Travel Markets section to establish existing auto and transit travel markets along the corridor.

Top BART Home Origins

Table 39 provides a summary of corridor-wide home origins of trips coming to BART stations located within the San Pablo Avenue half mile study corridor by direction during the AM peak period. This data was derived from answers to the home origin question from the BART ridership survey. A limitation of this dataset is that survey patrons did not specify morning or afternoon direction of travel when reporting their home origin. Therefore, the same home origin percentages were applied to both northbound and southbound BART trips.

Table 39
Corridor-Wide Top BART Home Origins – AM Peak Period

Segment	First Highest			Second Highest			Third Highest		
Northbound	3,116	25%	Downtown Oakland	2,767	23%	Northwest Oakland	997	8%	Berkeley
Southbound	5,509	19%	Richmond	4,456	16%	Northwest Oakland	3,979	14%	Downtown Oakland
Both Directions	7,222	18%	Northwest Oakland	7,095	18%	Downtown Oakland	6,246	15%	Richmond
Notes:									

As shown in **Table 39**, 18 percent of trips to BART stations located within the San Pablo Avenue half mile study corridor have a home origin in Northwest Oakland, while 18 percent have a home origin in Downtown Oakland and 15% have a home origin in Richmond.

Table 40 provides a list of the top three home origins of trips coming to BART stations located within the San Pablo Avenue half mile study corridor in the southbound direction during the AM peak period.

Table 40
Top BART Home Origins by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20									
Road 20 to Nevin Ave/I-80	1,452	63%	West Richmond	207	9%	Richmond BART	161	7%	San Pablo
Nevin Ave/I-80 to County Line	1,887	25%	Richmond East Half Mile	981	13%	Richmond West Half Mile	981	13%	East Richmond
County Line to University Avenue	1,089	49%	East Berkeley	578	26%	Berkeley East Half Mile	178	8%	Berkeley West Half Mile
University Avenue to Ashby Avenue									
Ashby Avenue to I-580	2,007	32%	Northwest Oakland	1,631	26%	East Berkeley	1,129	18%	Emeryville Half Mile
I-580 to Grand Avenue									
Grand Avenue to Frank Ogawa Plaza	3,979	39%	Downtown Oakland	2,448	24%	Northwest Oakland	1,224	12%	Oakland Half Mile South
I-80 North of University Avenue									
Notes:									

As shown in **Table 40**, 3,849 trips to BART stations on San Pablo Avenue from Nevin Ave/I-80 to County Line have a home origin in an area of Richmond while 1,845 trips to BART stations on San Pablo Avenue from County Line to University Avenue have a home origin in an area of Berkeley.

Table 41 provides a list of the top three home origins of trips coming to BART stations located within the San Pablo Avenue half mile study corridor in the northbound direction during the AM peak period.

Table 41
Top BART Home Origins by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive									
Nevin Ave/I-80 to Road 20	285	63%	West Richmond	41	9%	Richmond BART	32	7%	San Pablo
County Line to Nevin Ave/I-80	202	25%	Richmond East Half Mile	105	13%	Richmond West Half Mile	105	13%	East Richmond
University Avenue to County Line	181	49%	East Berkeley	96	26%	Berkeley East Half Mile	30	8%	Berkeley West Half Mile
Ashby Avenue to University Avenue									
I-580 to Ashby Avenue	849	32%	Northwest Oakland	690	26%	East Berkeley	478	18%	Emeryville Half Mile
Grand Avenue to I-580									
Frank Ogawa Plaza to Grand Avenue	3,116	39%	Downtown Oakland	1,918	24%	Northwest Oakland	959	12%	Oakland Half Mile South
I-80 North of University Avenue									
Notes:									

As shown in **Table 41**, 5,993 trips to BART stations on San Pablo Avenue from Frank Ogawa Plaza to Grand Avenue have a home origin in an area of Oakland while 2,017 trips to BART stations on San Pablo Avenue from I-580 to Ashby Avenue have a home origin in an area of Oakland, Berkeley, or Emeryville.

Top BART Origin-Destination Patterns

Table 42 provides a summary of corridor-wide origin-destination patterns of BART trips to/from BART stations located within the San Pablo Avenue half mile study corridor by direction during the AM peak period. This data was derived from BART origin-destination station-level data.

Table 42
Corridor-Wide Top BART Origin-Destination Patterns – AM Peak Period

Segment	First Highest			Second Highest			Third Highest		
To Corridor	4,385	11%	SF to Corridor	4,048	10%	South Alameda/Oakland to Corridor	3,411	8%	CCC to Corridor
From Corridor	9,305	23%	Corridor to SF Financial	7,069	17%	Corridor to Greater SF	2,051	5%	Corridor to Downtown Oakland
Overall	9,305	23%	Corridor to SF Financial	7,069	17%	Corridor to Greater SF	4,385	11%	SF to Corridor
Notes:									

As shown in **Table 42**, 40 percent of BART trips to/from BART stations located within the San Pablo Avenue half mile study area are travelling from the corridor to San Francisco while 11 percent are travelling from San Francisco to the corridor.

Table 43 provides a list of the top three origin-destination pairs to/from BART stations located within each of the San Pablo Avenue middle filters in the southbound direction during the AM peak period.

Table 43
Top BART Origin-Destination Patterns by Middle Filter – Southbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Hilltop Drive to Road 20									
Road 20 to Nevin Ave/I-80	779	34%	Corridor to Greater SF	587	25%	Corridor to SF Financial	243	11%	Corridor to Berkeley
Nevin Ave/I-80 to County Line	2,320	31%	Corridor to SF Financial	1,967	26%	Corridor to Greater SF	1,271	17%	Corridor to Downtown Oakland
County Line to University Avenue	879	40%	Corridor to SF Financial	605	27%	Corridor to Greater SF	344	15%	Corridor to Downtown Oakland
University Avenue to Ashby Avenue									
Ashby Avenue to I-580	2,772	44%	Corridor to SF Financial	1,932	31%	Corridor to Greater SF	436	7%	Corridor to Downtown Oakland
I-580 to Grand Avenue									
Grand Avenue to Frank Ogawa Plaza	2,747	27%	Corridor to SF Financial	2,744	27%	CCC to Corridor	1,786	18%	Corridor to Greater SF
I-80 North of University Avenue									

Notes:

As shown in **Table 43**, the top origin-destination pair to/from BART stations located within each of the San Pablo Avenue "select-link" segments is from the corridor to San Francisco.

Table 44 provides a list of the top three origin-destination pairs to/from BART stations located within each of the San Pablo Avenue middle filters in the northbound direction during the AM peak period.

Table 44
Top BART Origin-Destination Patterns by Middle Filter – Northbound AM Peak Period

Middle Filter	First Highest			Second Highest			Third Highest		
Road 20 to Hilltop Drive									
Nevin Ave/I-80 to Road 20	107	24%	Other SF to Corridor	63	14%	South Alameda County to Corridor	35	8%	South Oakland to Corridor
County Line to Nevin Ave/I-80	156	19%	Other SF to Corridor	121	15%	South Alameda County to Corridor	80	10%	South Oakland to Corridor
University Avenue to County Line	69	19%	South Alameda County to Corridor	38	10%	CCC to Corridor	37	10%	South Oakland to Corridor
Ashby Avenue to University Avenue									
I-580 to Ashby Avenue	629	24%	CCC to Corridor	535	20%	South Alameda County to Corridor	482	18%	Other SF to Corridor
Grand Avenue to I-580									
Frank Ogawa Plaza to Grand Avenue	3,108	39%	South Alameda County to Corridor	2,539	32%	Other SF to Corridor	1,101	14%	SF Financial to Corridor
I-80 North of University Avenue									
Notes:									

As shown in **Table 44**, the top origin-destination pair to/from BART stations located within each of the San Pablo Avenue middle filters varies from segment to segment.

Potential Walk and Bike Trips

Auto origin-destination trip tables were also used to quantify potential walk and bike trips for each of the middle filters. The determination of existing auto trips that have the potential to shift to walk and bike trips was based on the assumption that persons would be willing to walk or bike up to ten minutes if pedestrian or bicycle facilities and improvements were provided. Therefore, the process involved the quantification of existing auto trips in the final absolute auto origin-destination trips tables that could be completed in less than ten minutes walking and bicycling.

In order to estimate auto trips that could be completed in less than ten minutes, assumptions were made regarding the distance that could reasonably be travelled on foot and on a bicycle. An assumption of one half mile for walking and two miles for bicycling were made. Distance skim matrices for auto trips from the base year (2010) Alameda CTC model were then obtained and applied to the AM and PM 4-hour peak period auto origin-destination trips tables that are assigned to the highway network. The resulting trip tables contained a matrix of total auto trips, a matrix of only auto trips that were less than one half mile and a matrix of only auto trips that were less than two miles.

The next step was to tag each Alameda CTC model TAZ to the 50-zone system developed for the auto trip pattern analysis. The trips tables were then aggregated to the 50-zone system and the matrices of only auto trips less than one half and two miles were divided by the total auto trip matrices. This resulted in 50 by 50 trip tables that provided the percent of total auto trips that were less than one half and two miles. These percentages were then applied to the final absolute auto origin-destination trips tables for each of the nine middle filters for the AM and PM peak periods.

Please note a limitation of this methodology is that travel demand models tend to underestimate shorter distance trips due to the aggregate nature of the traffic analysis zone system, corresponding demographic data, and the lack of local streets in the model's highway network. Travel demand models also typically simplify the process for determining intrazonal trips which can result in unrealistic intrazonal trip distances. However, a review of the Alameda CTC model indicated a reasonable level of zonal detail in the study area and a reasonable calculation of intrazonal trip distances, reducing the potential limitations of this methodology.

Table 45 provides a summary of auto trips less than one half mile and auto trips less than two miles in the southbound direction for the AM peak period.

Table 45
Potential Walk and Bike Trips – Southbound AM Peak Period

Middle Filter	Total Auto Trips	Auto Trips Less than 0.5 Miles		Auto Trips Less than 2 Miles	
Hilltop Drive to Road 20	4,861	11	0%	307	6%
Road 20 to Nevin Ave/I-80	12,077	48	0%	975	8%
Nevin Ave/I-80 to County Line	17,550	151	1%	2,009	11%
County Line to University Avenue	12,131	36	0%	1,586	13%
University Avenue to Ashby Avenue	5,028	22	0%	627	12%
Ashby Avenue to I-580	6,716	66	1%	949	14%
I-580 to Grand Avenue	3,588	6	0%	263	7%
Grand Avenue to Frank Ogawa Plaza	2,892	20	1%	367	13%
I-80 North of University Avenue	29,028	62	0%	1,626	6%
Notes:					

As shown in **Table 45**, auto trips less than one half mile generally comprised less than one percent of total auto trips and auto trips less than two miles ranged from six percent to 13 percent along San Pablo Avenue.

Table 46 provides a summary of auto trips less than one half mile and auto trips less than two miles in the northbound direction for the AM peak period.

Table 46
Potential Walk and Bike Trips – Northbound AM Peak Period

Middle Filter	Total Auto Trips	Auto Trips Less than 0.5 Miles		Auto Trips Less than 2 Miles	
Road 20 to Hilltop Drive	4,976	18	0%	218	4%
Nevin Ave/I-80 to Road 20	6,019	31	1%	427	7%
County Line to Nevin Ave/I-80	5,624	53	1%	548	10%
University Avenue to County Line	6,012	22	0%	327	5%
Ashby Avenue to University Avenue	4,166	26	1%	420	10%
I-580 to Ashby Avenue	7,436	82	1%	549	7%
Grand Avenue to I-580	2,132	14	1%	191	9%
Frank Ogawa Plaza to Grand Avenue	1,720	108	6%	382	22%
I-80 North of University Avenue	22,599	76	0%	1,304	6%

Notes:
1. Notes.

As shown in **Table 46**, auto trips less than one half mile generally comprised less than one percent of total auto trips except on the Middle Filter from Frank Ogawa Plaza to Grand Avenue where six percent of auto trips were less than one half mile. Auto trips less than two miles ranged from four percent to 22 percent along San Pablo Avenue.

Table 47 provides a summary of auto trips less than one half mile and auto trips less than two miles in the southbound direction for the PM peak period.

Table 47
Potential Walk and Bike Trips – Southbound PM Peak Period

Middle Filter	Total Auto Trips	Auto Trips Less than 0.5 Miles		Auto Trips Less than 2 Miles	
Hilltop Drive to Road 20	1,118	1	0%	71	6%
Road 20 to Nevin Ave/I-80	26,397	111	0%	1,876	7%
Nevin Ave/I-80 to County Line	3,720	50	1%	347	9%
County Line to University Avenue	5,757	41	1%	525	9%
University Avenue to Ashby Avenue	5,315	16	0%	464	9%
Ashby Avenue to I-580	9,745	84	1%	619	6%
I-580 to Grand Avenue	6,179	25	0%	502	8%
Grand Avenue to Frank Ogawa Plaza	3,944	47	1%	473	12%
I-80 North of University Avenue	47,393	110	0%	2,467	5%

Notes:
1. Notes.

As shown in **Table 47**, auto trips less than one half mile generally comprised less than one percent of total auto trips and auto trips less than two miles ranged from six percent to 12 percent along San Pablo Avenue.

Table 48 provides a summary of auto trips less than one half mile and auto trips less than two miles in the northbound direction for the PM peak period.

Table 48
Potential Walk and Bike Trips – Northbound PM Peak Period

Middle Filter	Total Auto Trips	Auto Trips Less than 0.5 Miles		Auto Trips Less than 2 Miles	
Road 20 to Hilltop Drive	3,430	7	0%	199	6%
Nevin Ave/I-80 to Road 20	39,485	145	0%	3,154	8%
County Line to Nevin Ave/I-80	6,344	61	1%	735	12%
University Avenue to County Line	10,927	65	1%	689	6%
Ashby Avenue to University Avenue	8,110	40	0%	861	11%
I-580 to Ashby Avenue	14,375	77	1%	1,210	8%
Grand Avenue to I-580	5,379	13	0%	433	8%
Frank Ogawa Plaza to Grand Avenue	3,689	63	2%	470	13%
I-80 North of University Avenue	72,945	180	0%	4,334	6%

Notes:
2. Notes.

As shown in **Table 48**, auto trips less than one half mile generally comprised less than one percent of total auto trips except on the Middle Filter from Frank Ogawa Plaza to Grand Avenue where two percent of auto trips were less than one half mile. Auto trips less than two miles ranged from six percent to 13 percent along San Pablo Avenue.

Existing Mode Share

This section provides a summary of the existing mode share for the Project study area based on the analysis and integration of existing auto and transit origin-destination patterns and survey data.

Mode Share Determination

As discussed in the previous section, existing auto and transit origin-destination patterns within the Project study area were established using a combination of data sources. StreetLight Data auto origin-destination trip tables served as a starting point for understanding relative auto trip patterns, which were then factored based on a combination of travel demand model and traffic count data to establish an absolute measure of auto origin-destination patterns between each of the 50 study area zones.

Transit origin-destination patterns were established using bus AVL data to determine the number of bus transit patrons that board or alight along the corridor. BART boarding and alighting origin-destination data and home origin survey data was used to determine the total number of BART-related trips for patrons accessing BART stations within one half mile of each of the nine middle filters, the home origin of the patrons, and the trip destination of the patrons.

The next step in the process was to combine the existing auto and transit origin-destination data with additional data sources to establish the total corridor-wide person throughput by mode of travel for person trips travelling along each of the nine middle filters.

Determine Total Transit Ridership

Total transit trips to and from the San Pablo Avenue study corridor were determined through a summation of BART-related and bus-related transit trips.

Bus trips boarding and alighting along the corridor were summed to determine total bus-related transit trips along the corridor. However, boardings and alightings at bus stops located at BART stations were removed in order to provide a measure of bus trips associated with land use along the half mile study corridor. Additionally, bus AVL data was only obtained for bus routes travelling along San Pablo Avenue which would only provide a subset of bus trips accessing BART stations within the corridor. Alternatively, bus to BART trips were measured by applying station-level mode of access BART survey data to total BART boardings at each station.

Boarding and alighting data was also obtained from Clipper primarily for the purpose of determining transfer rates and transfer types at bus stops along the corridor. This data would have helped answer the following questions.

- What percentage of bus patrons are coming to the corridor to access BART?

- What percentage of bus patrons are coming to the corridor to access land use within the corridor?
- What percentage of bus patrons are coming to the corridor to transfer to another line?

Unfortunately, these questions were unable to be answered as the Clipper data did not include a complete accounting of bus line information, making it impossible to tag the Clipper data to bus routes along San Pablo Avenue and bus stops at BART stations.

BART trips boarding and alighting along the corridor were summed at each BART station, which were tagged to individual middle filters, to determine total bus-related transit trips along the corridor. BART mode of access survey data at the station-level was then used to stratify trips arriving at BART into the following modes of access. Trips arriving at BART were derived from alighting data at each BART station.

- Park-and-ride
- Kiss-and-ride driver
- Kiss-and-ride passenger
- Bus to BART
- Walk or bike to BART
- Arrive on BART

Refine Auto Trips by Vehicular Mode

Total auto trips were determined from the existing auto origin-destination data which was stratified by vehicular mode by data from the Alameda CTC model. To account for model limitations, vehicular mode stratification was refined using data available from alternative empirical sources as follows. Please note that total auto trips were not adjusted.

BART boarding data stratified by mode of access from the BART survey data was used to refine park-and-ride and kiss-and-ride auto trip allocations from the Alameda CTC model. Comparison of the two data sources, including comparison of model data to total BART ridership along each middle filter, indicated that empirical BART data was more reasonable and therefore used to refine park-and-ride and kiss-and-ride auto trips.

Determine Total Person Trips

Total person trips were determined through a summation of total auto trips and total transit trips to and from the corridor. It is important to note that total auto trips include auto trips passing through the corridor whereas transit trips only include trips to and from the corridor due to limitations in the data. To present an accurate comparison, auto trips passing through the corridor were separated from auto trips to and from the corridor but still included in the total person trips estimate.

Corridor-Wide Mode Share

Table 49 provides a summary of existing corridor-wide mode share including an estimate of total person trips that travel along the San Pablo Avenue study corridor during the AM peak period. Please note these estimate are only for person trips that are estimated to have travelled along one of the nine middle filters at some point during their trip.

Table 49
Existing Corridor-Wide Mode Share – Both Directions AM Peak Period

Trip Type	Trips	Percent of Trips
Person Trips	133,758	100%
Auto Trips	91,220	68%
Auto Trips Passing Through the Corridor	28,819	22%
Auto Trips to/from the Corridor	62,401	47%
Transit Trip to/from the Corridor	42,538	32%
Bus Trips to/from the Corridor (non-BART-related)	1,717	1%
BART-Related Trips	40,821	31%
Park-and-Ride	4,630	3%
Kiss-and-Ride Driver	4,602	3%
Kiss-and-Ride Passenger	4,602	3%
Bus to BART	1,998	1%
Walk/Bike to BART	12,436	9%
Arrive on BART	17,156	13%
Notes:		

As shown in **Table 49**, an estimated 134,000 person trip travel along the San Pablo Avenue study corridor during the AM peak period, with approximately 68 percent of trips in an automobile and 32 percent of trips being served by transit. Additionally, 22 percent of total person trips are passing through the corridor in an auto while 47 percent of person trips are accessing the land uses within one half mile of the corridor.

Mode Share by Segment

Table 50 provides a summary of existing mode share by middle filter including an estimate of total person trips that travel along the segment in the southbound direction during the AM peak period.

Table 50
Existing Mode Share by Middle Filter – Southbound AM Peak Period

Middle Filter	Person Trips	Auto Trips		Transit Trips	
Hilltop Drive to Road 20	5,733	5,660	99%	73	1%
Road 20 to Nevin Ave/I-80	17,400	15,000	86%	2,400	14%
Nevin Ave/I-80 to County Line	29,790	22,080	74%	7,710	26%
County Line to University Avenue	17,020	14,620	86%	2,400	14%
University Avenue to Ashby Avenue	5,831	5,730	98%	101	2%
Ashby Avenue to I-580	15,016	8,530	57%	6,486	43%
I-580 to Grand Avenue	4,288	4,180	97%	108	3%
Grand Avenue to Frank Ogawa Plaza	14,278	4,060	28%	10,218	72%
I-80 North of University Avenue	36,470	36,470	100%	0	0%
Notes:					

As shown in **Table 50**, auto person trip percentages range from 28 percent through Downtown Oakland to 99 percent through the City of San Pablo.

Table 51 provides a summary of existing mode share by "middle filter including an estimate of total person trips that travel along the segment in the northbound direction during the AM peak period.

Table 51
Existing Mode Share by Middle Filter – Northbound AM Peak Period

Middle Filter	Person Trips	Auto Trips		Transit Trips	
Road 20 to Hilltop Drive	6,490	6,420	99%	70	1%
Nevin Ave/I-80 to Road 20	7,932	7,430	94%	502	6%
County Line to Nevin Ave/I-80	7,623	6,740	88%	883	12%
University Avenue to County Line	7,593	7,090	93%	503	7%
Ashby Avenue to University Avenue	4,871	4,760	98%	111	2%
I-580 to Ashby Avenue	11,624	8,780	76%	2,844	24%
Grand Avenue to I-580	2,623	2,500	95%	123	5%
Frank Ogawa Plaza to Grand Avenue	10,016	2,010	20%	8,006	80%
I-80 North of University Avenue	26,270	26,270	100%	0	0%
Notes:					

As shown in **Table 51**, auto person trip percentages range from 20 percent through Downtown Oakland to 99 percent through the City of San Pablo.

Auto Mode Share Specifics

Table 52 provides a summary of existing auto mode share by trip type by middle filter including an estimate of total person auto trips that travel along the segment in the southbound direction during the AM peak period.

Table 52
Auto Mode Share Specifics by Middle Filter – Southbound AM Peak Period

Middle Filter	Auto Trips	Passing Through the Corridor		To/From the Corridor	
Hilltop Drive to Road 20	5,660	2,450	43%	3,210	57%
Road 20 to Nevin Ave/I-80	15,000	9,120	61%	5,880	39%
Nevin Ave/I-80 to County Line	22,080	4,587	21%	17,493	79%
County Line to University Avenue	14,620	2,531	17%	12,089	83%
University Avenue to Ashby Avenue	5,730	794	14%	4,936	86%
Ashby Avenue to I-580	8,530	2,392	28%	6,138	72%
I-580 to Grand Avenue	4,180	589	14%	3,591	86%
Grand Avenue to Frank Ogawa Plaza	4,060	698	17%	3,362	83%
I-80 North of University Avenue	36,470	21,862	60%	14,608	40%
Notes:					

As shown in **Table 52**, auto person trips passing through the corridor range from 14 percent to 61 percent. Additionally, 40 percent of person trips on I-80 north of University Avenue have an origin or destination within one half mile of the San Pablo Avenue study corridor.

Table 53 provides a summary of existing auto mode share by trip type by middle filter including an estimate of total person auto trips that travel along the segment in the northbound direction during the AM peak period.

Table 53
Auto Mode Share Specifics by Middle Filter – Northbound AM Peak Period

Middle Filter	Auto Trips	Passing Through the Corridor		To/From the Corridor	
Road 20 to Hilltop Drive	6,420	1,893	29%	4,527	71%
Nevin Ave/I-80 to Road 20	7,430	5,597	75%	1,833	25%
County Line to Nevin Ave/I-80	6,740	1,730	26%	5,010	74%
University Avenue to County Line	7,090	2,133	30%	4,957	70%
Ashby Avenue to University Avenue	4,760	766	16%	3,994	84%
I-580 to Ashby Avenue	8,780	3,295	38%	5,485	62%
Grand Avenue to I-580	2,500	806	32%	1,694	68%
Frank Ogawa Plaza to Grand Avenue	2,010	398	20%	1,612	80%
I-80 North of University Avenue	26,270	19,576	75%	6,694	25%
Notes:					

As shown in **Table 53**, auto person trips passing through the corridor range from 16 percent to 75 percent. Additionally, 25 percent of person trips on I-80 north of University Avenue have an origin or destination within one half mile of the San Pablo Avenue study corridor.

Transit Mode Share Specifics

Table 54 provides a summary of existing transit mode share by trip type by middle filter including an estimate of total person transit trips that travel along the segment in the southbound direction during the AM peak period.

Table 54
Transit Mode Share Specifics by Middle Filter – Southbound AM Peak Period

Middle Filter	Transit Trips	Bus to/from the Corridor		BART-Related	
Hilltop Drive to Road 20	73	73	100%	0	0%
Road 20 to Nevin Ave/I-80	2,400	95	4%	2,305	96%
Nevin Ave/I-80 to County Line	7,710	162	2%	7,548	98%
County Line to University Avenue	2,400	178	7%	2,222	93%
University Avenue to Ashby Avenue	101	101	100%	0	0%
Ashby Avenue to I-580	6,486	213	3%	6,273	97%
I-580 to Grand Avenue	108	108	100%	0	0%
Grand Avenue to Frank Ogawa Plaza	10,218	16	0%	10,202	100%
I-80 North of University Avenue	0	0	--	0	--
Notes:					

As shown in **Table 54**, three of the eight middle filters on San Pablo Avenue do not have a BART station within one half mile of the corridor. For middle filters that do have a BART station, BART-related transit person trips range from 93 percent to almost 100 percent of transit trips.

Table 55 provides a summary of existing transit mode share by trip type by middle filter including an estimate of total person transit trips that travel along the middle filter in the northbound direction during the AM peak period.

Table 55
Transit Mode Share Specifics by Middle Filter – Northbound AM Peak Period

Middle Filter	Transit Trips	Bus to/from the Corridor		BART-Related	
Road 20 to Hilltop Drive	70	70	100%	0	0%
Nevin Ave/I-80 to Road 20	502	50	10%	452	90%
County Line to Nevin Ave/I-80	883	77	9%	806	91%
University Avenue to County Line	503	133	26%	370	74%
Ashby Avenue to University Avenue	111	111	100%	0	0%
I-580 to Ashby Avenue	2,844	191	7%	2,653	93%
Grand Avenue to I-580	123	123	100%	0	0%
Frank Ogawa Plaza to Grand Avenue	8,006	16	0%	7,990	100%
I-80 North of University Avenue	0	0	--	0	--

Notes:

As shown in **Table 55**, three of the eight middle filters on San Pablo Avenue do not have a BART station within one half mile of the corridor. For middle filters that do have a BART station, BART-related transit person trips range from 74 percent to almost 100 percent of transit trips.

BART-Related Mode Share Specifics

Table 56 provides a summary of existing BART-related transit trips by mode of access by middle filter including an estimate of total person BART-related trips that travel along the segment in the southbound direction during the AM peak period.

Table 56
BART-Related Mode Share Specifics by Middle Filter – Southbound AM Peak Period

Middle Filter	BART-Related Trips	Park-and-Ride	Kiss-and-Ride Driver	Kiss-and-Ride Rider	Bus to BART	Walk/Bike to BART	Arrive on BART
Hilltop Drive to Road 20	0	0	0	0	0	0	0
Road 20 to Nevin Ave/I-80	2,305	622	576	576	184	921	2
Nevin Ave/I-80 to County Line	7,548	2,456	1,786	1,786	744	2,456	106
County Line to University Avenue	2,222	550	339	339	21	1,206	106
University Avenue to Ashby Avenue	0	0	0	0	0	0	0
Ashby Avenue to I-580	6,273	736	963	963	396	3,567	611
I-580 to Grand Avenue	0	0	0	0	0	0	0
Grand Avenue to Frank Ogawa Plaza	10,202	146	732	732	537	3,464	5,324
I-80 North of University Avenue	0	0	0	0	0	0	0

Notes:

As shown in **Table 56**, three of the eight middle filters on San Pablo Avenue do not have a BART station within one half mile of the corridor. For middle filters that do have a BART station, mode of access varies greatly by middle filter with the most auto access trips along Nevin Ave/I-80 to County Line, the most walk or bike access trips along Ashby Avenue to I-580, and the most trips arriving on BART along Grand Avenue to Frank Ogawa Plaza.

Table 57 provides a summary of existing BART-related transit trips by mode of access by middle filter including an estimate of total person BART-related trips that travel along the middle filter in the northbound direction during the AM peak period.

Table 57
BART-Related Mode Share Specifics by Middle Filter – Northbound AM Peak Period

Middle Filter	BART-Related Trips	Park-and-Ride	Kiss-and-Ride Driver	Kiss-and-Ride Rider	Bus to BART	Walk/Bike to BART	Arrive on BART
Road 20 to Hilltop Drive	0	0	0	0	0	0	0
Nevin Ave/I-80 to Road 20	452	1	1	1	0	1	450
County Line to Nevin Ave/I-80	806	27	20	20	8	27	725
University Avenue to County Line	370	10	6	6	0	21	333
Ashby Avenue to University Avenue	0	0	0	0	0	0	0
I-580 to Ashby Avenue	2,653	62	81	81	33	301	2,176
Grand Avenue to I-580	0	0	0	0	0	0	0
Frank Ogawa Plaza to Grand Avenue	7,990	20	100	100	73	472	7,326
I-80 North of University Avenue	0	0	0	0	0	0	0

Notes:

As shown in **Table 57**, three of the eight middle filters on San Pablo Avenue do not have a BART station within one half mile of the corridor. For middle filters that do have a BART station, mode of access varies greatly by middle filter with the most auto access trips along I-580 to Ashby Avenue, the most walk or bike access trips along Frank Ogawa Plaza to Grand Avenue, and the most trips arriving on BART along Grand Avenue to Frank Ogawa Plaza.

Existing Travel Markets

This section provides a summary of the existing auto, transit, and active mode travel markets in the San Pablo Avenue travel-shed. The travel markets were identified through an analysis of auto and transit origin-destination patterns and the analysis of potential walk and bike trips discussed in the previous section. This section also provides travel time and demographic characteristics of different components of the key existing travel markets.

In order to gain an understanding of existing travel markets and how they vary along the corridor, the following key questions were answered for each middle filter along the corridor:

1) How many trips pass through the corridor, start in the corridor, end in the corridor, and start and end along the corridor?
2) How many people are driving versus taking transit?
3) Where are trips originating and where are they ending?
4) How many existing auto trips are walkable, bikeable, or could reasonably be served by transit?

The answers to these questions will provide an understanding of existing travel markets along the corridor and help determine the auto markets that would potentially shift to transit or active travel modes if improvements were provided.

Existing Travel Markets Summary

Figures G-2 through G-10 illustrate the top three auto and BART origin-destination patterns and provide the number and share of auto and transit person trips for each middle filter along the San Pablo Avenue study corridor.

This section supplements these figures and highlights key takeaways from the data. Further, this section builds on the methodology employed in the previous section to determine the number of existing auto trips that are walkable and bikeable, also providing an estimate of existing auto trips that could be served by transit to provide a more complete understanding of how improvements along the project corridor could potentially lead to mode shifts.

Auto Trips with Modal Flexibility Methodology

Methodology for Determining Walkable and Bikeable Trips

As discussed in the previous section, the final auto origin-destination trip tables provide the number of auto trips between each of the 50 study area zones. To understand whether these trips could be served by either walking or biking, a 10-minute walk shed (one half mile) and 10-minute bike shed (two miles) was employed. The Alameda CTC model was used to determine the percentage of total auto trips that fall within the walk and bike sheds. These percentages were then applied to final auto origin-destination trip tables to quantify the potential walk and bike trips. For the purposes of determining auto trips

with walk or bike modal flexibility, auto trips along San Pablo Avenue that have an estimated trip length of less than two miles were classified as auto trips with modal flexibility.

Methodology for determining Transit Availability and Potential

The top three auto origin-destination pairs in both the northbound and southbound direction for each middle filter were analyzed to determine existing transit options between the origin and destination zone and how the potential transit trip would compare to the auto trip. For each origin-destination pair, the following attributes were compared for the existing auto trip and the potential transit trips:

- ***Transit Availability*** A trip was determined to have an existing transit option if the trip could be made via transit with two transfers or less. For route planning, the center point of each zone was assumed to be the starting/ending point.

- ***Travel Time*** If the trip could be made with transit, the approximate travel time of the auto trip and transit trip during a typical weekday morning peak period were compared. Google Maps was used to approximate travel times of the two modes. The trip was deemed to have an existing viable transit option if transit is available and the travel time is less than 30 minutes, or less than two times that of the auto travel time, whichever is greater.

- ***Income Level and Vehicle Ownership*** If transit was deemed a viable option for the trip, average income level and vehicle ownership were compared for frequent transit and non-transit users for the origin zone. California Household Travel Survey (CHTS) data was used to determine income level and vehicle ownership for frequent transit and non-transit users for home-based trips in the morning peak period. To ensure an adequate sample size, trips that began or ended within each zone were considered. Further, some zones were combined to ensure statistical significance of the survey data.

- ***Reliability*** If both the origin and destination zone are along the corridor and transit was deemed a viable option, auto and transit reliability were compared. Reliability is a metric used to quantify the variance in travel time for various sections along the corridor. For this analysis, the average reliability for the traversed sections of San Pablo Avenue are presented.

- ***Comfort Level*** Similar to reliability, if both the origin and destination zone are along the corridor and transit was deemed a viable option, the "comfort level" of the transit trip was determined. The maximum load factor for the available transit option, either BART or AC Transit bus service along San Pablo Avenue, was used to determine the level of comfort of the trip. A maximum load factor equal to or less than 0.75, meaning everyone has a seat on transit and approximately 25 percent of

seats are vacant, is classified as a "high level of comfortability". A maximum load factor greater than 0.75 and less than or equal to 1.0, meaning everyone has a seat but most likely someone is sitting next to them, is considered a "medium level of comfortability". A maximum load factor greater than 1.0, meaning standing room only, is considered a "low level of comfortability".

Hilltop Drive to Road 20 (Middle Filter 8)

Middle Filter 8 is located along San Pablo Avenue between Road 20 in the City of San Pablo and Hilltop Drive in the City of Richmond. This middle filter is primarily serving vehicles, with only one-percent of all motorized person trips taken on transit. **Figure G-3** presents the primary origin-destination pairs of vehicles and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- Approximately 70 percent of southbound trips originate in the cities of San Pablo or Pinole.
- Approximately 25 percent of southbound trips end in West Richmond. Similarly, approximately 30 percent of northbound trips originate in West Richmond.
- Approximately 15 percent of southbound trips originate within one half mile of the study corridor in the City of San Pablo, versus 30 percent of northbound trips.
- This portion of the corridor is used equally for pass through trips as it is for trips whose destination is along the corridor, in both the northbound and southbound directions.

Walkable and Bikeable Trips

Approximately six-percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. **Table 58** breaks these potential trips down into northbound and southbound trips, and walk and bike trips.

Table 58
Middle Filter 8 Potential Walk and Bike Trips

Mode	Northbound		Southbound		Total
	Trips	Percent of Total	Trips	Percent of Total	
Walk	20	0.4%	10	0.2%	30
Bike	220	4%	310	6%	530
Total	***240***	***4%***	***320***	***6%***	***560***

Auto Trips with Transit Potential

Table 59 provides the top northbound and southbound origin-destination pairs for Middle Filter 8 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 60** introduces typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone.

Table 59
Middle Filter 8 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)		Is Transit an Existing Viable Option?
				Auto	Transit	
900	West Richmond	Hilltop Mall	No	15	50	No
700	San Pablo	Carquinez Bridge	No	10	85	No
600	San Pablo Half Mile	Pinole	No	12	54	No
500	Pinole	West Richmond	No	25	75	No
300	San Pablo	West Richmond	No	20	45	No
300	San Pablo	Northwest Oakland	No	45	90	Yes

Table 60
Middle Filter 8 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
San Pablo	Northwest Oakland	$50,000 to $74,999	2.4	$50,000 to $74,999	2.4

As shown in **Table 59**, only one auto origin-destination pair has an existing viable transit option. Demographics data in **Table 60** indicates that non-transit and transit-users within San Pablo share similar income and vehicle ownership characteristics, implying that based solely on demographics, City of San Pablo residents who currently drive could be a target group for mode shift to transit.

Additionally, approximately 1,200 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially

have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

Road 20 to Interstate 80/Nevin Road (Middle Filter 7)

Middle Filter 7 is located along San Pablo Avenue between Interstate 80/Nevin Road in the City of Richmond and Road 20 in the City of San Pablo. This middle filter is primarily serving autos, however, when compared to Middle Filter 8 there is a four percent increase in transit mode share (one percent to five percent) due to the proximity of the Richmond BART station. **Figure G-4** presents the primary origin-destination pairs of vehicles and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- The majority of trips that traverse this sub-area of the corridor in both the northbound and southbound direction are pass-through trips, with the majority of these trips travelling between the Bay Bridge and Carquinez Bridge.
- Approximately 20 percent of southbound trips originate in the City of Pinole or the City of San Pablo and have destinations within one half mile of San Pablo Avenue.
- Total vehicle trips along this segment increase 80 percent over Middle Filter 8, largely due to convenient freeway access adjacent to this segment of the Project Corridor.

Walkable and Bikeable Trips

As shown in **Table 61**, approximately eight percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The potential trips are broken down into northbound and southbound trips, and walk and bike trips.

Table 61
Middle Filter 7 Potential Walk and Bike Trips

Mode	Northbound		Southbound		Total
	Trips	Percent of Total	Trips	Percent of Total	
Walk	30	1%	50	0.4%	80
Bike	430	7%	980	8%	1,410
Total	***460***	***8%***	***1,030***	***8%***	***1,490***

Auto Trips with Transit Potential

Table 62 provides the top northbound and southbound origin-destination pairs for Middle Filter 7 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 63**

provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone.

Table 62
Middle Filter 7 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)[1]		Is Transit an Existing Viable Option?
				Auto	Transit	
1,700	Bay Bridge	Carquinez Bridge	No	--	--	No
400	Bay Bridge	Pinole	No	40	80	Yes
200	East Berkeley	Carquinez Bridge	No	--	--	No
1,800	Carquinez Bridge	Bay Bridge	No	--	--	No
600	Pinole	Bay Bridge	No	60	90	Yes
400	San Pablo	Bay Bridge	No	60	75	Yes

Notes:
1. Travel times not presented for origin-destination pairs where there is no existing transit route.

Table 63
Middle Filter 7 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
Pinole	Bay Bridge	$50,000 to $74,999	2.1	$75,000 to $99,999	2.1
San Pablo	Bay Bridge	$50,000 to $74,999	2.4	$50,000 to $74,999	2.4
Bay Bridge[1]	Pinole	--	--	--	--

Notes:
1. No data could be pulled for gateway zones, as there is no certainty in where these trips originate.

As shown in **Table 62**, three origin-destination pairs have existing viable transit options. Demographics data indicates that non-transit and transit-users within the City of San Pablo share similar income and vehicle ownership characteristics, implying that based

solely on demographics, those who currently drive from this area could be a target group for mode shift to transit. In the City of Pinole, non-transit and transit user demographics show transit users are in a higher income bracket than non-transit users, suggesting that existing transit is serving destinations with higher paying jobs and that there may be demand for transit options to areas with lower paying jobs.

Additionally, approximately 800 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

Interstate 80/Nevin Road to Alameda/Contra Costa County Line (Middle Filter 6)

Middle Filter 6 is located along San Pablo Avenue between the Alameda/Contra Costa County Line and Interstate 80/Nevin Road in the City of Richmond. This middle filter is predominantly serving autos, however, transit person trip mode share is 15 percent in the northbound direction and 20 percent in the southbound direction due to the proximity of both the El Cerrito del Norte and El Cerrito Plaza BART stations. **Figure G-5** presents the primary origin-destination pairs of vehicles and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- The top destination for trips traversing this segment of the Project Corridor in the southbound direction is the El Cerrito Plaza BART Station.
- In the northbound direction, the top trip origin is the Richmond East Half Mile zone, which borders Middle Filter 6 to the east. This demonstrates that this portion of the corridor is "exporting" a significant number of trips in the northbound direction.
- Trips are for the most part evenly distributed between the four trip types ("Pass-Through", "Outside Area to Corridor", "Corridor to Outside Area", and "Corridor-to-Corridor") in both the northbound and southbound directions.

Walkable and Bikeable Trips

As shown in **Table 64**, approximately 12 percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The potential trips are broken down into northbound and southbound trips, and walk and bike trips.

Table 64 Middle Filter 6 Potential Walk and Bike Trips					
Mode	**Northbound**		**Southbound**		**Total**
	Trips	**Percent of Total**	**Trips**	**Percent of Total**	
Walk	50	1%	150	1%	200
Bike	550	10%	2010	11%	2,560
Total	***600***	***11%***	***2,160***	***12%***	***2,760***

Auto Trips with Transit Potential

Table 65 provides the top northbound and southbound origin-destination pairs for Middle Filter 6 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 66** provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone.

Table 65 Middle Filter 6 Auto Trips with Potential Transit Flexibility						
Trips	**Origin Zone**	**Destination Zone**	**Corridor-to-Corridor Trip?**	**Travel Time (min)[1]**		**Is Transit an Existing Viable Option?**
				Auto	**Transit**	
600	Richmond East Half Mile	West Richmond	No	15	30	Yes
300	East Richmond	West Richmond	No	15	40	No
300	East Berkeley	Richmond Bridge	No	50	110	No
600	Richmond West Half Mile	West Oakland	No	30	45	Yes
600	Richmond Portola Dr Area	East Berkeley	No	25	60	No
500	Richmond Bridge	El Cerrito BART	No	--	--	No

Notes:
1. Travel times not presented for origin-destination pairs where there is no existing transit route.

Table 66
Middle Filter 6 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
Richmond East Half Mile	West Richmond	$35,000 to $49,999	1.7	$100,000 to $149,999	1.8
Richmond West Half Mile	West Oakland	$50,000 to $74,999	2.2	$50,000 to $74,999	1.5

As shown in **Table 65**, two origin-destination pairs have existing viable transit options. Demographics data in **Table 66** indicates that non-transit and transit-users within the Richmond West Half Mile zone share similar income and vehicle ownership characteristics, implying that based solely on demographics, those who currently drive from this area could be a target group for mode shift to transit. Non-transit and transit user demographics in the Richmond East Half Mile zone show transit users are in a significantly higher income bracket than non-transit users, suggesting that existing transit is serving destinations with higher paying jobs and that there may be demand for transit options to areas with lower paying jobs, similar to the findings for Middle Filter 7.

Additionally, approximately 5,300 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

Alameda/Contra Costa County Line to University Avenue (Middle Filter 5)

Middle Filter 5 is located along San Pablo Avenue between University Avenue in the City of Berkeley and the Alameda/Contra Costa County Line. This middle filter is primarily serving vehicles, with a transit person trip mode split of seven percent in the northbound direction and 15 percent in the southbound direction. The North Berkeley BART Station is located on the east side of Middle Filter 5. **Figure G-6** presents the primary origin-destination pairs of auto trips and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- Approximately 70 percent and 45 percent of auto trips that traverse this segment of San Pablo Avenue in the northbound and southbound direction, respectively, originate in the City of Berkeley.
    - Of those northbound trips, approximately 40 percent originate within the project corridor in Berkeley.

    - Of those southbound trips, approximately 75 percent originate within the project corridor in Berkeley.
- The primary destination for trips traversing this segment of San Pablo Avenue in both directions is the one half mile San Pablo Avenue study area within the City of Berkeley in both directions.
- In both directions, the one half mile San Pablo Avenue study area within the City of Berkeley is the greatest importer and exporter of trips.

Walkable and Bikeable Trips

As shown in **Table 67**, approximately 11 percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The following table breaks these potential trips down into northbound and southbound trips, and walk and bike trips.

Table 67
Middle Filter 5 Potential Walk and Bike Trips

	Northbound		**Southbound**		
Mode	**Trips**	**Percent of Total**	**Trips**	**Percent of Total**	**Total**
Walk	20	0.3%	40	0.3%	60
Bike	330	6%	1590	13%	1,920
Total	***350***	***6%***	***,630***	***13%***	***,980***

Auto Trips with Transit Potential

Table 68 provides the top northbound and southbound origin-destination pairs for Middle Filter 5 and indicates whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 69** provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone. **Table 70** provides auto and transit reliability and comfort data for the vehicle origin-destination pair that is travelling from one part of the Study Area to another that also has an existing viable transit option.

Table 68
Middle Filter 5 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)		Is Transit an Existing Viable Option?
				Auto	Transit	
400	Berkeley West Half Mile	East Berkeley	No	18	35	Yes
200	East Berkeley	West Richmond	No	40	60	Yes
100	Berkeley East Half Mile	El Cerrito BART	Yes	20	35	Yes
600	Berkeley East Half Mile	Bay Bridge	No	20	50	No
500	Berkeley East Half Mile	Emeryville Half Mile	Yes	10	50	No
500	East Berkeley	Berkeley West Half Mile	No	15	35	Yes

Table 69
Middle Filter 5 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
East Berkeley	Berkeley West Half Mile, West Richmond, and Berkeley West Half Mile	$75,000 to $99,999	1.7	$75,000 to $99,999	1.5
Berkeley East Half Mile	El Cerrito BART	$50,000 to $74,999	1.5	$75,000 to $99,999	1.6

Table 70
Middle Filter 5 Corridor-to-Corridor Trip Reliability and Comfort Comparison

Origin Zone	Destination Zone	Auto Reliability	Transit Reliability	Transit Comfort[1]
Berkeley East Half Mile	El Cerrito BART	High	Medium-High	Low (High)

Notes:
1. AC Transit Bus Service (BART Service)

As shown in **Table 68**, four origin-destination pairs have existing viable transit options. Demographics data in **Table 69** indicates that non-transit and transit-users within East Berkeley share similar income and vehicle ownership characteristics, implying that based solely on demographics, those who currently drive from this area could be a target group for mode shift to transit.

Non-transit and transit user demographics in the Berkeley East Half Mile zone show transit users are in a higher income bracket than non-transit users, similar to Middle Filters 6 and 7. However, while auto and transit reliability are comparable, **Table 70** indicates there is a low level of comfort when taking bus service, and a high level of comfort when riding BART along this segment of San Pablo Avenue. This suggests that investments to bus service, the more cost-effective transit option, could lead to mode shifts in this segment of San Pablo Avenue.

Additionally, approximately 4,800 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

University Avenue to Ashby Avenue (Middle Filter 4)

Middle Filter 4 is located along San Pablo Avenue between Ashby Avenue and University Avenue in the City of Berkeley. This middle filter is primarily serving autos, with almost 100 percent of motorized person trips taken in private vehicles. **Figure G-7** presents the primary origin-destination pairs of vehicle trips and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- In the southbound direction, approximately 25 percent of trips originate in the one half mile Study Area east of San Pablo Avenue in the City of Berkeley and travel to South Oakland, the Bay Bridge, and the one half mile Study Area in Emeryville.
- Similarly, in the northbound direction, approximately 25 percent of trips originate in the one half mile study area west of San Pablo Avenue in the City of San Pablo and the Berkeley Bowl Area in the City of Berkeley, with the majority of their destinations within the City of Berkeley.

- There is far less vehicular volume on this section of San Pablo Avenue than along other parts of San Pablo Avenue, with almost a 50 percent reduction in vehicle trips compared to Middle Filter 5.

Walkable and Bikeable Trips

As shown in **Table 71**, approximately 12 percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The following table breaks these potential trips down into northbound and southbound trips, and walk and bike trips.

Table 71
Middle Filter 4 Potential Walk and Bike Trips

	Northbound		Southbound		
Mode	**Trips**	**Percent of Total**	**Trips**	**Percent of Total**	**Total**
Walk	30	1%	20	0.4%	50
Bike	420	10%	630	13%	1,050
Total	***450***	***11%***	***650***	***13%***	***1,100***

Auto Trips with Transit Potential

Table 72 provides the top northbound and southbound origin-destination pairs for Middle Filter 4 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 73** provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone. **Table 74** presents auto and transit reliability and comfort data for the vehicle origin-destination pairs that are travelling from one part of the half mile study area to another that also have existing viable transit options.

Table 72
Middle Filter 4 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)		Is Transit an Existing Viable Option?
				Auto	Transit	
300	Berkeley Bowl Area	Berkeley West Half Mile	Yes	18	35	Yes
200	Berkeley West Half Mile	East Berkeley	No	18	50	No
200	Caldecott Tunnel	Berkeley West Half Mile	No	24	150	No
600	Berkeley East Half Mile	South Oakland	No	25	50	Yes
500	Berkeley East Half Mile	Emeryville Half Mile	Yes	10	20	Yes
500	East Berkeley	Berkeley West Half Mile	No	15	35	Yes

Table 73
Middle Filter 4 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
Berkeley Bowl Area[1]	Berkeley West Half Mile	--	--	--	--
Berkeley East Half Mile	South Oakland, Emeryville Half Mile	$50,000 to $74,999	1.5	$75,000 to $99,999	1.6
East Berkeley	Berkeley West Half Mile	$75,000 to $99,999	1.7	$75,000 to $99,999	1.5

Notes:
1. This zone did not have a large enough sample size to present demographics data from CHTS.

Table 74
Middle Filter 4 Corridor-to-Corridor Trip Reliability and Comfort Comparison

Origin Zone	Destination Zone	Auto Reliability	Transit Reliability	Transit Comfort
Berkeley Bowl Area	Berkeley West Half Mile	High	Medium-High	Medium
Berkeley East Half Mile	Emeryville Half Mile	High	Medium	Low

As shown in **Table 72**, four origin-destination pairs have existing viable transit options. Demographics data in **Table 73** indicates that non-transit and transit-users within East Berkeley share similar income and vehicle ownership characteristics, implying that based solely on demographics, those who currently drive from this area could be a target group for mode shift to transit. Non-transit and transit user demographics in the Berkeley East Half Mile zone show transit users are in a higher income bracket than non-transit users, suggesting that existing transit is serving destinations with higher paying jobs and that there may be demand for transit options to areas with lower paying jobs, similar to the findings for Middle Filters 5, 6, and 7.

Additionally, as shown in **Table 74**, for the two origin-destination pairs that are corridor-to-corridor, transit is a lesser option in regards to reliability and comfort than driving due to slow and congested bus service.

Additionally, approximately 2,900 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

Ashby Avenue to Interstate 580 (Middle Filter 3)

Middle Filter 3 is located along San Pablo Avenue between the Interstate 580 in the City of Oakland and Ashby Avenue in the City of Berkeley. This middle filter is primarily serving vehicles, however, 40 percent of southbound and 25 percent of northbound motorized person trips are taken with transit due to the presence of the Ashby and MacArthur BART Stations. **Figure G-8** presents the primary origin-destination pairs of autos and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- Approximately 50 percent of trips traversing this segment of San Pablo Avenue travelling southbound originate in areas within the half mile study area and are travelling across the Bay Bridge or have destinations in Oakland or Emeryville.
- For trips travelling along this segment of San Pablo Avenue in the northbound direction, the primary travel pattern is from either the Bay Bridge or the Caldecott

Tunnel to the half mile study area in Emeryville, most likely due to the large employment center in Emeryville.

- Convenient freeway access reintroduces pass-through trips, making up 40 percent of both southbound and northbound trips.

Walkable and Bikeable Trips

As shown in **Table 75**, approximately 12 percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The following table breaks these potential trips down into northbound and southbound trips, and walk and bike trips.

Table 75
Middle Filter 3 Potential Walk and Bike Trips

	Northbound		Southbound		
Mode	**Trips**	**Percent of Total**	**Trips**	**Percent of Total**	**Total**
Walk	80	1%	70	1%	150
Bike	550	7%	950	14%	1,500
Total	***630***	***8%***	***,020***	***15%***	***1,650***

Auto Trips with Transit Potential

Table 76 provides the top northbound and southbound origin-destination pairs for Middle Filter 3 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 77** provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone.

Table 76
Middle Filter 3 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)[1]		Is Transit an Existing Viable Option?
				Auto	Transit	
700	Caldecott Tunnel	Emeryville Half Mile	No	--	--	No
400	Bay Bridge	East Berkeley	No	45	50	Yes
300	Bay Bridge	UC Berkeley	No	45	42	Yes
600	East Berkeley	Bay Bridge	No	40	50	Yes
400	Berkeley East Half Mile	Bay Bridge	No	20	50	No
400	Berkeley East Half Mile	South Oakland	No	25	50	Yes

Notes:
1. Travel times not presented for origin-destination pairs where there is no existing transit route.

Table 77
Middle Filter 3 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
Bay Bridge[1]	East Berkeley, UC Berkeley	--	--	--	--
East Berkeley	Bay Bridge	$75,000 to $99,999	1.7	$75,000 to $99,999	1.5
Berkeley East Half Mile	South Oakland	$50,000 to $74,999	1.5	$75,000 to $99,999	1.6

Notes:
1. No data could be pulled for gateway zones, as there is no certainty in where these trips originate.

As shown in **Table 76**, four origin-destination pairs have existing viable transit options. Demographics data indicates that non-transit and transit-users within East Berkeley share similar income and vehicle ownership characteristics, implying that based solely on demographics, those who currently drive from this area could be a target group for mode shift to transit. Non-transit and transit user demographics in the Berkeley East Half Mile

zone show transit users are in a higher income bracket than non-transit users, suggesting that existing transit is serving destinations with higher paying jobs and that there may be demand for transit options to areas with lower paying jobs, similar to the findings for Middle Filters 4, 5, 6, and 7.

Additionally, approximately 2,000 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

Interstate 580 to West Grand Avenue (Middle Filter 2)

Middle Filter 2 is located along San Pablo Avenue between West Grand Avenue and Interstate 580 in the City of Oakland. This middle filter is primarily serving vehicles, with almost 95 percent of motorized person trips taken in private vehicles. **Figure G-9** presents the primary origin-destination pairs of vehicles and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- For vehicles travelling northbound in this segment of San Pablo Avenue, almost 50 percent of trips have destinations in Emeryville, with the majority of those trips originating in the Oakland area.
- In the southbound direction, approximately 40 percent of trips end in Downtown Oakland, primarily travelling from the Bay Bridge and from within the half mile study area.
- The majority of trips along this segment of the corridor are confined to Berkeley, Emeryville, and Oakland.
- Over 30 percent of northbound trips are pass-through trips along this segment of San Pablo Avenue, with the primary pass-through travel patterns between South Oakland/City of Alameda and the City of Emeryville, which are in close proximity to the project corridor and half mile study area.

Walkable and Bikeable Trips

As shown in **Table 78**, approximately eight percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The following table breaks these potential trips down into northbound and southbound trips, and walk and bike trips.

Table 78
Middle Filter 2 Potential Walk and Bike Trips

Mode	Northbound		Southbound		Total
	Trips	Percent of Total	Trips	Percent of Total	
Walk	10	1%	10	0.3%	20
Bike	190	9%	260	7%	450
Total	***200***	***10%***	***270***	***7%***	***470***

Auto Trips with Transit Potential

Table 79 provides the top northbound and southbound origin-destination pairs for Middle Filter 2 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 80** provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone. **Table 81** presents auto and transit reliability and comfort data for the vehicle origin-destination pairs that are travelling from one part of the half mile study area to another, and have existing viable transit options.

Table 79
Middle Filter 2 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)[1]		Is Transit an Existing Viable Option?
				Auto	Transit	
100	South Oakland	Emeryville Half Mile	No	25	50	Yes
100	Downtown Oakland	Berkeley West Half Mile	Yes	25	35	Yes
100	Alameda	Emeryville	No	20	60	No
1000	Bay Bridge	Downtown Oakland	No	20	25	Yes
300	Richmond Bridge	Downtown Oakland	No	--	--	No
200	Berkeley West Half Mile	Downtown Oakland	Yes	20	35	Yes

Notes:
1. Travel times not presented for origin-destination pairs where there is no existing transit route.

Table 80 Middle Filter 2 Trips with Existing Viable Transit Options					
		Non-Transit Users		**Transit Users**	
Origin Zone	**Destination Zone**	**Income**	**Number of Vehicles**	**Income**	**Number of Vehicles**
South Oakland	Emeryville Half Mile	$50,000 to $74,999	1.8	$50,000 to $74,999	1.7
Downtown Oakland	Berkeley West Half Mile	$75,000 to $99,999	2.3	$75,000 to $99,999	1.5
Bay Bridge[1]	Downtown Oakland	--	--	--	--
Berkeley West Half Mile	Downtown Oakland	$100,000 to $149,999	2.1	$75,000 to $99,999	1.9

Notes:
1. No data could be pulled for gateway zones, as there is no certainty in where these trips originate.

Table 81 Middle Filter 2 Corridor-to-Corridor Trip Reliability and Comfort Comparison				
Origin Zone	**Destination Zone**	**Auto Reliability**	**Transit Reliability**	**Transit Comfort**
Downtown Oakland	Berkeley West Half Mile	High	Medium-High	Low
Berkeley West Half Mile	Downtown Oakland	High	Medium	Low

As shown in **Table 79**, four origin-destination pairs have existing viable transit options. Demographics data in **Table 80** indicates that non-transit and transit-users within South Oakland share similar income and vehicle ownership characteristics, implying that based solely on demographics, those who currently drive from this area could be a target group for mode shift to transit. However, demographics of Downtown Oakland show that the number of vehicles available is much higher for non-transit users. Given this, and the already high transit mode split in Downtown Oakland, these trips may not have as much mode flexibility and may not be the best target group for mode shift. Additionally, as shown in **Table 81**, auto reliability along this middle filter is high likely due to congestion on nearby freeways metering traffic into Downtown Oakland and arterial routing options in the area.

Additionally, approximately 2,000 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially

have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

West Grand Avenue to Frank Ogawa Plaza (Middle Filter 1)

Middle Filter 1 is located along San Pablo Avenue between Frank Ogawa Plaza and West Grand Avenue in the City of Oakland. This portion of the Project corridor is primarily served by transit, with only 20 percent of northbound and 30 percent of southbound motorized person trips taken in private vehicles. This is due to a high level of transit accessibility due to several AC Transit routes and the proximity of the 12th Street and 19th Street BART Stations. **Figure G-10** presents the primary origin-destination pairs of vehicles and a breakdown of trip type. The following are key findings from the analysis of trip patterns along this middle filter:

- For trips travelling southbound along this portion of San Pablo Avenue, 80 percent have destinations in Downtown Oakland and are primarily travelling from external gateways and both North and South Oakland.
- Downtown Oakland is the primary origin and destination for trips travelling northbound in this portion of San Pablo Avenue.

Walkable and Bikeable Trips

As shown in **Table 82**, approximately 20 percent of all trips traversing this portion of San Pablo Avenue are trips that are less than two miles in length and have the potential to be walk or bike trips. The following table breaks these potential trips down into northbound and southbound trips, and walk and bike trips.

Table 82
Middle Filter 1 Potential Walk and Bike Trips

Mode	Northbound		Southbound		Total
	Trips	Percent of Total	Trips	Percent of Total	
Walk	110	6.5%	20	0.7%	130
Bike	380	22%	370	13%	750
Total	***490***	***29%***	***390***	***13%***	***880***

Auto Trips with Transit Potential

Table 83 provides the top northbound and southbound origin-destination pairs for Middle Filter 1 and states whether or not the origin-destination pairs have an existing viable transit option. For origin-destination pairs with viable transit options, **Table 84** provides typical income level and number of vehicles per household data for both transit users and non-transit users in each origin zone. **Table 85** presents auto and transit

reliability and comfort data for the vehicle origin-destination pairs that are travelling from one part of the half mile study area to another, and have existing viable transit options.

Table 83
Middle Filter 1 Auto Trips with Potential Transit Flexibility

Trips	Origin Zone	Destination Zone	Corridor-to-Corridor Trip?	Travel Time (min)[1]		Is Transit an Existing Viable Option?
				Auto	Transit	
200	Downtown Oakland	Downtown Oakland	Yes	--	--	Yes
100	Downtown Oakland	Northwest Oakland	No	14	20	Yes
100	Downtown Oakland	Bay Bridge	No	40	35	Yes
500	Bay Bridge	Downtown Oakland	No	20	25	Yes
400	Caldecott Tunnel	Downtown Oakland	No	20	180	No
200	South Oakland	Downtown Oakland	No	15	27	Yes

Notes:
1. Travel times not presented for intra-zonal trips, it is assumed there is an existing viable transit option.

Table 84
Middle Filter 1 Trips with Existing Viable Transit Options

Origin Zone	Destination Zone	Non-Transit Users		Transit Users	
		Income	Number of Vehicles	Income	Number of Vehicles
Downtown Oakland	Downtown Oakland, Northwest Oakland, and Bay Bridge	$75,000 to $99,999	2.3	$75,000 to $99,999	1.5
Bay Bridge	Downtown Oakland	--	--	--	--
South Oakland	Downtown Oakland	$50,000 to $74,999	1.8	$50,000 to $74,999	1.7

Notes:
1. No data could be pulled for gateway zones, as there is no certainty in where these trips originate.

Table 85
Middle Filter 1 Corridor-to-Corridor Trip Reliability and Comfort Comparison

Origin Zone	Destination Zone	Auto Reliability	Transit Reliability	Transit Comfort
Downtown Oakland	Downtown Oakland	High	Medium-High	Low

As shown in **Table 83**, five origin-destination pairs have existing viable transit options. Demographics data in **Table 84** indicates that non-transit and transit-users within South Oakland share similar income and vehicle ownership characteristics, implying that based solely on demographics, those who currently drive from this area could be a target group for mode shift to transit. However, demographics of Downtown Oakland show that the number of vehicles available is much higher for non-transit users. Given this, and the already high transit mode split in Downtown Oakland, these trips may not have as much mode flexibility and may not be the best target group for mode shift.

While this analysis focuses on top origin-destination pairs for this middle filter, vehicle trips that traverse this portion of San Pablo Avenue and both start and end within the Study Area total 700 trips, which could be trips that have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue are made. Additionally, as shown in **Table 815**, auto reliability along this middle filter is high likely due to congestion on nearby freeways metering traffic into Downtown Oakland and arterial routing options in the area.

Additionally, approximately 700 auto trips traverse this segment of San Pablo Avenue that both start and end within the Study Area, representing auto trips that potentially have a fair amount of mode flexibility and could be served by transit if appropriate investments along San Pablo Avenue were made.

Key Conclusions

This section summarizes the key conclusions of the travel market assessment that can help inform the improvement concept development for the Project. This section focuses on identifying existing travel markets that are served by transit but primarily accessed by another mode of travel and existing travel markets that are not served by transit that are primarily accessed by auto. A summary of short origin-destination trip patterns with potential for walk and bike trips is also included.

Existing Auto Travel Markets Served by Transit

Tables 86 through 88 provide a summary of existing travel markets that are served by transit but primarily accessed by another mode of travel. **Table 86** provides a list of travel markets that do not start or end at a zone system gateway (such as the Bay Bridge

or Caldecott Tunnel) and that do not start and end within one half mile of the project corridor (likely local trips that are made along the project corridor).

Table 86
Existing Auto Travel Markets Served by Transit – No Project Corridor or Gateway Travel Markets

Middle Filter	Auto Trips	Origin Zone	Destination Zone
8	300	San Pablo	Northwest Oakland
6	600	Richmond East Half Mile	West Richmond
6	600	Richmond West Half Mile	West Oakland
5	400	Berkeley West Half Mile	East Berkeley
5	200	East Berkeley	West Richmond
5	500	East Berkeley	Berkeley West Half Mile
4	600	Berkeley East Half Mile	South Oakland
4	500	East Berkeley	Berkeley West Half Mile
3	400	Berkeley East Half Mile	South Oakland
2	100	South Oakland	Emeryville Half Mile
1	100	Downtown Oakland	Northwest Oakland
1	200	South Oakland	Downtown Oakland

As shown in **Table 86**, **twelve auto travel markets totaling 4,000 auto trips were identified** that are currently served by transit that could be made more competitive if transit improvements to existing services within the San Pablo Avenue travel shed were provided. Please note that the travel market from East Berkeley to Berkeley West Half Mile was identified along middle filters 4 and 5, but was only counted once to avoid double counting as this travel market likely travels along both middle filters.

Table 87 provides a list of travel markets that start and end within one half mile of the project corridor, representing auto trips that are likely local trips made along the project corridor.

Table 87
Existing Auto Travel Markets Served by Transit – Project Corridor Travel Markets

Middle Filter	Trips	Origin Zone	Destination Zone
5	100	Berkeley East Half Mile	El Cerrito BART
4	300	Berkeley Bowl Area	Berkeley West Half Mile
4	500	Berkeley East Half Mile	Emeryville Half Mile
2	100	Downtown Oakland	Berkeley West Half Mile
2	200	Berkeley West Half Mile	Downtown Oakland
1	200	Downtown Oakland	Downtown Oakland

As shown in **Table 87**, **six auto travel markets totaling 1,400 auto trips were identified** that are currently served by transit that could be made more competitive if transit improvements to existing services along San Pablo Avenue were provided to facilitate person movements along the project corridor.

Table 88 provides a list of travel markets that start or end at a San Pablo Avenue travel shed gateway (such as the Bay Bridge or Caldecott Tunnel), representing auto trips that travel long distances from outside the presumed San Pablo Avenue travel shed.

Table 88
Existing Auto Travel Markets Served by Transit – Gateway Travel Markets

Middle Filter	Trips	Origin Zone	Destination Zone
7	400	Bay Bridge	Pinole
7	600	Pinole	Bay Bridge
7	400	San Pablo	Bay Bridge
3	400	Bay Bridge	East Berkeley
3	300	Bay Bridge	UC Berkeley
3	600	East Berkeley	Bay Bridge
2	1000	Bay Bridge	Downtown Oakland
1	100	Downtown Oakland	Bay Bridge
1	500	Bay Bridge	Downtown Oakland

As shown in **Table 88**, **nine auto travel markets totaling 3,800 auto trips were identified** that are currently served by transit that could be made more competitive if transit improvements to existing services were provided. However, give the length and origins of these trips improvements to facilitate these travel markets are likely outside the scope of the project. Please note that the travel market from Bay Bridge to Downtown Oakland was identified along middle filters 1 and 2, but was only counted once to avoid double counting as this travel market likely travels along both middle filters.

In summary, a total of **18 travel markets totaling 5,400 auto trips were identified** that are currently served by transit that could be made more competitive if transit improvements to existing services within the scope of the project were provided.

Existing Auto Travel Markets not Served by Transit

Tables 89 through 91 provide a summary of existing travel markets that are not served by transit that are primarily accessed by auto. **Table 896** provides a list of travel markets that do not start or end at a zone system gateway (such as the Bay Bridge or Caldecott Tunnel) and that do not start and end within one half mile of the project corridor (likely local trips that are made along the project corridor).

Table 89 Existing Auto Travel Markets not Served by Transit - No Project Corridor or Gateway Travel Markets			
Middle Filter	**Trips**	**Origin Zone**	**Destination Zone**
8	900	West Richmond	Hilltop Mall
8	600	San Pablo Half Mile	Pinole
8	500	Pinole	West Richmond
8	300	San Pablo	West Richmond
6	300	East Richmond	West Richmond
6	600	Richmond Portola Dr Area	East Berkeley
4	200	Berkeley West Half Mile	East Berkeley
2	100	Alameda	Emeryville

As shown in **Table 89**, **eight auto travel markets totaling 3,500 auto trips were identified** that are not currently served by transit that could be if transit services within the San Pablo Avenue travel shed were provided.

Table 90 provides a list of travel markets that start and end within one half mile of the project corridor, representing auto trips that are likely local trips made along the project corridor.

Table 90 Existing Auto Travel Markets not Served by Transit – Project Corridor Travel Markets			
Middle Filter	**Trips**	**Origin Zone**	**Destination Zone**
5	500	Berkeley East Half Mile	Emeryville Half Mile

As shown in **Table 90**, only **one auto travel markets totaling 500 auto trips was identified** that is currently not served by transit that could be if transit services along San Pablo Avenue were provided. The finding of only one major travel market not served by transit indicates that for the most part transit services are already provided along San Pablo Avenue to facilitate person movements to/from the one half mile study are along the project corridor.

Table 91 provides a list of travel markets that start or end at a San Pablo Avenue travel shed gateway (such as the Bay Bridge or Caldecott Tunnel), representing auto trips that travel long distances from outside the presumed San Pablo Avenue travel shed.

Table 91 Existing Auto Travel Markets not Served by Transit – Gateway Travel Markets			
Middle Filter	**Trips**	**Origin Zone**	**Destination Zone**
8	700	San Pablo	Carquinez Bridge
7	1,700	Bay Bridge	Carquinez Bridge
7	200	East Berkeley	Carquinez Bridge
7	1,800	Carquinez Bridge	Bay Bridge
6	300	East Berkeley	Richmond Bridge
6	500	Richmond Bridge	El Cerrito BART
5	600	Berkeley East Half Mile	Bay Bridge
4	200	Caldecott Tunnel	Berkeley West Half Mile
3	700	Caldecott Tunnel	Emeryville Half Mile
3	400	Berkeley East Half Mile	Bay Bridge
2	300	Richmond Bridge	Downtown Oakland
1	400	Caldecott Tunnel	Downtown Oakland

As shown in **Table 91**, **twelve auto travel markets totaling 7,600 auto trips were identified** that are currently not served by transit that could be if transit services were provided. However, give the length and origins of these trips improvements to facilitate these travel markets are likely outside the scope of the project. Please note that the travel market from Berkeley East Half Mile to Bay Bridge was identified along middle filters 5 and 3, but was only counted once to avoid double counting as this travel market likely travels along both middle filters.

In summary, a total of **nine travel markets totaling 4,000 auto trips were identified** that are currently not served by transit that could be if transit services within the scope of the project were provided.

Existing Auto Travel Markets with Potential to Shift to Active Modes

Table 92 provides a summary of origin-destination trip patterns less than one half mile that travel along the project corridor that have the potential to shift to walk trips if improvements were provided.

Table 92 Potential Walk Trips				
Middle Filter	**AM Peak Period**		**PM Peak Period**	
	Northbound	**Southbound**	**Northbound**	**Southbound**
8	18	11	63	47
7	31	48	13	25
6	53	151	77	84
5	22	36	40	16

4	26	22	65	41
3	82	66	61	50
2	14	6	145	111
1	108	20	7	1
Total	354	361	470	377
	1,562			

As shown in **Table 92**, an estimated 1,600 potential auto trips could shift to walk trips if improvements were provided.

Table 93 provides a summary of origin-destination trip patterns less than two miles that travel along the project corridor that have the potential to shift to bike trips if improvements were provided.

Table 93
Potential Bike Trips

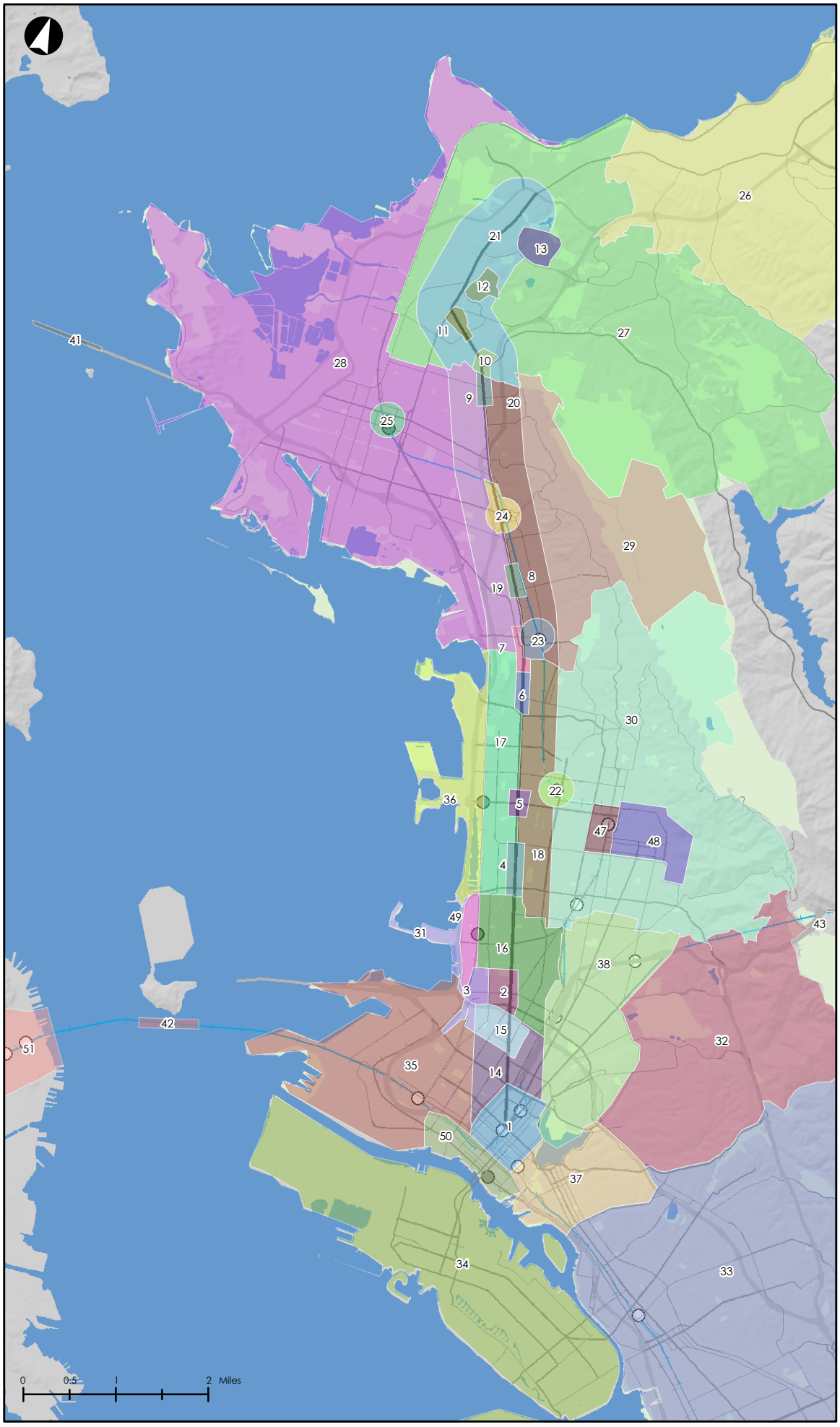
Middle Filter	AM Peak Period		PM Peak Period	
	Northbound	Southbound	Northbound	Southbound
8	218	307	470	473
7	427	975	433	502
6	548	2,009	1,210	619
5	327	1,586	861	464
4	420	627	689	525
3	549	949	735	347
2	191	263	3,154	1,876
1	382	367	199	71
Total	3,062	7,083	7,751	4,877
	22,773			

As shown in **Table 93**, an estimated 23,000 potential auto trips could shift to bike trips if improvements were provided.

San Pablo Avenue Corridor Project

Figure G-1

Zone System



1. Downtown Oakland
2. Emeryville Home Depot Area
3. Emeryville Target Area
4. Berkeley Bowl Area
5. Berkeley University Ave Area
6. Albany Solano Ave Area
7. El Cerrito Plaza Area
8. Richmond Portola Dr Area
9. Richmond McBryde Area
10. San Pablo Town Center
11. San Pablo Church Lane Area
12. Contra Costa College
13. Hilltop Mall
14. Oakland Half Mile South
15. Oakland Half Mile North
16. Emeryville Half Mile
17. Berkeley West Half Mile
18. Berkeley East Half Mile
19. Richmond West Half Mile
20. Richmond East Half Mile
21. San Pablo Half Mile
22. North Berkeley BART
23. El Cerrito BART
24. El Cerrito Del Norte BART
25. Richmond BART
26. Pinole
27. San Pablo
28. West Richmond
29. East Richmond
30. East Berkeley
31. Emeryville
32. North Oakland
33. South Oakland
34. Alameda
35. West Oakland
36. West Berkeley
37. Cleveland Heights Oakland
38. Northwest Oakland
40. SR 4*
41. Richmond Bridge
42. Bay Bridge
43. Caldecott Tunnel
44. Carquinez Bridge*
45. I-880 South of Oakland*
46. I-580 South of Oakland*
47. Downtown Berkeley
48. UC Berkeley
49. Bay Street Area
50. Jack London Square
51. SF Financial District

*Not shown

BART Station

BART Above/Below Ground

Capitol Corridor Stations

Freight Rail and Capitol Corridor Tracks

Freeways

Water

Parks/Open Space

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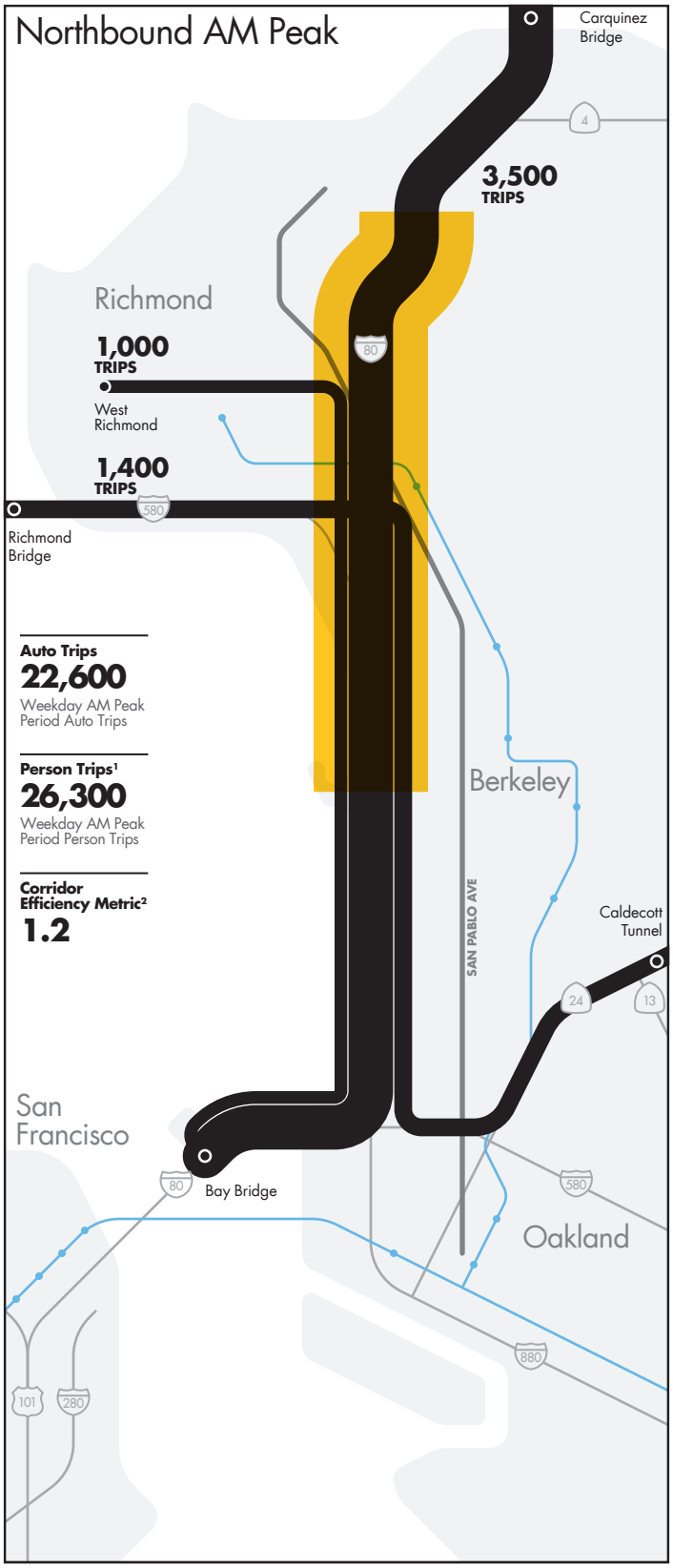

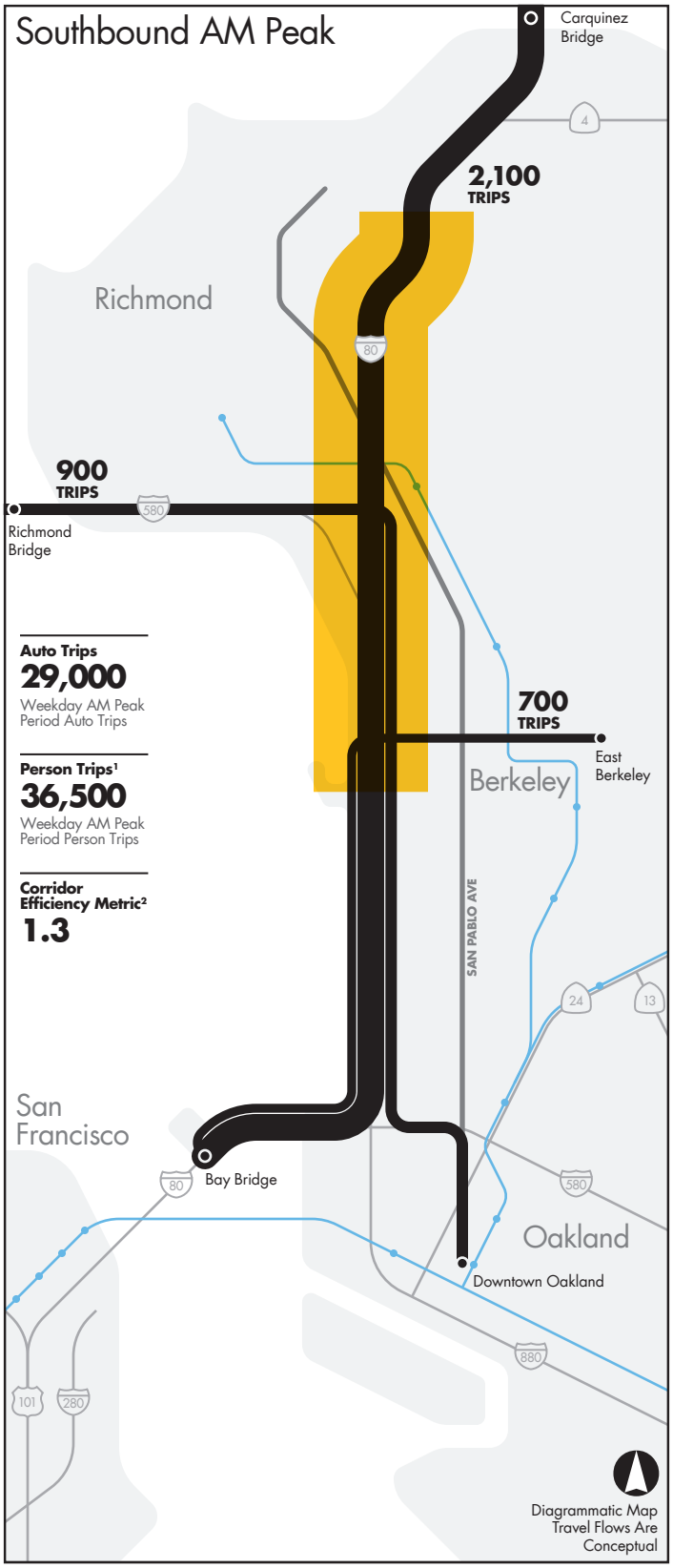

BART Line and Station

Auto Travel Flow

San Pablo Ave Corridor

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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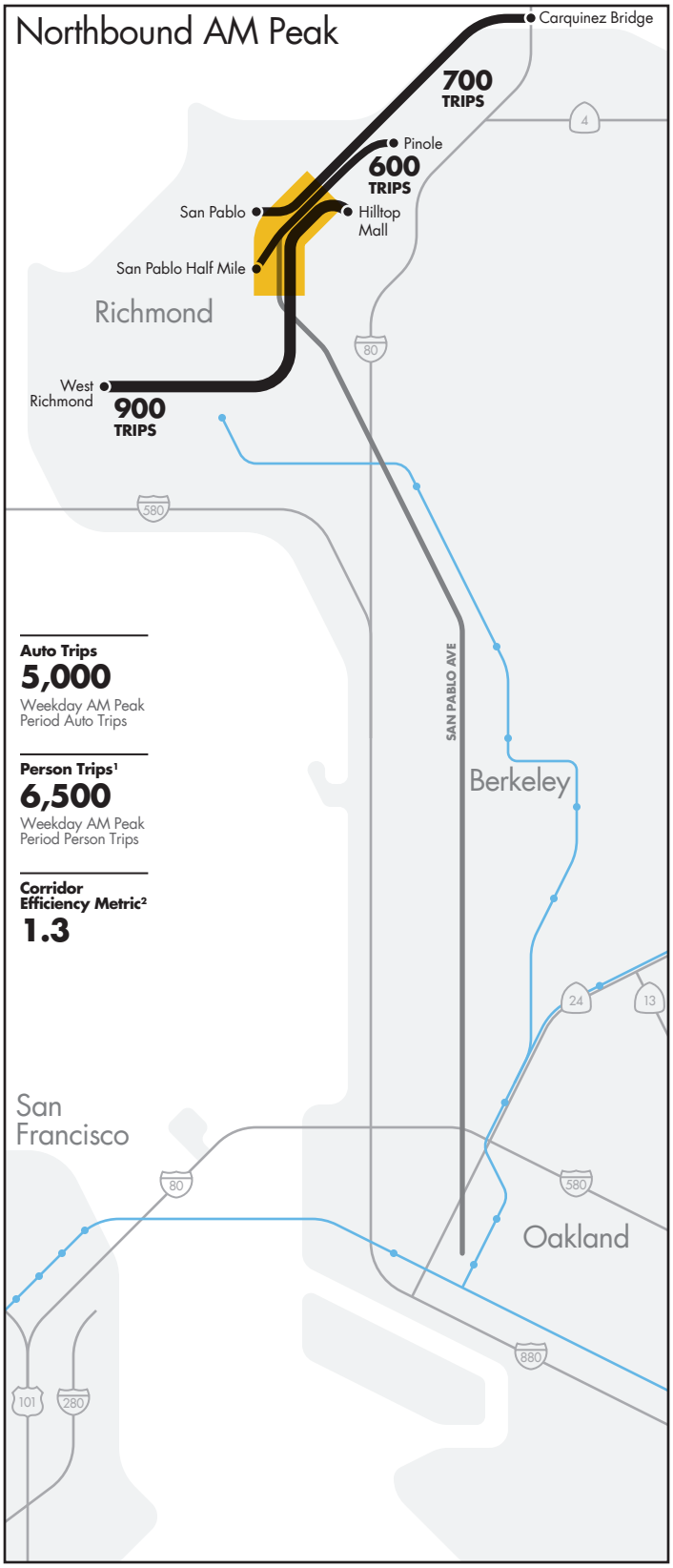
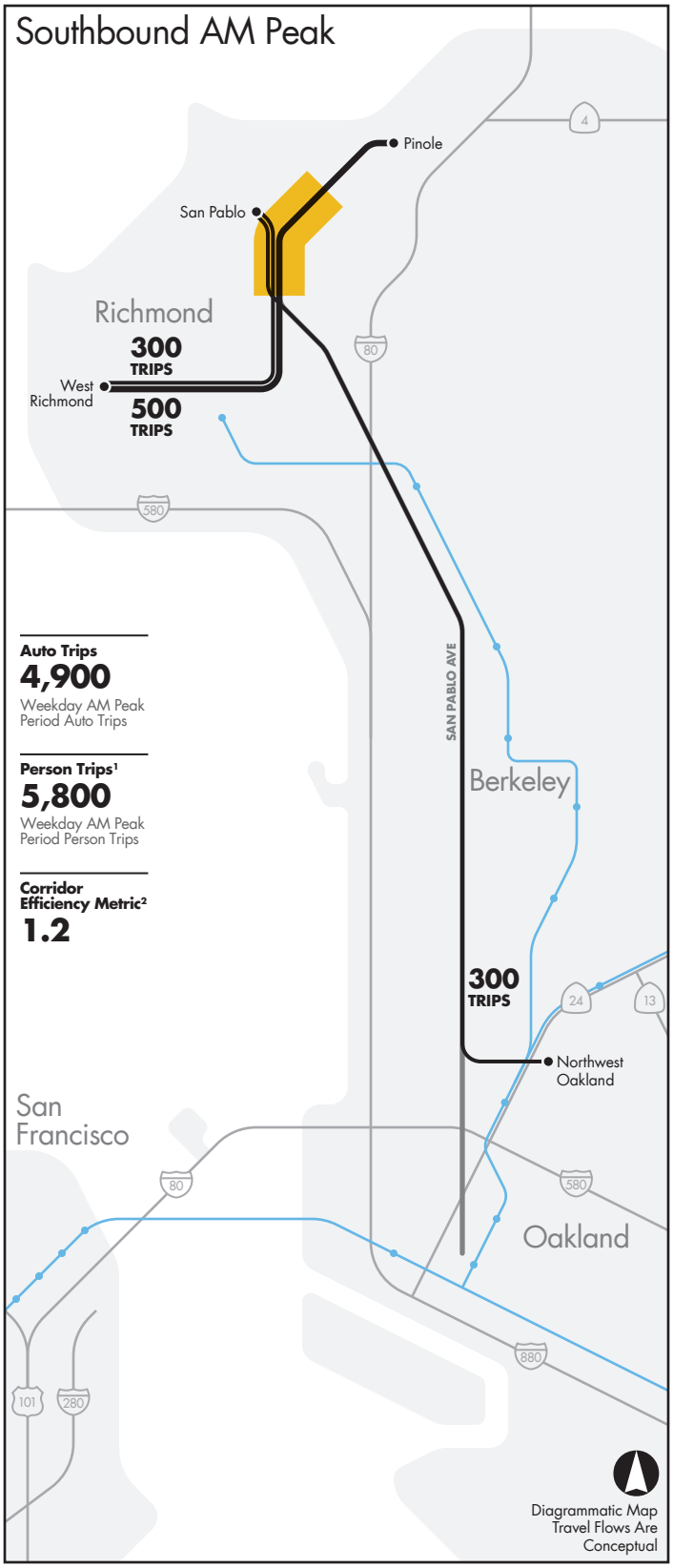
Figure G-2 Top Corridor Auto Travel Markets
Segment 9: I-80 North of University Avenue





[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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Figure G-3 Top Corridor Auto Travel Markets
Segment 8: Road 20 to Hilltop Drive

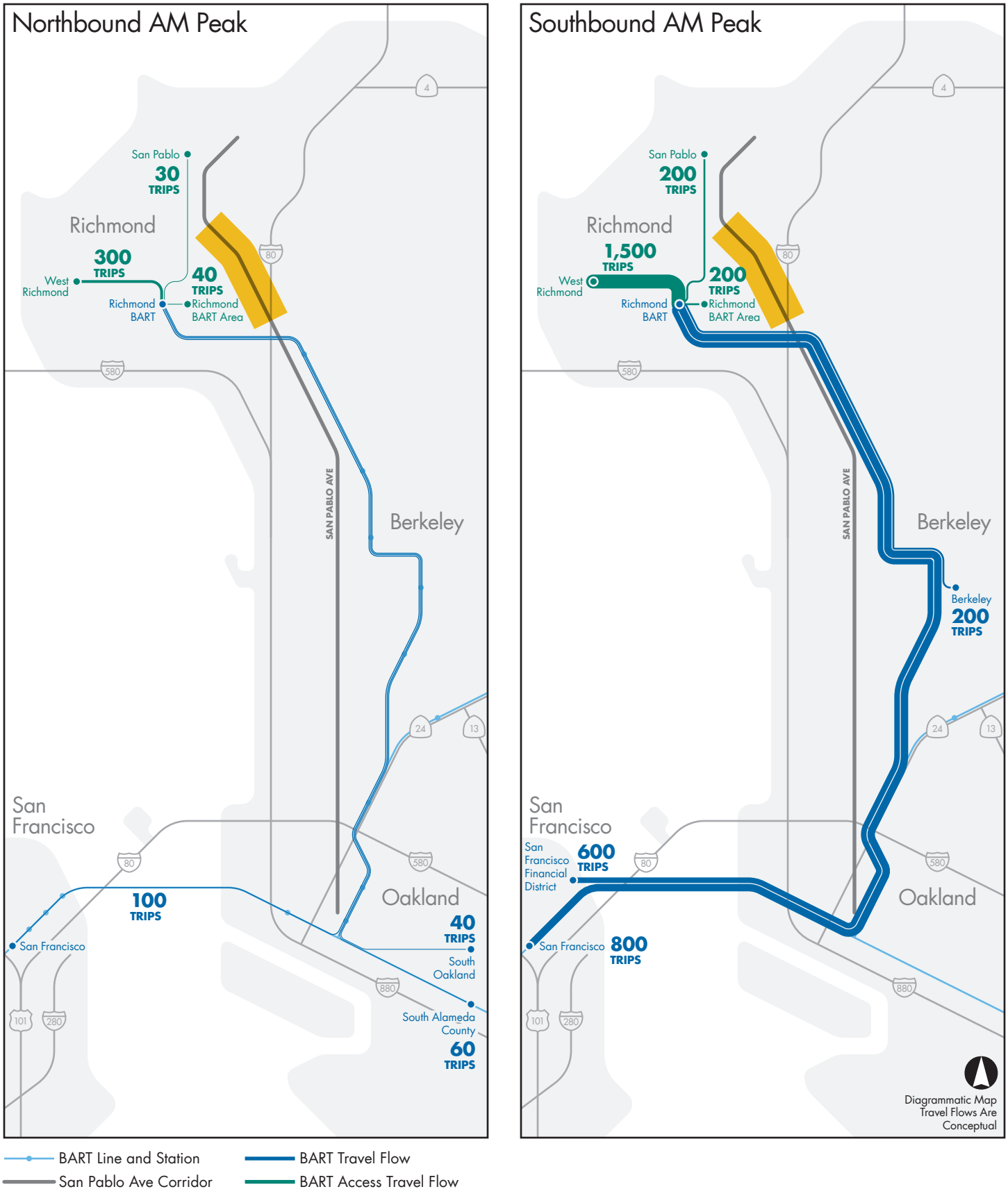

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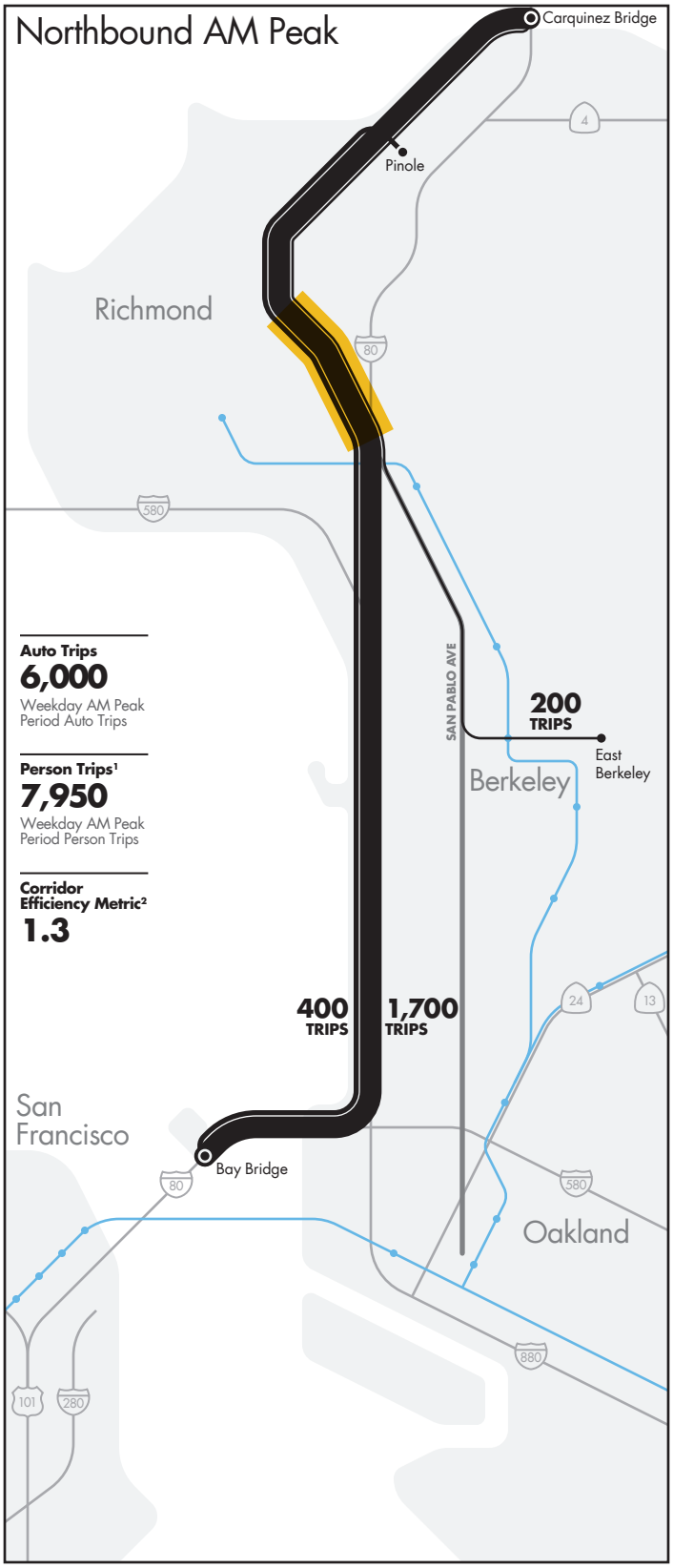
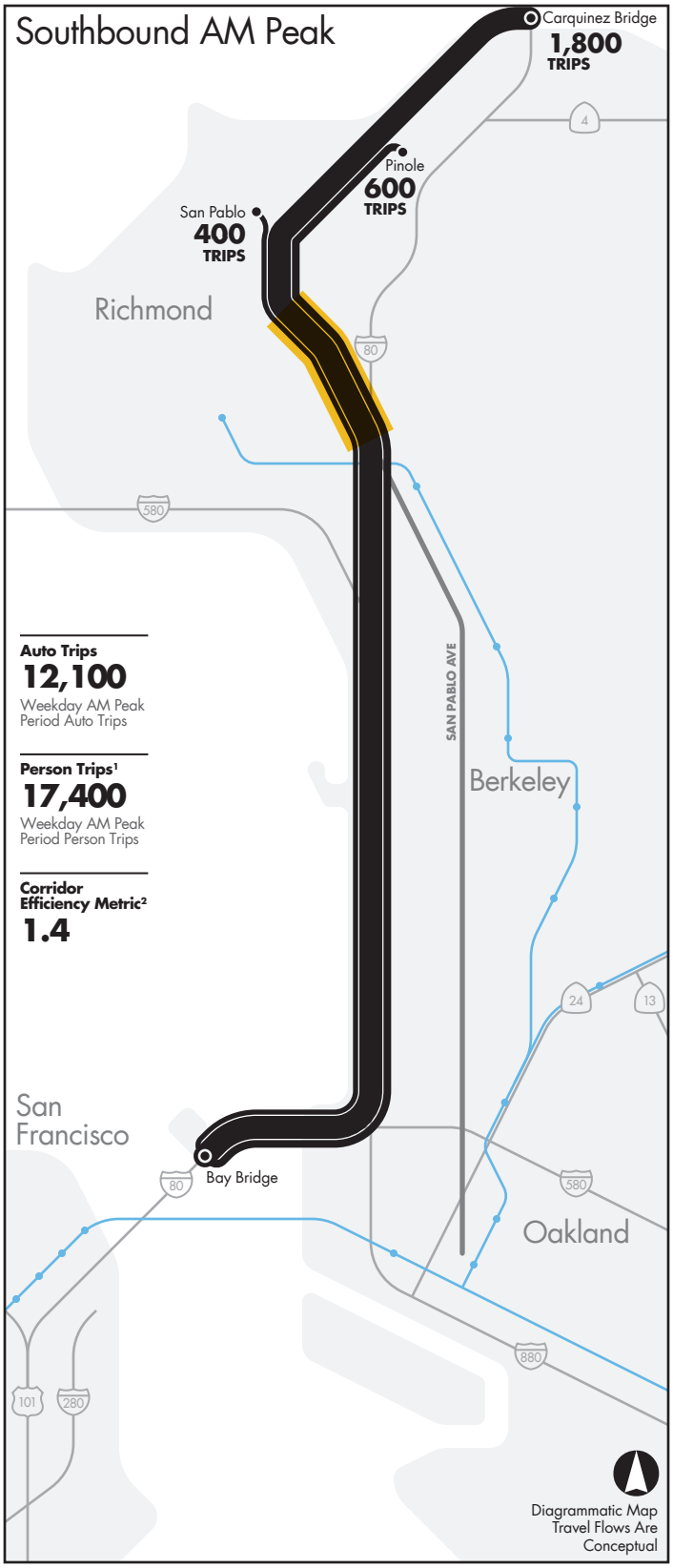
Figure G-4.1 Top Corridor BART Travel Markets
Segment 7: I-80 to Road 20





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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Figure G-4.2 Top Corridor Auto Travel Markets Segment 7: I-80 to Road 20

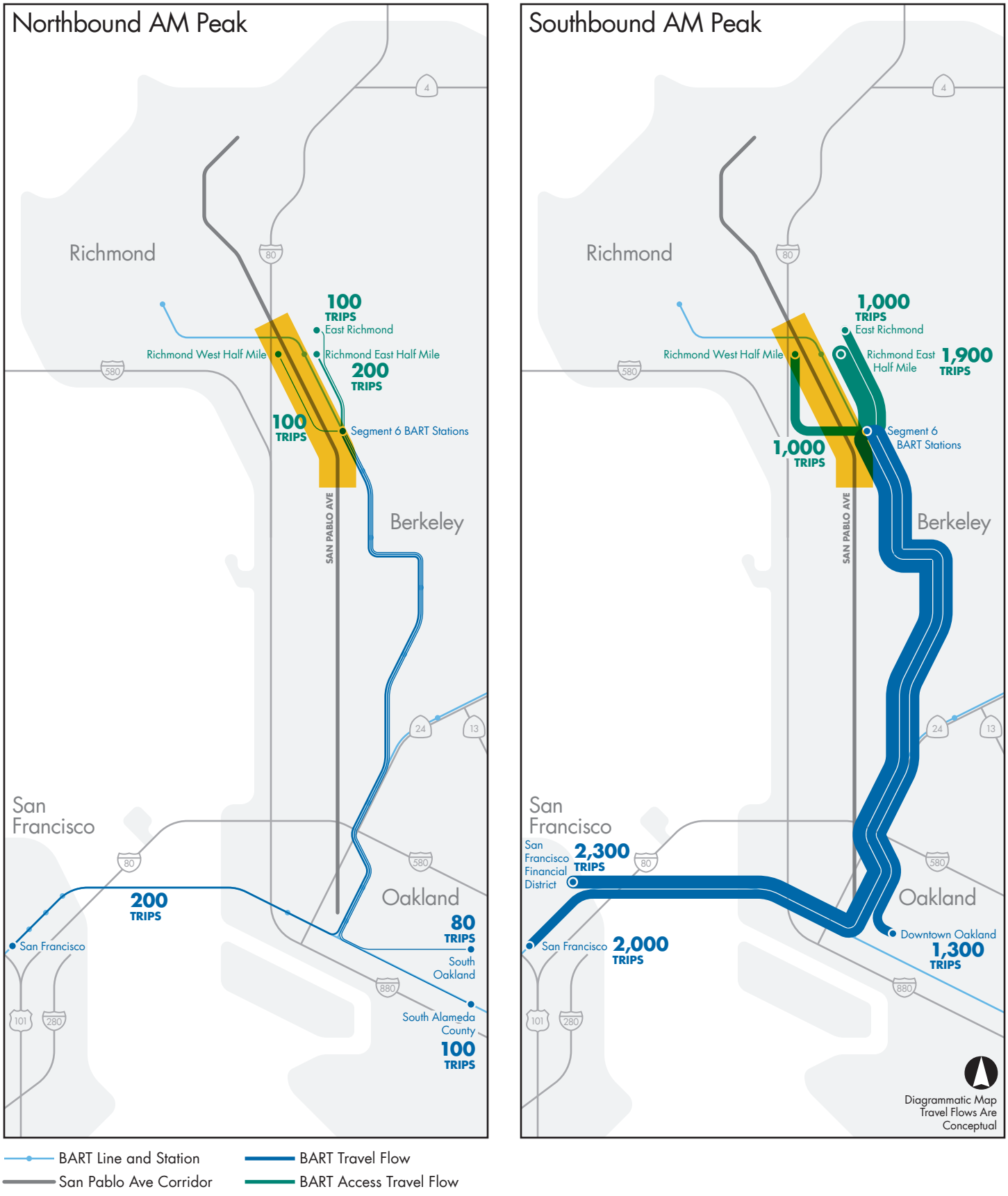

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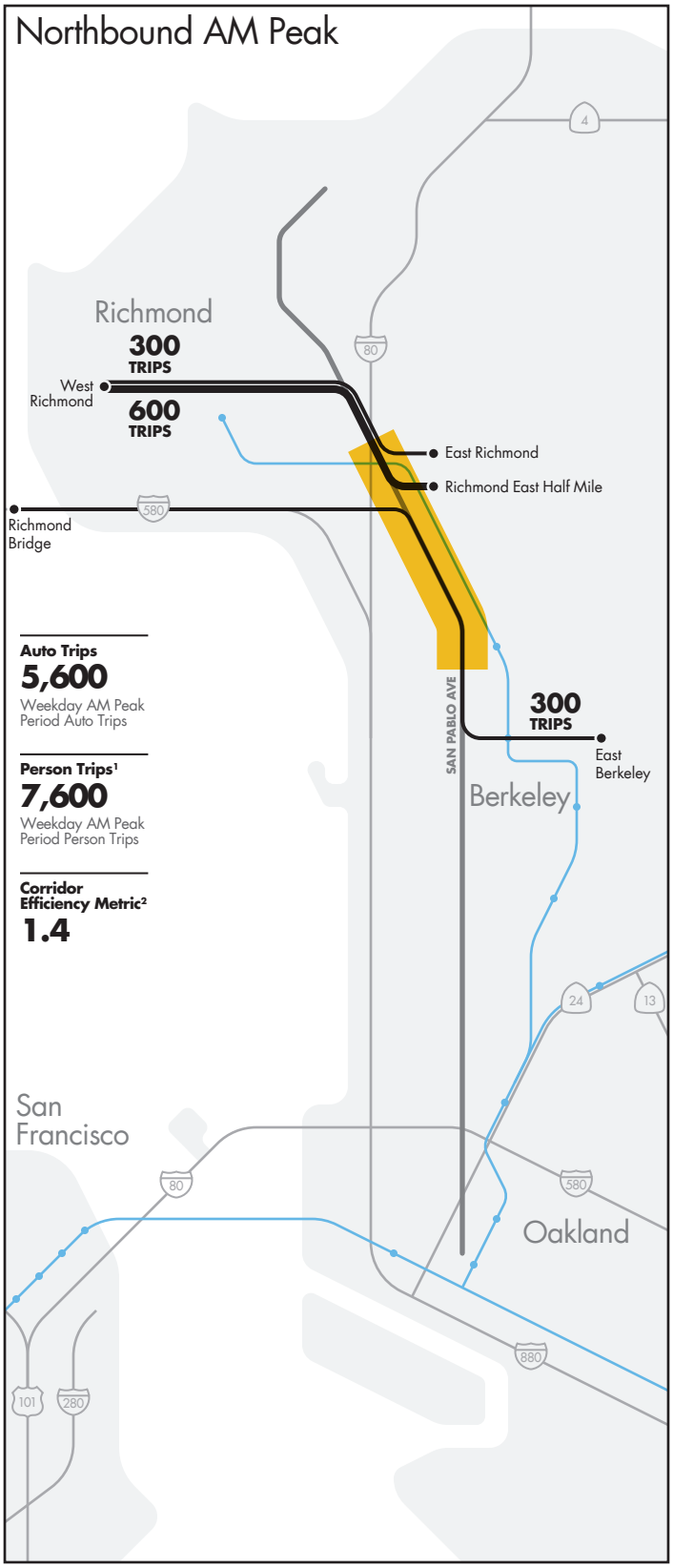
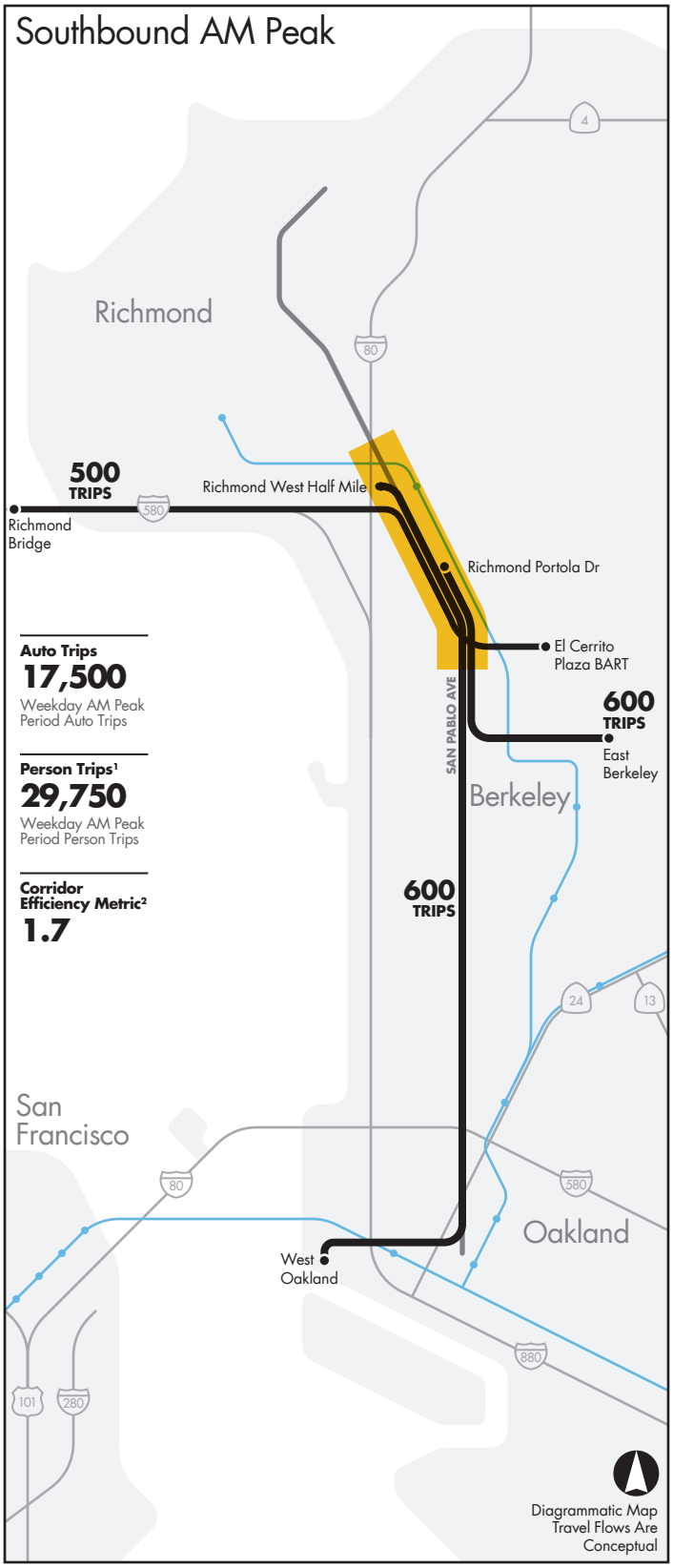
Figure G-5.1 Top Corridor BART Travel Markets
Segment 6: County Line to I-80





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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Figure G-5.2 Top Corridor Auto Travel Markets
Segment 6: County Line to I-80

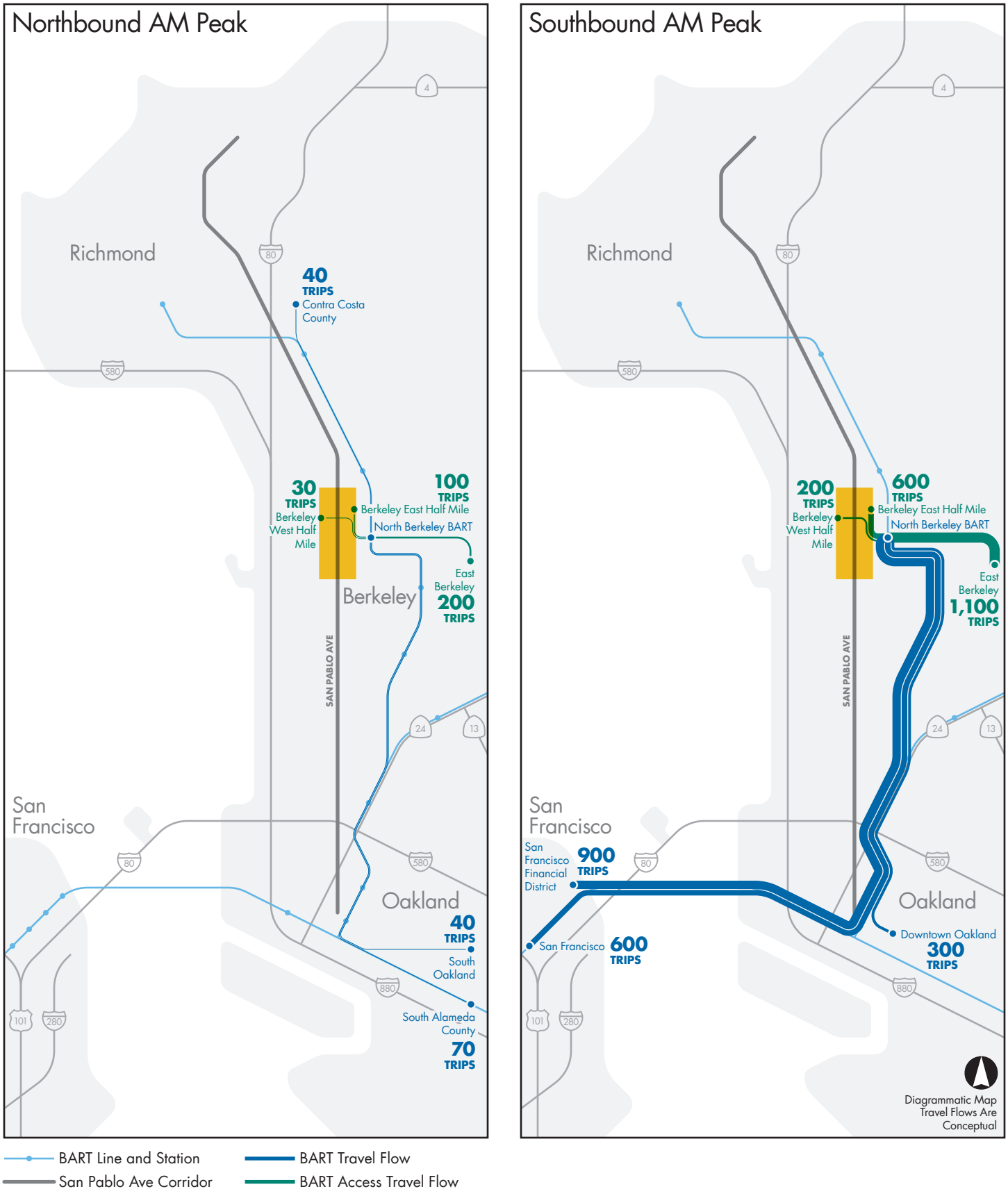

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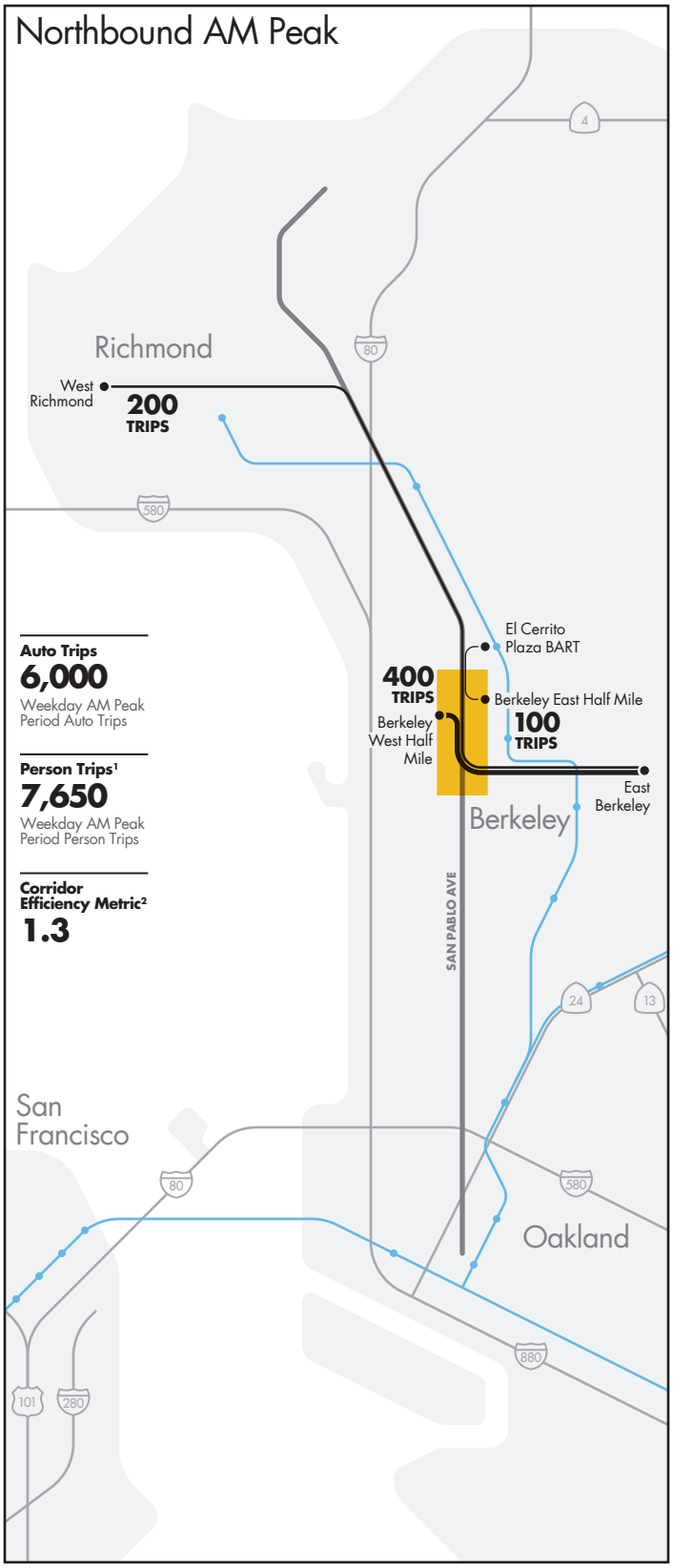
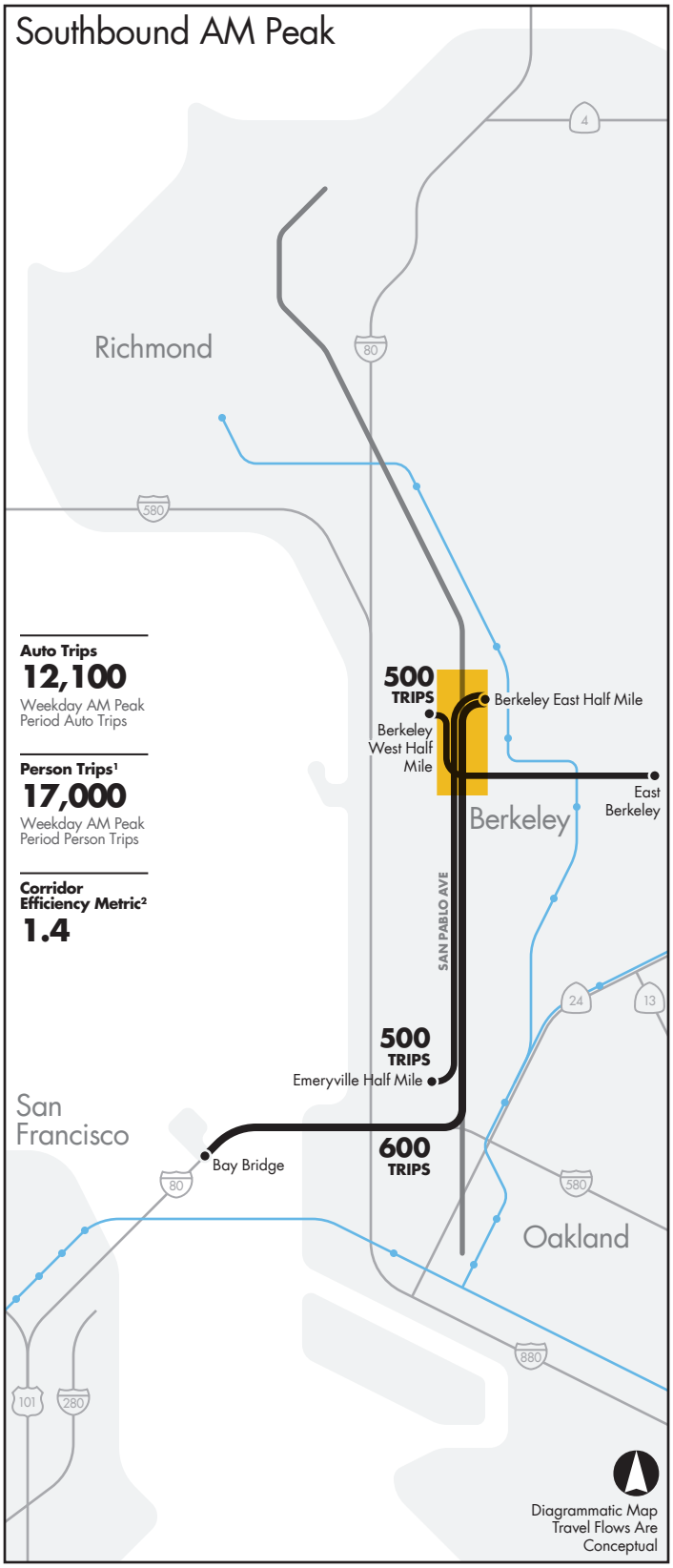
Figure G-6.1 Top Corridor BART Travel Markets
Segment 5: University Avenue to County Line





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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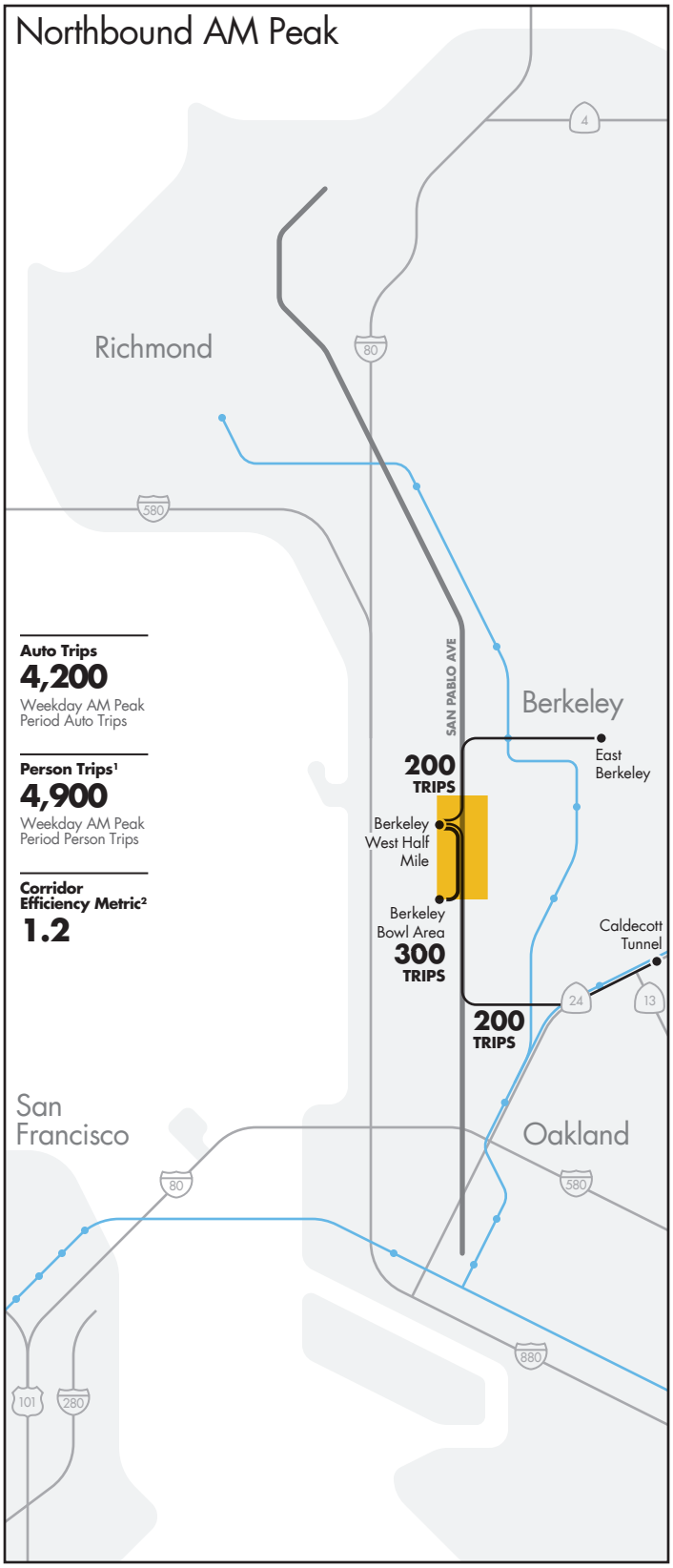
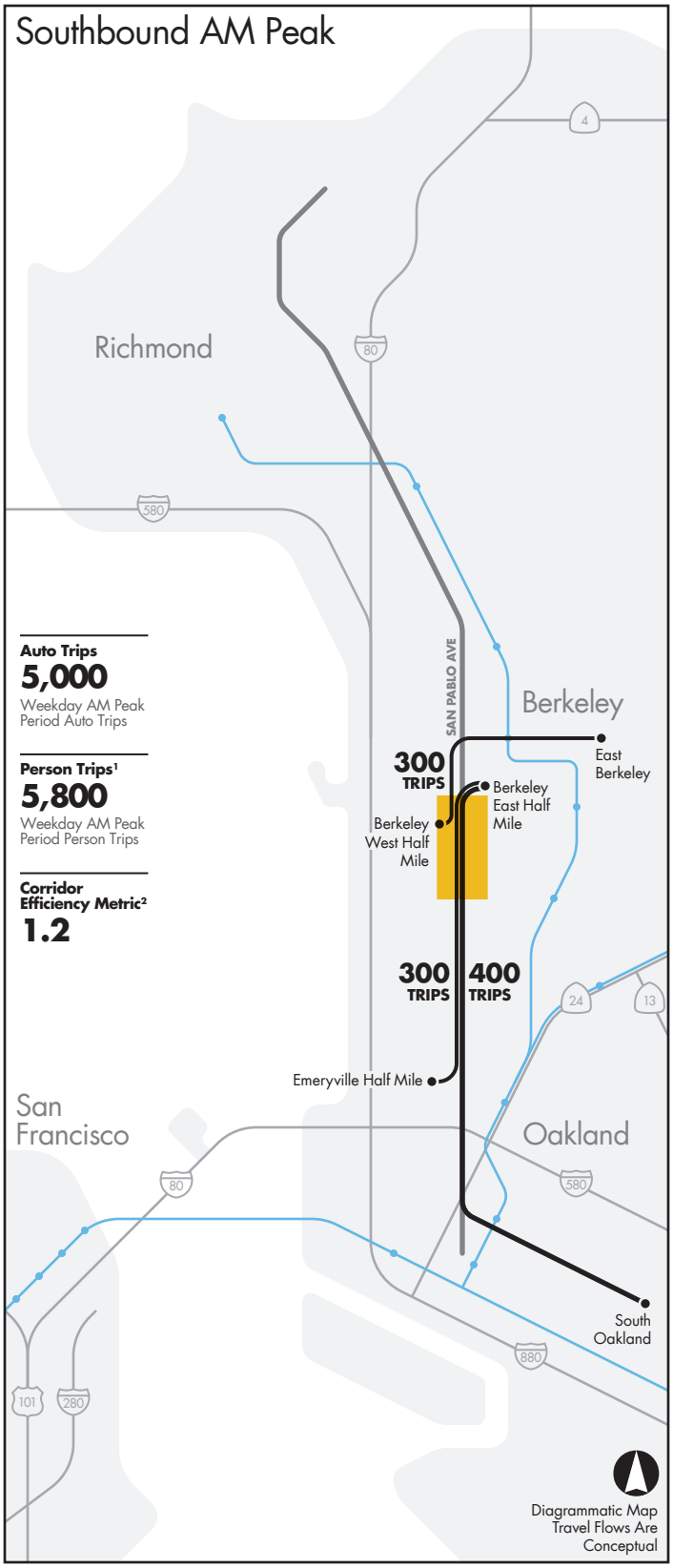
Figure G-6.2 Top Corridor Auto Travel Markets Segment 5: University Avenue to County Line





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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Figure G-7 Top Corridor Auto Travel Markets
Segment 4: Ashby Avenue to University Avenue

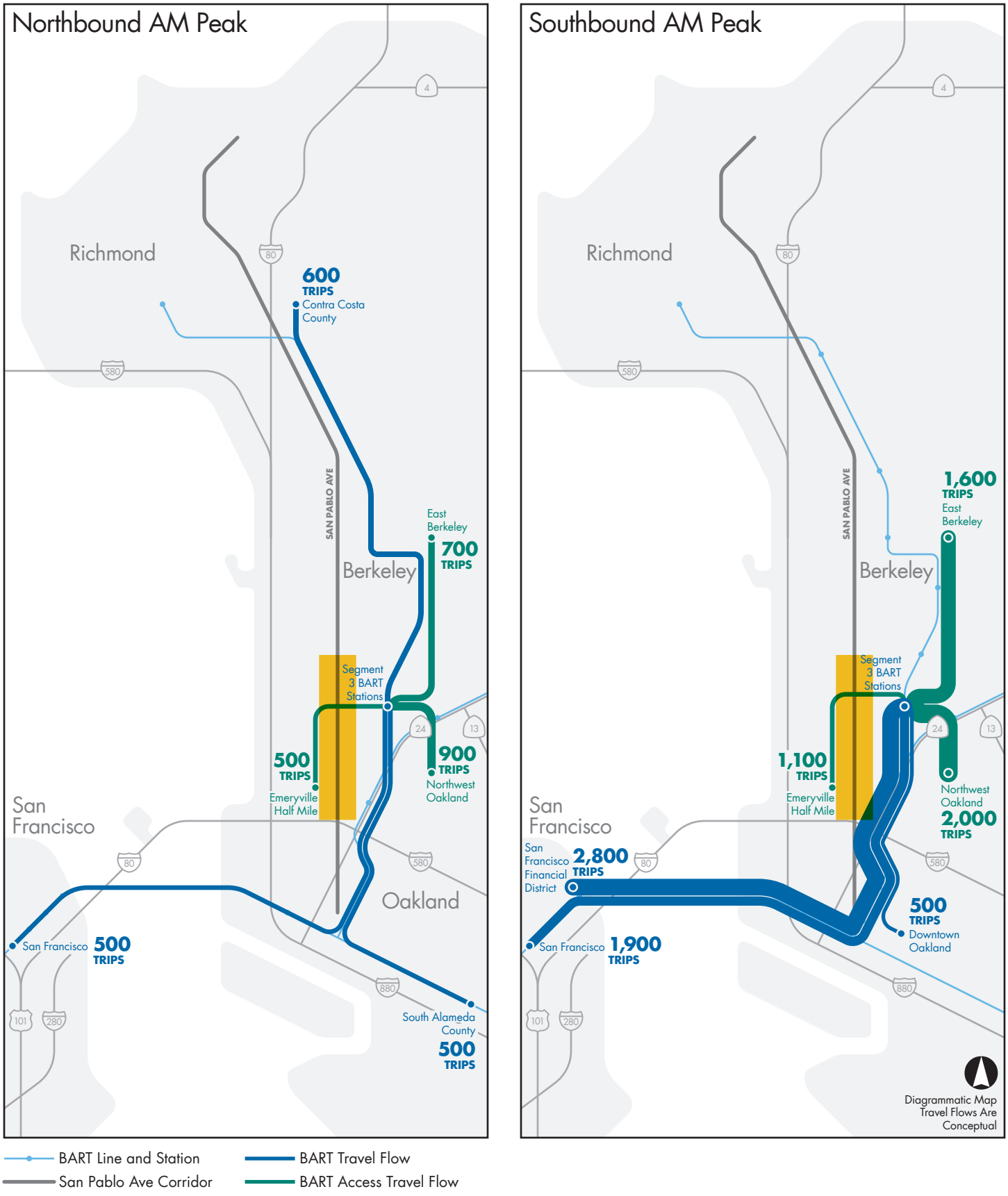

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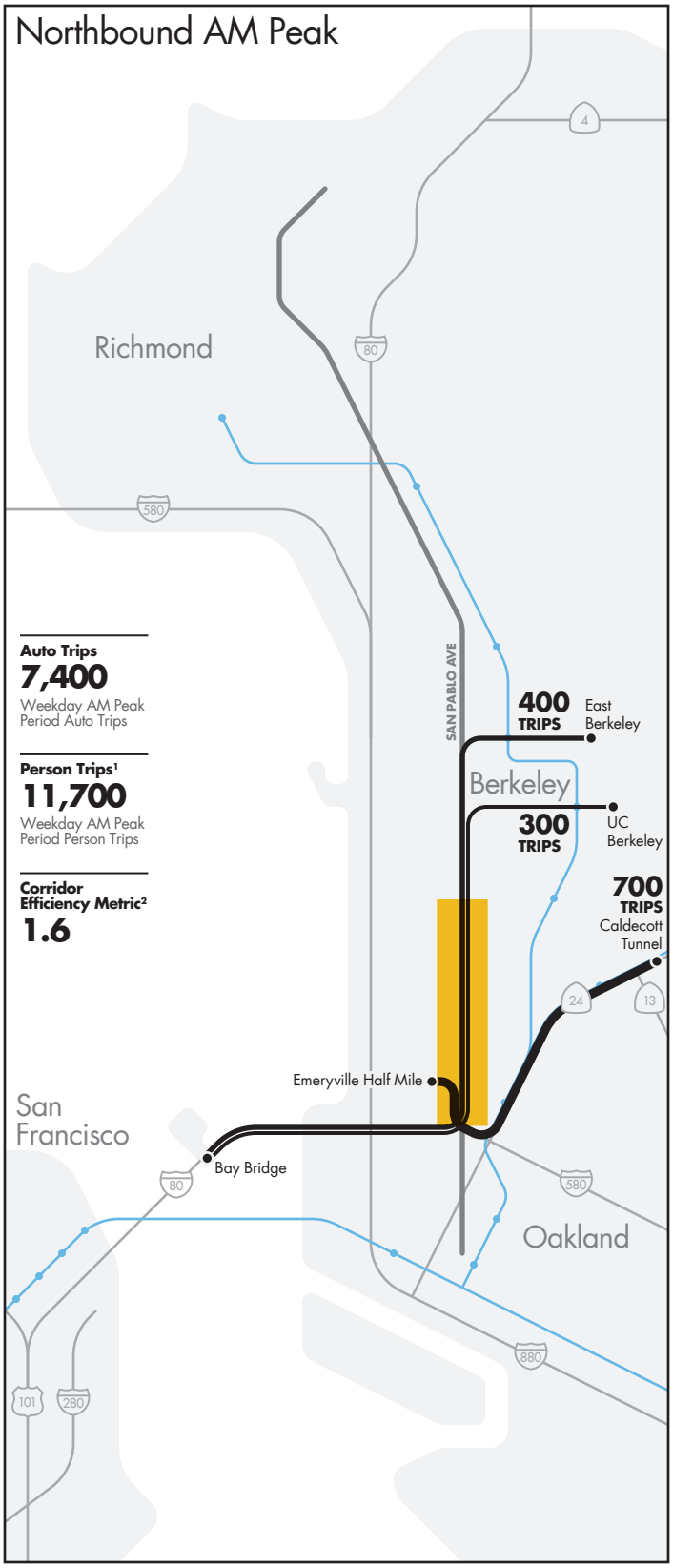
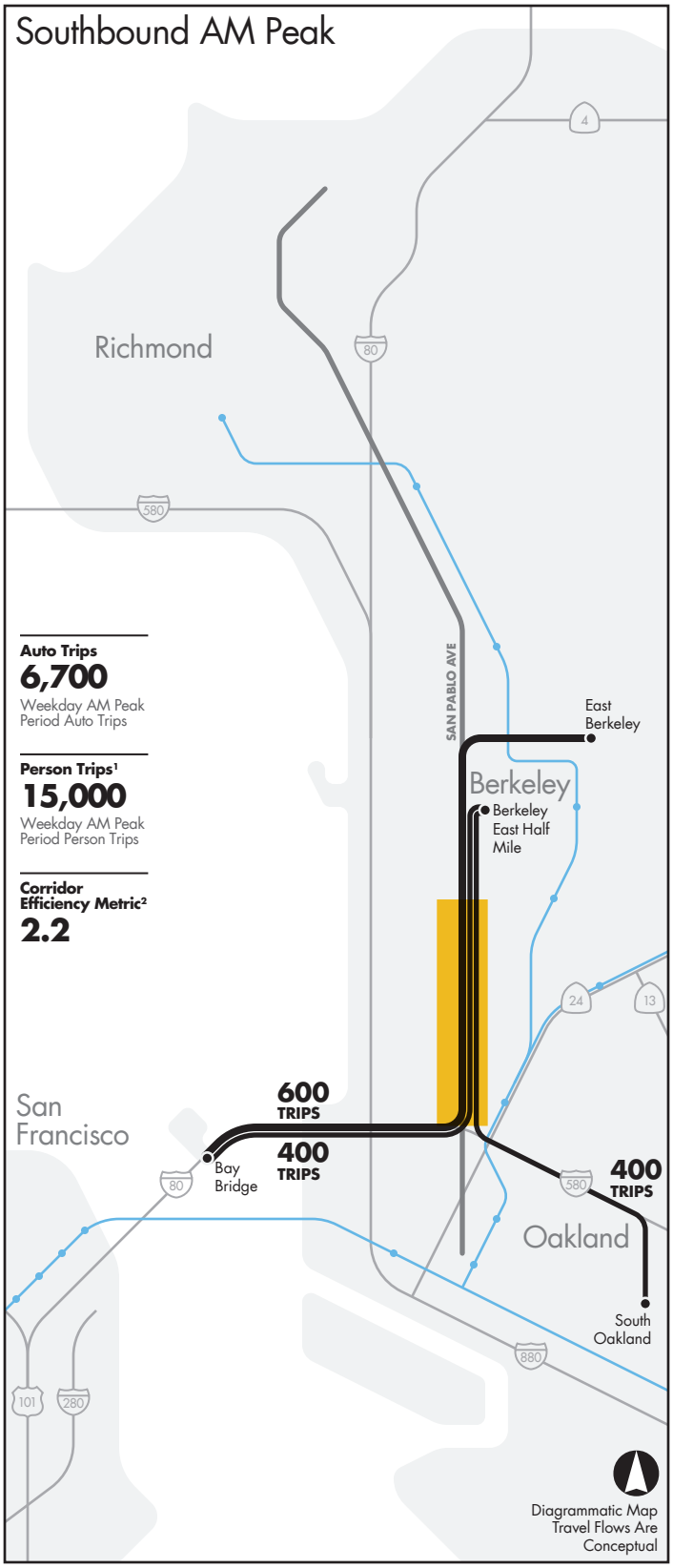
Figure G-8.1 Top Corridor BART Travel Markets
Segment 3: I-580 to Ashby Ave





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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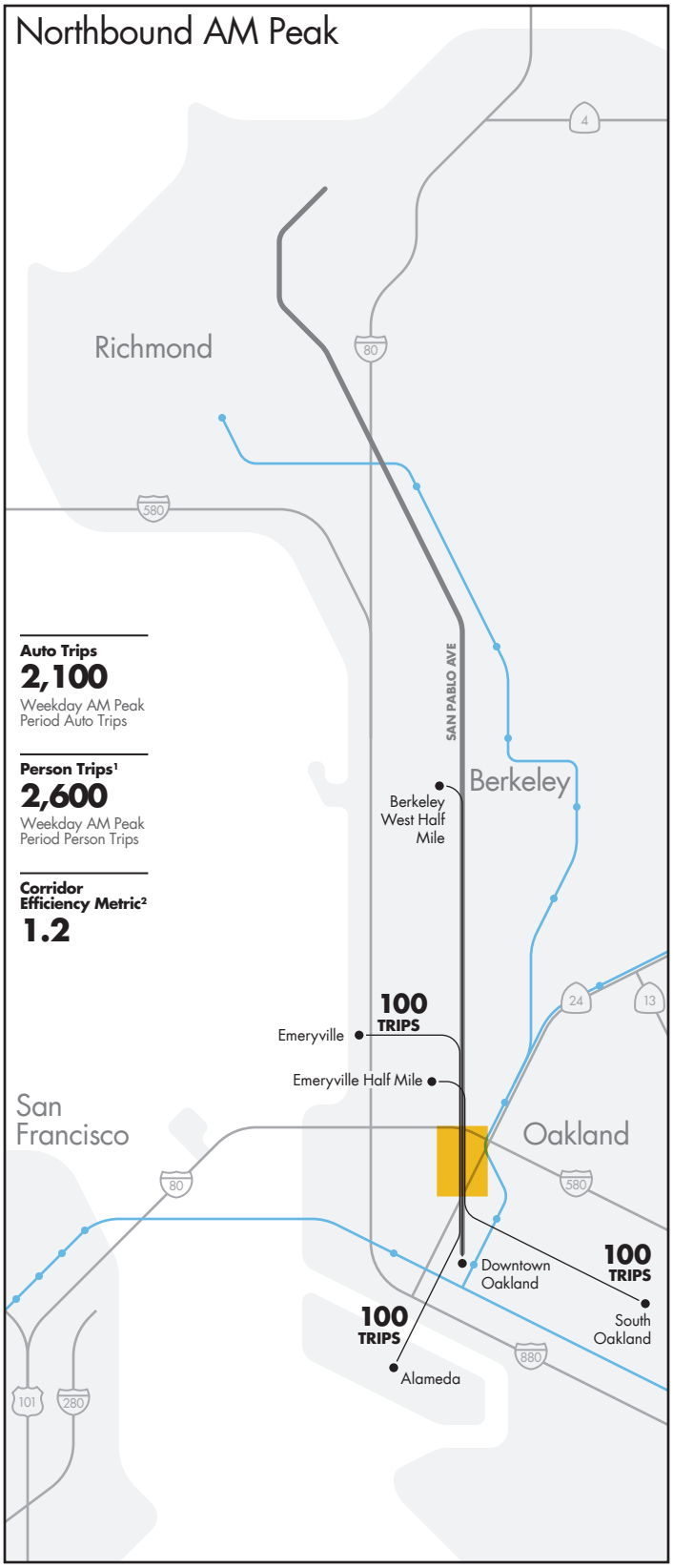
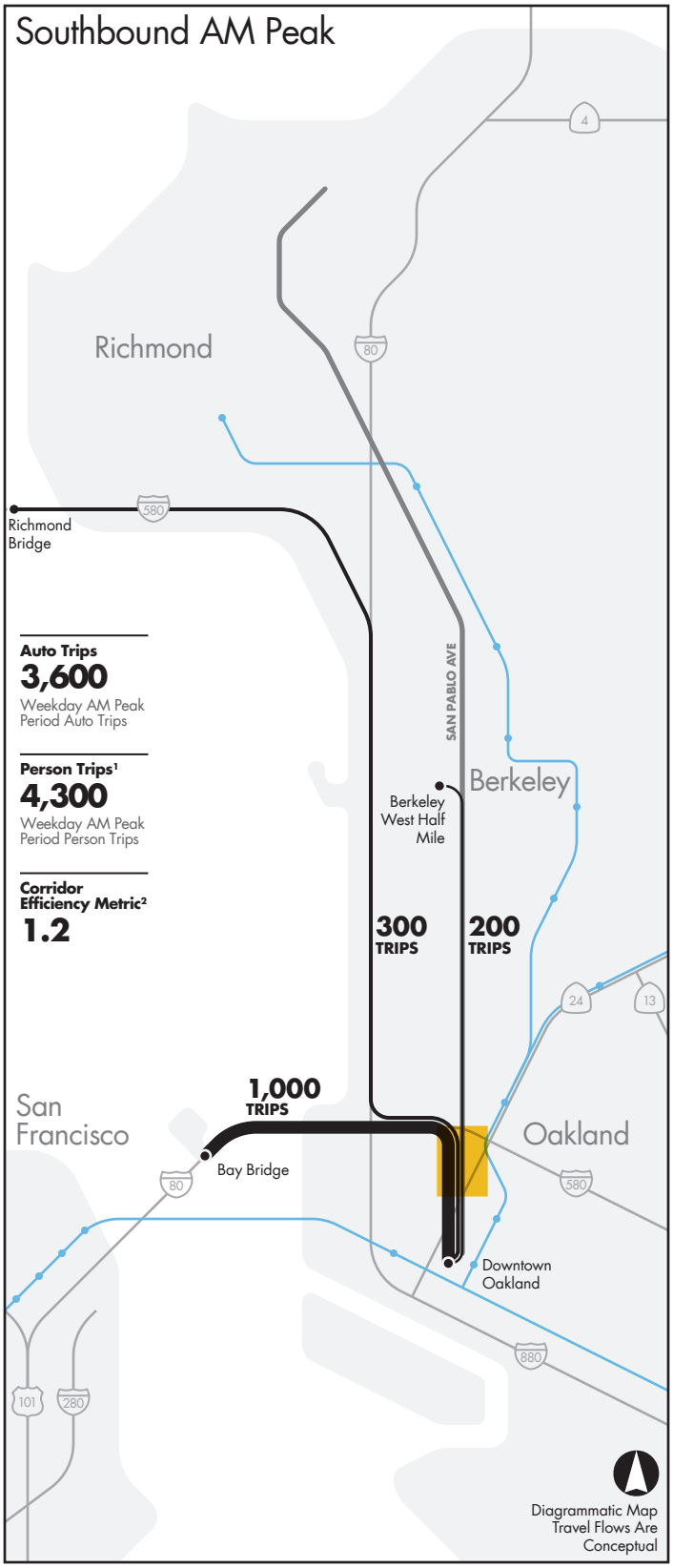
Figure G-8.2 Top Corridor Auto Travel Markets Segment 3: I-580 to Ashby Ave





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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Figure G-9 Top Corridor Auto Travel Markets Segment 2: Grand Avenue to I-580

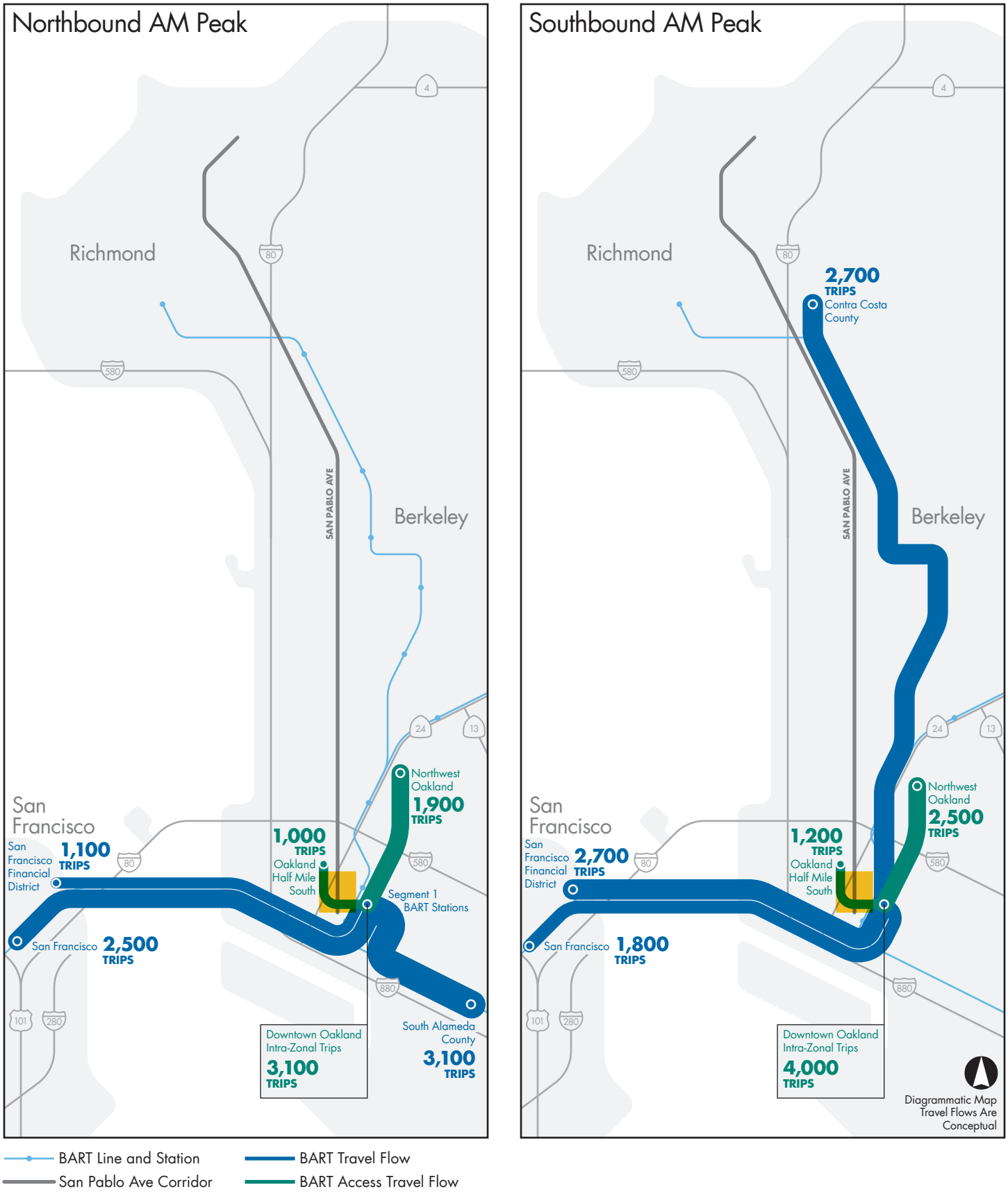

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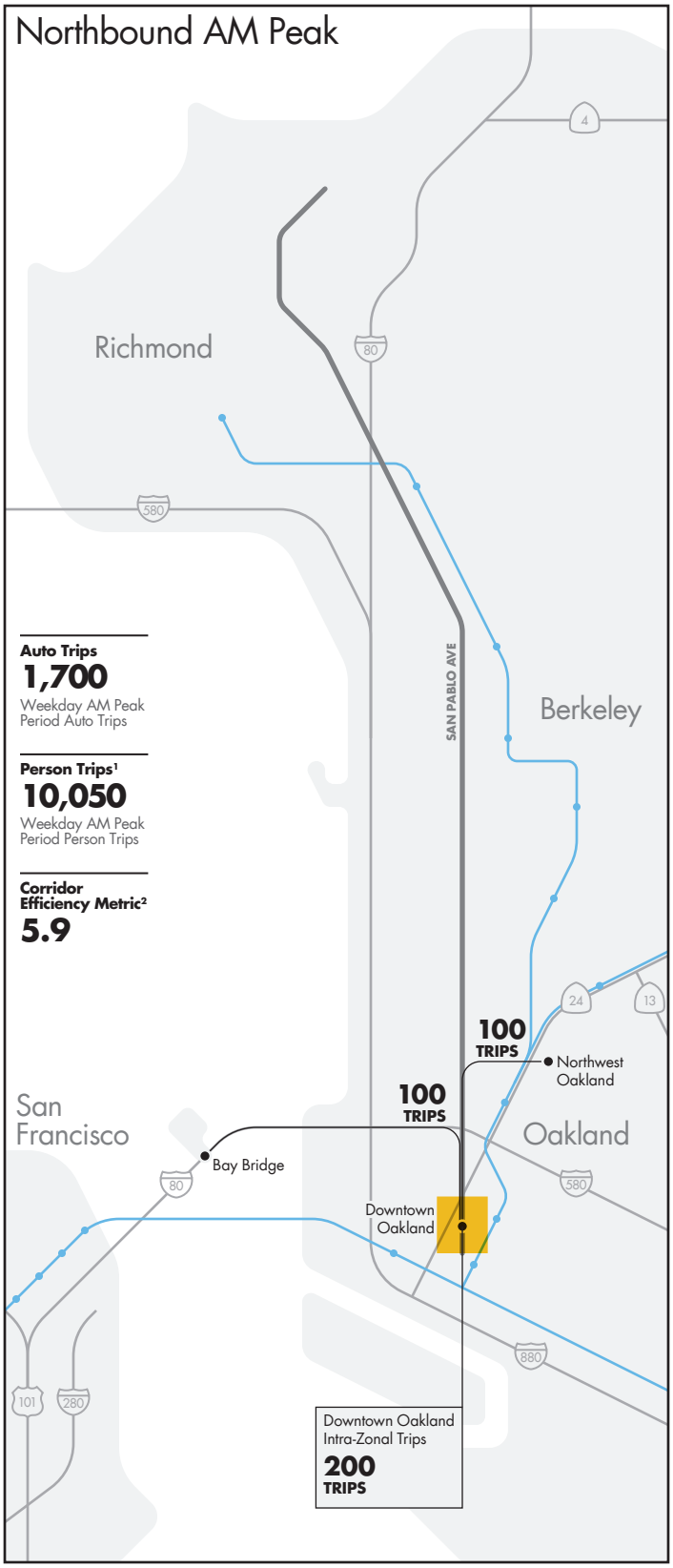
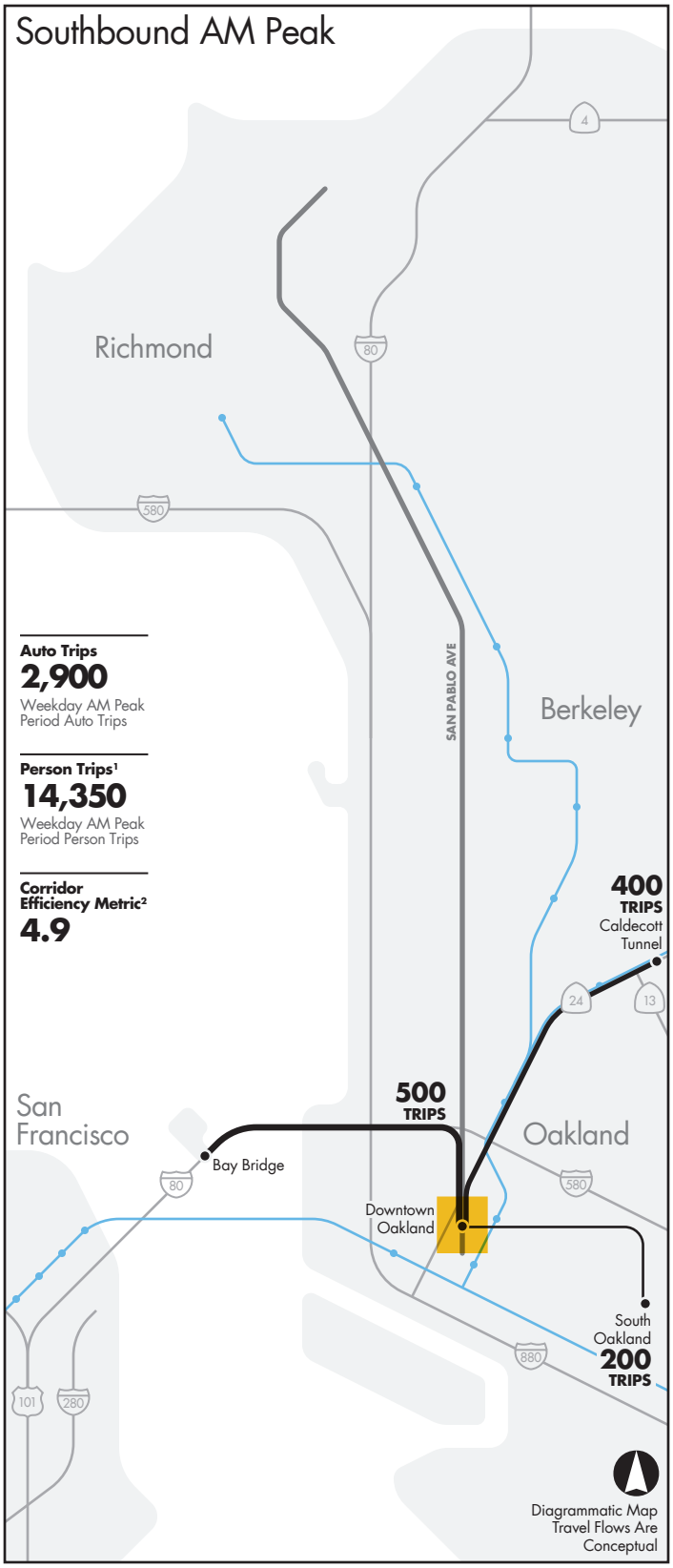
Figure G-10.1 Top Corridor BART Travel Markets
Segment 1: Frank Ogawa Plaza to Grand Avenue





BART Line and Station

San Pablo Ave Corridor

Auto Travel Flow

[1] Person trips include auto, bus, and BART person trips. Walk and bike trips are excluded from this number due to lack of data

[2] Corridor Efficiency Metric = (Person Trips)/(Auto Trips)

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Figure G-10.2 Top Corridor Auto Travel Markets Segment 1: Frank Ogawa Plaza to Grand Avenue