CORE CAPACITY TRANSIT STUDY

MEMORANDUM

To: Matt Maloney, Kenneth Folan, MTC

CC: Core Capacity Transit Study PMT

From: Aidan Hughes, Lauren Dong and Anthony Bruzzone, Arup

Date: 5/23/2016

Title: Revised Transbay Corridor: Current Demand, Current and Planned Transit Capacity

---

1 Introduction

The purpose of this memo is to present a summary of travel demand and capacity in the Transbay Corridor, under historic (2010), existing (2015) and future conditions (2040). This memo presents the following information:

- Transit Capacity in the Transbay Corridor
  - Existing
  - Future, based on planned services changes and improvement projects
- Peak Hour Travel Demand in the Transbay Corridor – 2010, 2015, and 2040
  - Existing automobile trips and vehicle occupancy, based on observed data
  - Existing (2015) and future (2040) transit ridership, based on observed data and Plan Bay Area forecast outputs

The Core Capacity Transit Study (CCTS) is expected to recommend a 25 year program of transit investments and improvements. Investments require justification – leading to a desire to understand the needs of the transportation system between today and 2040. The primary concern centers on transportation demand and capacity: comparing the amount of capacity against demand provides insight on current and future needs. If the future demand for trips exceeds capacity, this suggests the need for new investments or policy interventions. This memorandum focuses on the Transbay Corridor; future studies will focus on the Metro (San Francisco/Peninsula) Corridor.

1.1 Definitions

Demand: Demand is the observed transit ridership entering San Francisco and the automobile *person* trips counted at the toll plaza (i.e., accommodated demand). Automobile person trips are calculated using occupancy rates provided by the Caltrans Bay Area HOV Lane Reports *plus* the observed Bay Bridge queue. All demand is peak hour.

Capacity: Transit capacity is policy stated capacity of individual buses/train cars/vessels. Specific policy documents sourced for vehicle capacity by agency are referenced. Automobile vehicle and person trips are *realized* capacity as observed and calculated in 2014.

Transbay Corridor: Travel primarily from Alameda, Contra Costa and Solano Counties into the downtown San Francisco Core, funneled via the Bay Bridge, BART Transbay Tube, and East Bay to San Francisco ferry routes.

Core: The area in downtown San Francisco from approximately 16th Street on the south to Van Ness on the west, the Embarcadero on the east, and Broadway (but not including Nob Hill) on the north. See Figure 1 for a detailed map.

1.2 Corridor Travel Overview

On a typical weekday[1] in the Bay Bridge/Transbay Corridor, one-way westbound travel includes more than 125,000[2] vehicle trips. BART and AC Transit combined carry an additional 128,500[3] westbound person trips each weekday. As a result, all day travel is nearly split equally between transit and automobiles.

In the peak hour, peak direction, transit carries about ¾ of all the people traveling in the corridor, including people traveling in automobiles on the Bay Bridge.

Work commute trips from the East Bay[4] to the Core dominate peak hour (and peak period) trips. Census LEHD data from 2013 estimate about 353,000[5] jobs in the downtown Core[6]; with about 40% of Downtown San Francisco workers commuting from the East Bay. Table 1 summarizes the geographical split of downtown San Francisco employee home origins.

Table 1: Employee Origins of Downtown Workers

Residence of Employees	Percentage
San Francisco	34%
East Bay	41%
Peninsula/South Bay	19%
Marin/North Bay	6%

Source: LEHD, US Census Bureau

1.3 Memo Organization

This memorandum is organized into the following sections:

[1] Tuesday, Wednesday or Thursday
[2] PeMS data for Tuesdays-Thursdays in May 2015 counted a daily average of 126,994 vehicles passing over detector 404915 on the East Span of the Bay Bridge
[3] BART recorded 115,063 daily Transbay exits in October 2015 and AC Transit recorded 13,500 daily Transbay riders (both directions), http://www.actransit.org/about-us/facts-and-figures/ridership
[4] East Bay includes Alameda, Contra Costa and Solano Counties
[5] http://onthemap.ces.census.gov/
[6] The Core geographic boundaries are shown in Figure 1

- Section 2: Methodology
- Section 3: Historical (2010) and Existing (2015) Demand
- Section 4: Historical (2010) and Existing (2015) Capacity
- Section 5: Planned Capacity
- Section 6: 2040 Demand Scenarios
- Section 7: Findings
- Appendix A: Transit Capacity and Demand Assumptions
- Appendix B: Historical (2010) and Existing (2015) Transit Capacity – Detailed Table
- Appendix C: Calculations for Historical and Existing Automobile trips
- Appendix D: Planned Capacity – Detailed Table

2 Methodology

The methodology to derive existing and planned transit capacity is provided in Appendix A. Appendix B details capacity in the Transbay Corridor. Appendix C details the methodology to calculate the automobile demand for East Bay to San Francisco downtown core trips. This process for calculating the transit capacity and automobile demand is summarized as follows:

Demand:

1. Determine the 2010 peak hour travel demand using the Plan Bay Area forecasts for peak hour growth in demand (by percentage and total volume)
2. Document (observed data) 2010 system peak hour demand (all modes, by mode)
3. Document (observed data) 2015 system peak hour demand (all modes, by mode).
4. Apply 2010-2040 Plan Bay Area forecasts to 2010 observed peak hour demand.

Capacity:

1. Establish (observed data) 2010 system peak hour capacity (all modes).
2. Establish (observed data) 2015 system peak hour capacity (all modes).
3. Document operators' (AC Transit, BART, WETA, etc.) plans to address capacity issues and assumptions for 2040.

Capacity vs. Demand

1. Determine capacity surplus/deficit for 2040 based on 2010 observed demand factored by Plan Bay Area forecasts, subtracted from system 2040 stated capacity.
2. Determine range of possible growth assumptions for 2040.

Appendix A includes references to specific policy documents that lead to the existing and planned transit capacity data. Appendix A also defines the Core geography, as well as the screenlines used in the analysis. The Core and screenline maps are presented in Figures 1 and 2.

Figure 1: Overall Core and Sub-Areas

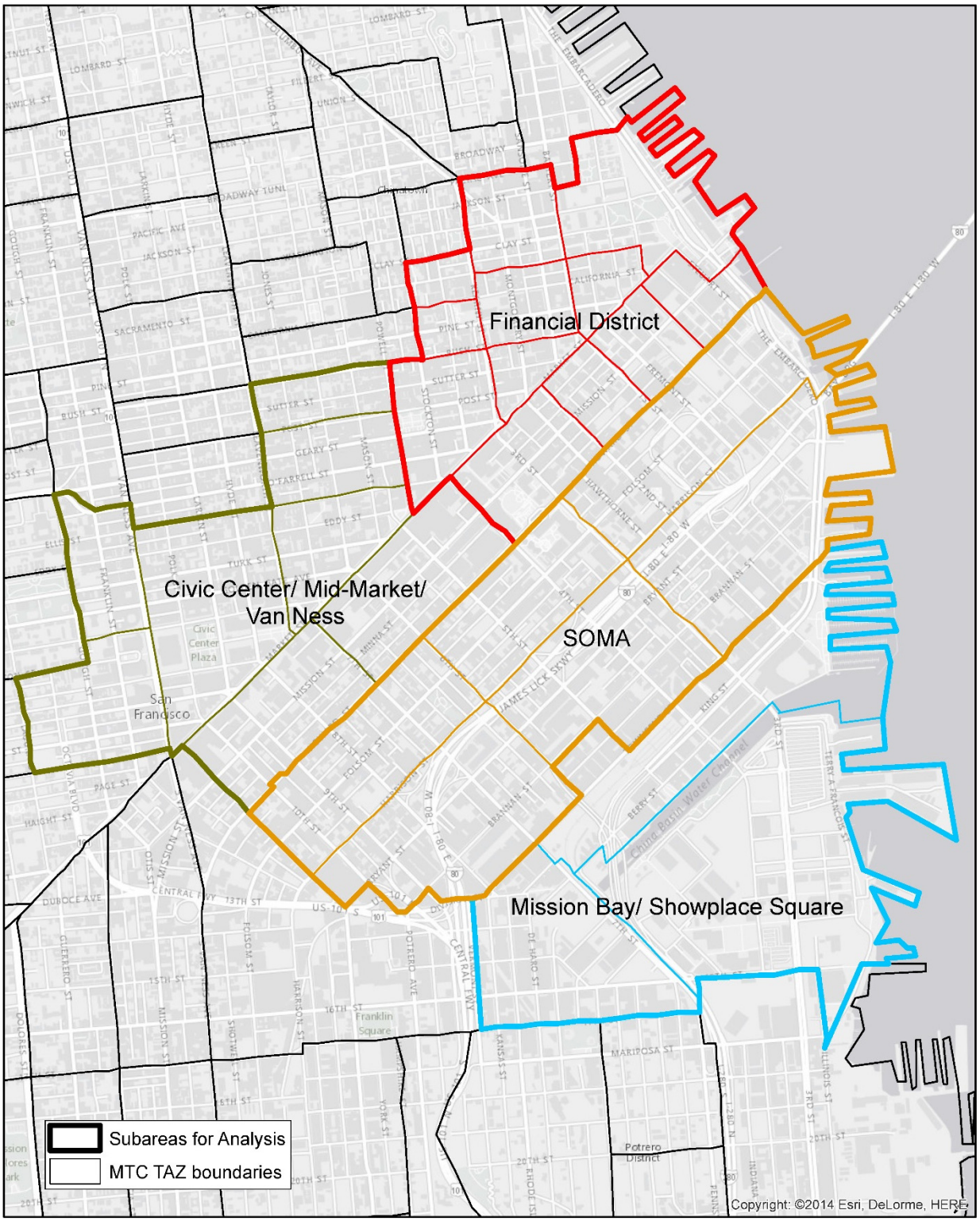
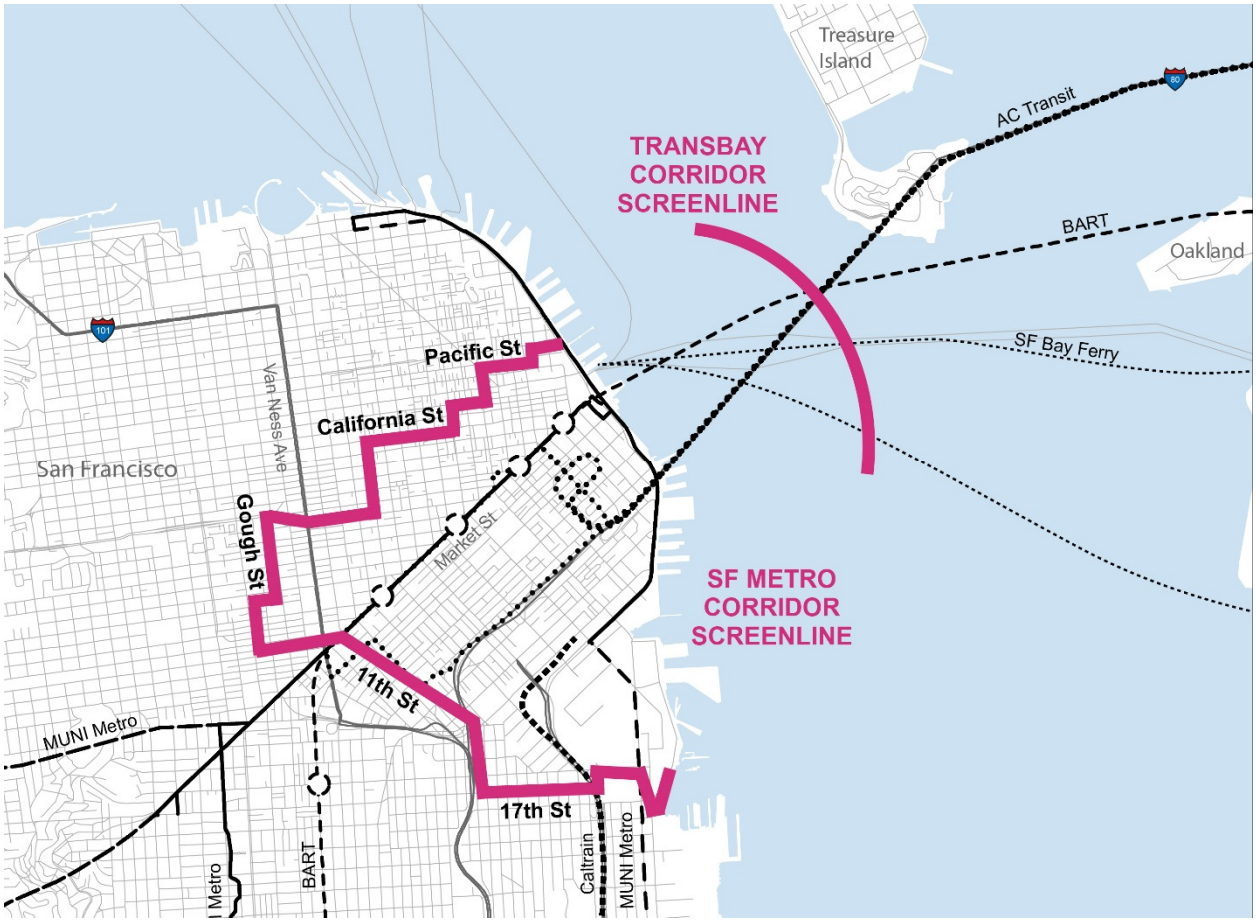


Figure 2: Transbay and San Francisco Metro Screenlines



3 Historical (2010) and Existing (2015) Demand

Overall corridor transportation demand is based on transit agency reported ridership statistics and calculated highway person trips. AM demand is used because AM automobile counts are more robust than the afternoon counts, as toll plaza controls allow an accurate set of data points.

3.1 Transit Demand

Transit demand is based on transit agency reported ridership. Ridership is provided for both the 2010 and 2015 AM peak hour. Table 2 shows the AM demand for each operator and the percentage change.

Table 2: Change in Peak Hour, Peak Direction Demand Bay Bridge Corridor, Transit (2010-2015)[7]

	2010	2015	Change	
	AM Demand	AM Demand	Number	Percent
AC Transit	1,984	2,531	+ 547	+28%
BART[8]	17,406	24,986	+ 7,580	+44%
SF Bay Ferry	765	1,271	+ 506	+66%
Other bus[9]	180	180	0	0%
Total	**20,335**	**28,968**	**+8,633**	**+42%**

3.2 Automobile Trip Demand (2010-2014)

The Bay Bridge serves trips into the Core (via off-ramps at Fremont Street, Harrison Street, 5th Street and 9th Street), as well as travel beyond the Core. Identifying *person trips* for travel into the Core via the Bay Bridge requires a number of assumptions to calculate the number of vehicles and people that are ending their trips in Core. These assumptions are based on both observed data and Plan Bay Area forecasts, and detailed in Appendix C.

The estimate of *person trips* on the Bay Bridge acknowledges carpooling, and these estimates are based on HOV and mixed flow occupancy rates produced by the Caltrans *Bay Area HOV Lanes Report*[10].

The *Bay Area HOV Lanes Report*[11] annually details total vehicle volume, high occupancy vehicle (HOV) and single occupancy vehicle (SOV) vehicle share, and average vehicle occupancy rates for both HOV and SOV vehicles. The most recent reports span the years 2010-2013. The most recent data on the Bay Bridge was published in the 2012 report. A new report has not been released since 2013.

[7] For purposes of this memo, Treasure Island is considered a discrete corridor.

[8] BART ridership is at westbound Transbay Tube screenline; about 2,600 of these passengers – 11% – continue west of Civic Center Station

[9] WestCAT

[10] 2010 Occupancy rates provided by the 2010 Bay Area HOV Lanes Report. 2014 rates derived from the 2012 Bay Area HOV Lanes Report, the most recent report including Bay Bridge HOV Lane data. Further details provided in Appendix C.

[11] 2010 Bay Area HOV Lanes, Caltrans District 4, http://www.dot.ca.gov/dist4/highwayops/docs/hov_report_2010.pdf; 2014 rates derived from the 2012 Bay Area HOV Lanes Report. Further details provided in Appendix C.

Appendix C details the methodology for calculating the historical and existing automobile volumes through the Transbay Corridor. The process is summarized below:

1. Using the Bay Area HOV Lane report, calculate the number of vehicles and share of HOV/SOV traveling to the Core on the Bay Bridge in 2010.
2. Based upon the HOV/SOV share and the average occupancy rates provided in the report, calculate the number of people delivered through the Corridor
3. Derive a percentage of trips that are ending in the Core using Plan Bay Area forecasts and observed data[12]
4. Calculate the number of vehicle and people trips that are ending in the Core
5. Repeat the steps described above for years 2012 and 2015. The automobile volumes for 2015 were derived from assumptions made from the 2012 Bay Area HOV Lane Report. This is detailed in Appendix C.

From 2010-2014 accommodated automobile demand on the Bay Bridge decreased. The number of vehicles traveling on the Bay Bridge during the AM peak hour fell 8%. In addition to fewer vehicles, the number of total people traveling the corridor also fell because occupancy also decreased.

Vehicle volumes and person trips through the corridor and to the Core from 2010-2014 are shown in Table 3. Note that the information detailed in Appendix C suggests that 70% of peak hour Bay Bridge trips end in the Core, with 30% traveling through to other destinations.

Table 3: Change in Volumes, Bay Bridge Users (2010-2014 Peak Hour)

	2010	2012	2014	Change 2010-14	
	AM Peak Hour	AM Peak Hour	AM Peak Hour	Number	Percent
Vehicles through Corridor	9,308	8,473	8,546	- 762	- 8%
Vehicles to Core	6,516	5,931	5,982	- 534	- 8%
People through Corridor	16,048	13,649	14,093	- 1,955	-12%
People to Core	**11,234**	**9,554**	**9,866**	**-1,368**	**-12%**

This memorandum considers Bay Bridge accommodated demand and realized capacity (or current condition person trips) as the same. During the AM peak period, there is more demand than can be accommodated on the Bridge, resulting in a queue at the Toll Plaza, capping the automobile capacity through the Bridge.

While motorists in the queue experience delay, only 300 – 400 vehicles are not served during the AM peak hour, (about 3.5% of bridge traffic, or less than 2% of total peak hour travel).

[12] The split for Core-ending tips vs. through trips is a combination of Plan Bay Area forecast estimates with observed on-ramp data. Further detail is provided in Appendix C.

While multiple factors contribute to travel accommodated through the corridor, notable changes during this time period include:

- A $2.50 carpool toll was introduced on July 1, 2010
- The non-HOV toll was raised from $4 to $6 for travel on Monday-Friday from 5AM to 10AM and 3PM to 7PM in 2010.
- Fastrak and other technology increased in availability and usage.[13]

3.3 Findings

Combining transit and highway Transbay AM peak hour demand results in an increase of more than 7,000 AM peak hour person trips, or about 23 percent (4.2% annually), between 2010 and 2015. Table 4 summarizes this demand:

Table 4: Change in Peak Hour, Peak Direction Demand Bay Bridge Corridor, All Modes (2010-2015)[14]

	2010	2015	Change	
	AM Demand	AM Demand	Number	Percent
AC Transit	1,984	2,531	+ 547	+28%
BART	17,406	24,986	+ 7,580	+44%
SF Bay Ferry	765	1,271	+ 506	+66%
Other bus	180	180	0	0%
Bay Bridge Travel	11,234	9,866 *(2014)*	-1,368	-12%
Total	**31,569**	**38,834**	**+7,265**	**+23%**

[13] Richards, Gary, *Bay Bridge metering lights will be upgraded (first time since 1974),* SJ Mercury News, August 20, 2015

[14] All numbers represent person trips to the Core traveling in the Transbay Corridor.

4 Historical (2010) and Existing (2015) Capacity

Capacity includes all transit capacity (by operator and mode) and person-trips in automobiles on the Bay Bridge. As noted, Bay Bridge accommodated demand and realized capacity are considered the same.

4.1 Transit Capacity

Transit capacity is calculated by identifying each individual transit route that crosses the Transbay screenline during the peak hour, in the peak direction. Detailed information for individual transit routes is provided in Appendix B. The actual capacity of each vehicle is referenced to adopted transit capacity policies and documents[15], the overall capacity is summed for each agency. The 2010 totals are shown in Table 5. Table 6 shows current (2015) capacity totals, and Table 7 presents the change in capacity by mode from 2010 to 2015.

Table 5: Historical (2010) Peak Hour, Peak Direction Transit Capacity by Time Period and Operator

	AM Service – Vehicles at Screenline	AM Passenger Capacity[16]	PM Service – Vehicles at Screenline	PM Passenger Capacity
AC Transit	63 buses	2,924	88 buses	3,917
BART	212 cars 23 trains	22,684	212 cars 23 trains	22,684
SF Bay Ferry	4 ferries	1,032	5 ferries	1,322
Other bus[17]	3 buses	171	3 buses	171
Total		**26,811**		**28,094**

AC Transit provides more service for the PM peak hour as the PM ridership demand is higher for trips leaving the Core than trips into the Core in the AM.

Table 6: Existing (2015) Peak Hour, Peak Direction Transit Capacity by Time Period and Operator

	AM Services Vehicles at Screenline	AM Passenger Capacity	PM Services Vehicles at Screenline	PM Passenger Capacity
AC Transit	63 buses	2,730 [18]	89 buses	3,666
BART	212 cars 23 trains	22,684	212 cars 23 trains	22,684
SF Bay Ferry	5 ferries	1,322	5 ferries	1,522[19]
Other bus	3 buses	171	3 buses	171
Total		**26,907**		**28,043**

[15] Provided in Appendix B
[16] Capacity is based on policy-stated operator documents. This is discussed further in Appendix A (Table 1)
[17] WestCAT
[18] Since 2010, AC Transit has reduced the total number of MCIs (57 seat passenger buses) operating in the peak period; fleet mix has also changed between 2010 and 2015 and between AM and PM periods.
[19] Ferry schedules vary vessel sizes between AM and PM periods.

Table 7: Change in Transit Capacity by Mode (2010-2015 Peak Hour, Peak Direction)

	2010	2015	Change	
	AM Capacity	**AM Capacity**	**Number**	**Percent**
BART	22,684	22,684	No change	No change
Bus	3,095	2,901	- 194	- 6%
Ferry	1,032	1,322	+ 290	+ 28%
Total	**26,811**	**26,907**	**+ 96**	**+ 0.4%**

Between 2010 and 2015, BART had no change in Transbay capacity. AC Transit AM capacity declined (due to replacement of 57 seat buses with 37 seat vehicles[20]), and WETA increase by about 28%.

Table 8 presents transit demand and transit capacity trends between 2010 and 2015.

Table 8: Peak Hour, Peak Direction Occupancy by Mode and Year

	2010			2015		
	AM Capacity	**AM Demand**	**Occupancy**	**AM Capacity**	**AM Demand**	**Occupancy**
BART	22,684	17,406	77%	22,684	24,986	110%[21]
Bus	3,095	2,164	70%	2,901	2,711	94%
Ferry	1,032	765	74%	1,322	1,271	96%
Total	**26,811**	**20,335**	**76%**	**26,907**	**28,968**	**108%**

Since 2010, transit demand has increased 42%, while overall transit capacity has remained virtually the same. Occupancy levels have also increased, jumping from 75% in 2010 to 108% in 2015.

4.2 Total Existing Capacity

Combining transit stated capacity and Bay Bridge realized capacity provides an overview of total corridor capacity under current policy. It should be noted that theoretical capacity of the Bay Bridge could be much greater, assuming policy changes (such as requiring occupancy minimums). When all-modes capacity, as defined under current policy, is summed, the overall peak hour capacity through the Transbay Corridor declined 3% from 2010 to 2015. Table 9 combines all trips together.

Table 9: Change in Peak Hour, Peak Direction Transbay Capacity for All Modes (2010-2015)

	2010	2015	Change	
	AM Capacity	**AM Capacity**	**Number**	**Percent**
Person Trips Served to the Core via Auto	11,234	9,866 *(2014)*	-1,368	-12%
BART	22,684	22,684	No change	No change
Bus	3,095	2,901	- 194	- 6%
Ferry	1,032	1,322	+ 290	+ 28%
Total	**38,045**	**36,773**	**- 1,272**	**- 3%**

[20] Specific service capacity calculation is located in Appendix A
[21] Occupancy on BART is exceeding BART's capacity per its policy of 107 passengers/train.

4.3 Total Corridor Demand-Capacity

Table 10 summarizes capacity and demand for the Transbay Corridor (AM peak hour):

Table 10: Peak Hour, Peak Direction Occupancy for Transbay Corridor – All Modes (2010-2015)

	2010			2015		
	AM Capacity	**AM Demand**	**Occupancy**	**AM Capacity**	**AM Demand**	**Occupancy**
Transbay Corridor – Total	38,045	31,569	82%	36,773	38,834	106%

The entire corridor is operating at 106% of capacity, an increase from 82% in 2010.

5 Planned Capacity

Prior to determining any surplus/deficit for 2040, the planned capacity improvements that are committed in the near future are documented to provide a more complete assessment of the capacity and demand on the corridor.

5.1 Planned Transit Capacity

The planned transit capacity reflects the additional capacity that is identified and/or committed to in policy documents[22]. Projects supporting the planned transit capacity are shown in Table 11. Not all projects listed are fully funded.

Table 11: Planned Transit Capacity Supportive Projects

	Project
AC Transit	Fleet Replacement (Core Capacity Challenge Grant)
	Fleet Expansion (50% of the Core Capacity Challenge Grant expansion request)
	Facility Replacement/Rehabilitation (Richmond Yard)
BART	Train Control Modernization Project (Core Capacity Challenge Grant)
	BART Rail Car Replacement
	BART Fleet Expansion (Core Capacity Challenge Grant)
	Hayward Maintenance Facility (HMC) Phases 1 and 2 (Core Capacity Challenge Grant)
	Traction Power Upgrades
WETA	New ferry service from Richmond, Berkeley and Treasure Island
	Additional Vessels
Other/Non-Operator	Transbay Transit Center

Similar to the existing capacity calculations, the planned capacity during the AM and PM peak hour for each agency is summed in Table 12. The planned capacity figures include the existing capacity operated today. Detailed information for each operator is provided in Appendix D. In 2017 AC Transit is assumed to increase service by 40 buses hourly, WETA increases ferry service in 2025 and 2035, and BART signal and power improvements, along with additional improvements, allow service increases in 2025. The total AM peak hour transit capacity is expected to increase about 40%, as detailed in Table 13.

[22] Policy documents providing guidance on planned additional service are shown in Appendix A

Table 12: Planned Transit Capacity by Peak Hour, Peak Direction and Operator (2040)[23]

	AM Service	AM Capacity	PM Service	PM Capacity
AC Transit	103 buses	4,330	129 buses	5,266
BART	270 cars 27 trains	28,890	270 cars 27 trains	28,890
Ferry	15 ferries	4,168	15 ferries	4,168
Other bus[24]	3 buses	171	3 buses	171
Total		**37,559**		**38,495**

Table 13: Change in Planned Capacity by Mode (2015 to 2040)

	2015	2040	Change	
	AM Capacity	**AM Capacity**	**Number**	**Percent**
BART	22,684	28,890	6,206	27%
Bus	2,901	4,501	1,600	55%
Ferry[25]	1,322	4,168	3,464	215%
Total	**26,907**	**37,559**	**11,270**	**40%**

5.2 Automobile Capacity

While observed vehicle volume has declined marginally from 2010-2014, vehicle and person throughput is assumed to increase back to 2010 levels through operational improvements.

5.3 Total Planned Transbay Capacity 2040

Table 14 summarizes planned capacity in 2040:

Table 14: Change in Planned Capacity, All Modes (2015 to 2040)

	2015	2040	Change	
	AM Capacity	**AM Capacity**	**Number**	**Percent**
Person Trips Served to the Core via Auto	9,866 *(2014)*	11,234	1,368	14%
BART	22,684	28,890	6,206	27%
Bus	2,901	4,501	1,600	55%
Ferry	1,322	4,168	2,846	215%
Total	**36,773**	**48,793**	**12,020**	**33%**

Current plans, along with a return to 2010 realized capacity on the Bay Bridge[26], results in an overall capacity increase of about 33% by 2040, or more than 12,000 peak hour person trips in the Transbay Corridor.

[23] Numbers in person trips.
[24] WestCAT
[25] Does not include Treasure Island service.
[26] Bay Bridge "realized capacity" is assumed to return to 2010 observations due to increases in carpooling (currently trending up from low post-2010 levels) and throughput increases related to changes in metering protocols and metering rates.

6 2040 Demand Scenarios

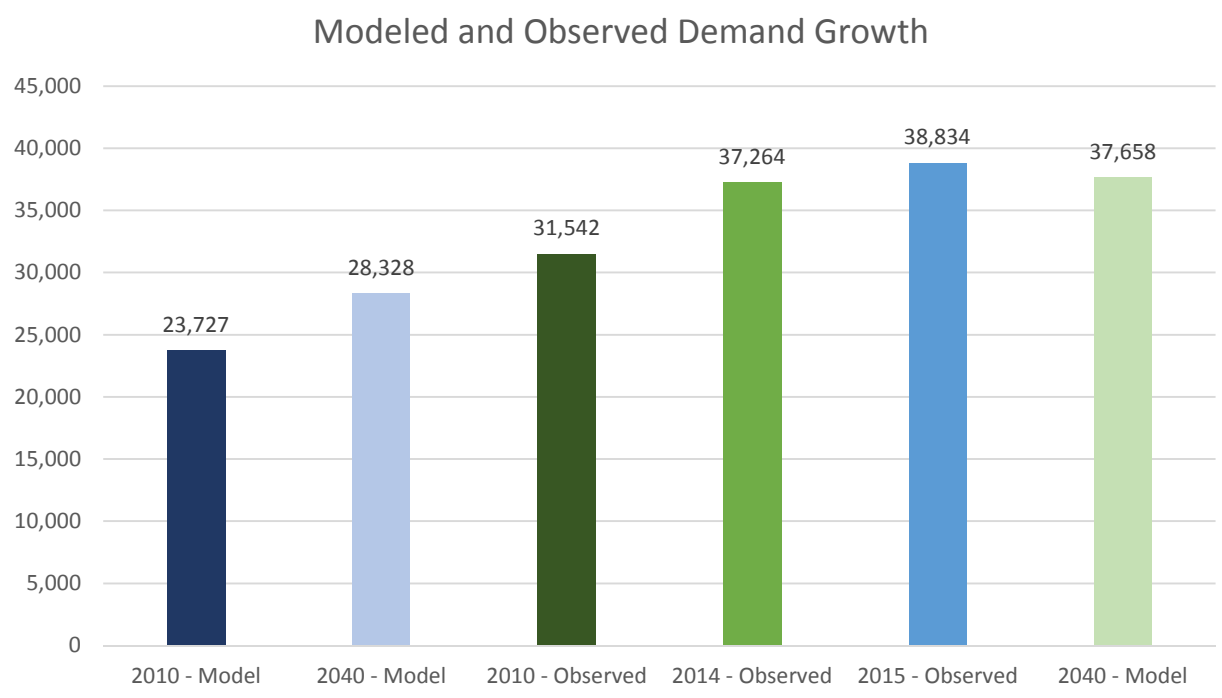
6.1 Plan Bay Area Forecasts 2010-2040

Plan Bay Area forecasts estimate a 19% growth in demand for all modes for the Transbay Corridor between 2010 and 2040. In 2010, 23,700 modeled trips in the AM peak hour will increase to 28,300 trips in 2040. Over 30 years, this is an average rate increase of about 0.6% annually. However, observed demand for all modes already has increased by 23 percent (4.2% annually)between 2010 and 2015. As a result, the first five years of travel growth in the Transbay Corridor has exceeded the entire forecast 30 year growth by about 4 percent. Table 15 lists the modeled and observed demand, and Figure 3 graphs the demand differences.

Table 15: Plan Bay Area forecast Growth Rate Applied to 2010 Demand, AM Peak Hour

	2010	Modeled Growth Rate	2040
Plan Bay Area forecasts output	23,727	+19%	28,328
Applying Model Growth Rate to Observed Demand	31,542[27]		37,658

Figure 3: Modeled and Observed Demand Growth, AM Peak Hour



[27] 2010 Transit demand plus 2010 auto people trips to the Core; peak hour as defined by origin departures.

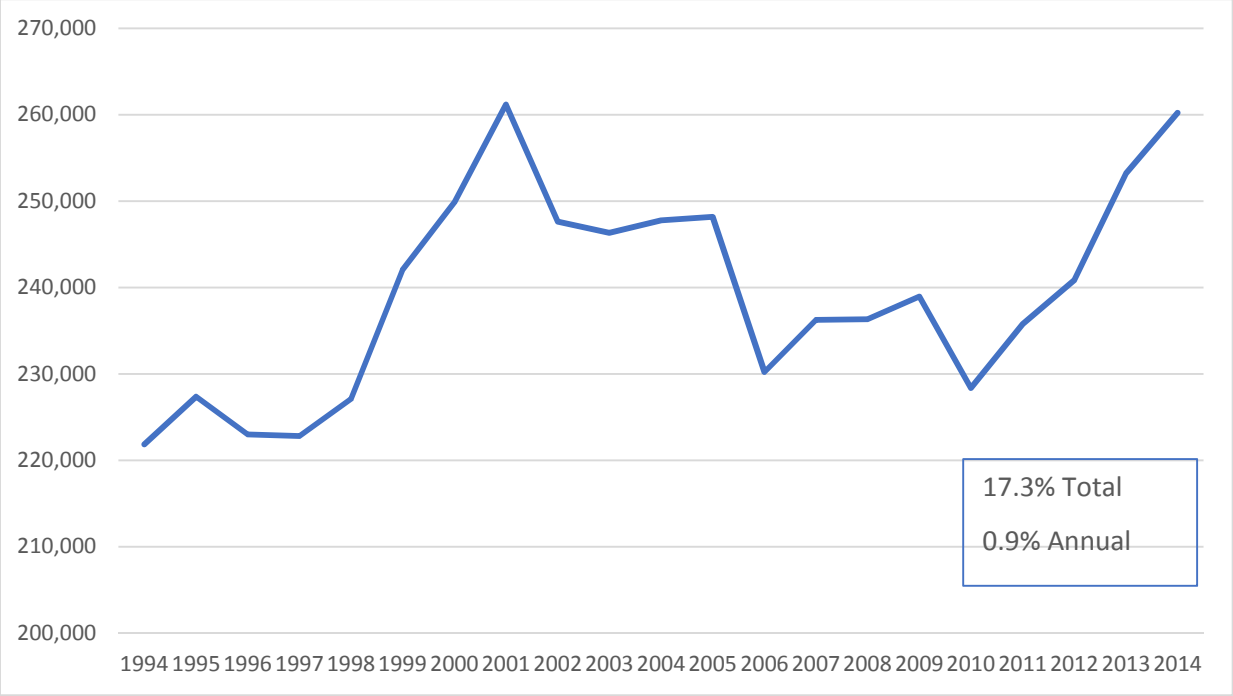
Applying the average annual Plan Bay Area increase (0.6% annually) from 2015 results in about 16% more peak hour trips, or about 44,000 peak hour trips in 2040.

For purposes of assessing future Core investments a range of growth scenarios is proposed. To inform this range, a review of the historical growth for daily all travel through the Transbay Corridor is provided.

6.2 Corridor Historical Growth (All Modes, Daily Weekdays)

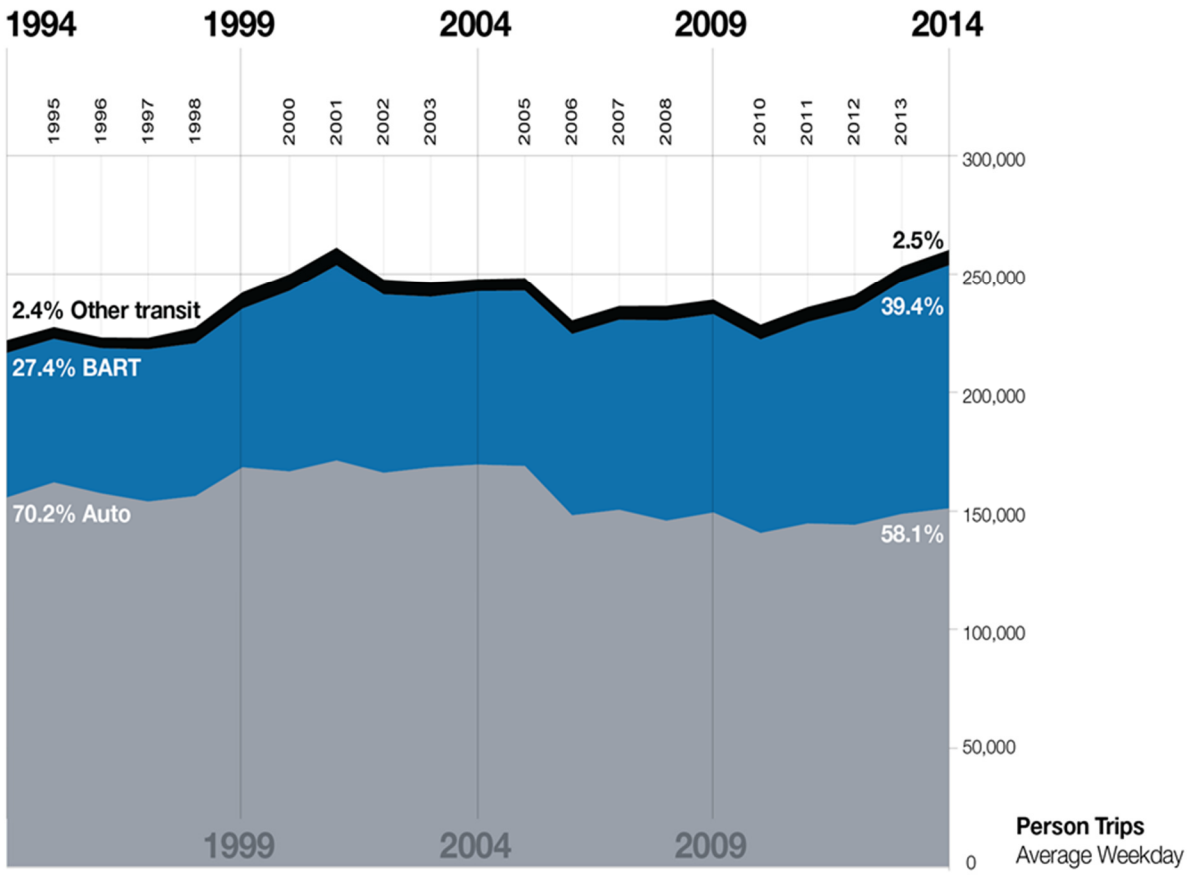
Between 1994 and 2014, overall daily travel (transit and auto) for the Transbay Corridor grew more than 17%, or about 0.9% annually. Figure 4 shows the historical growth for all travel over the twenty year period.

Figure 4: Historical Growth for All Daily Travel (1994-2014)



Separated by mode (and reported as weekday/daily, as hourly data is not available for the early years), the historical growth highlights a nearly 3% decline for auto trips, a 75% increase on BART and a 22% increase for AC Transit over the twenty year time period. Figure 5 shows the historical growth by mode.

Figure 5: Historical Growth for Daily Westbound Travel by Mode (1994-2014)



6.3 T2035 Forecasts (2006-2035)

MTC's previous Regional Transportation Plan (T2035) forecast an annual growth rate of 2.35% for daily travel between 2006 and 2035 for the Transbay Corridor. Assuming a consistent 2.35% growth rate from 2015 through 2040, there would be about 70,000 AM peak hour trips in the Transbay Corridor by 2040.

6.4 Market Assessment/Employment Increases (2015-2040)

As part of the Core Capacity Study, a market assessment reviewed the potential future market demand and availability/feasibility of work sites in downtown San Francisco. The assessment developed two possible scenarios for future growth: 1) a continued concentration where San Francisco captures a high rate of regional growth with increased densification of jobs and high rates of soft site redevelopment, and 2) a reduced competitiveness where San Francisco captures a lower rate of regional growth, with medium levels of job densification and soft site redevelopment.

The findings are grouped by subareas (shown in Figure 1). The continued concentration scenario projects approximately 143,000 new jobs and the reduced competitiveness approximately 102,000 jobs. Applying the continued concentration scenario, the growth is an increase of about 40%, or a 1.35% annual average increase. Applying this annual increase to 2014/15 results in a total peak hour demand of about 53,000 trips in 2040.

Greater detail and discussion of the San Francisco market assessment is provided in a separate memo.

Table 16 summarizes the range of growth forecasts for the Transbay Corridor from Plan Bay Area, T2035 and the Market Assessment.

Table 16: Range of Possible Demand Increases

		Total AM Peak Hour Demand						
Growth Trends		**Actual Observed (Rounded)**		**Forecast Demand (Rounded)**				
	Rate	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
T2035	*2.35%*	31,500	38,800	43,500	49,000	55,000	62,000	70,000
Plan Bay Area	*0.60%*	31,500	38,800	40,000	40,700	41,600	42,600	44,000
SF Market Assessment	*1.35%*	31,500	38,800	41,500	44,000	46,800	49,900	53,000

Figure 6 illustrates these growth ranges from 2015 – 2040. Figure 7 shows the low and high growth projections as a range of future demand compared to the amount of planned capacity improvements.

Figure 6: Transbay Corridor Demand Forecast Ranges (AM Peak Hour, 2010-2040)

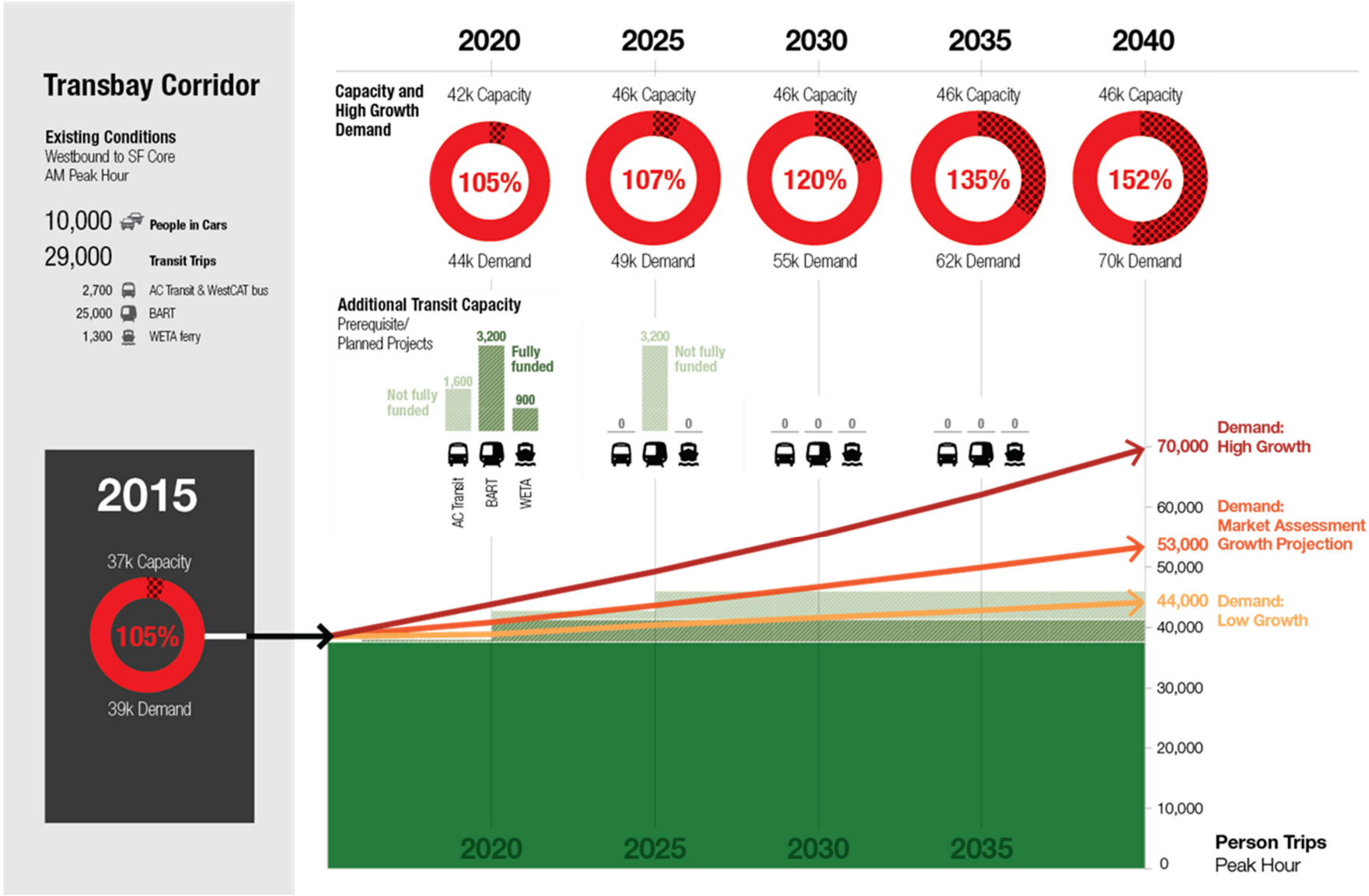
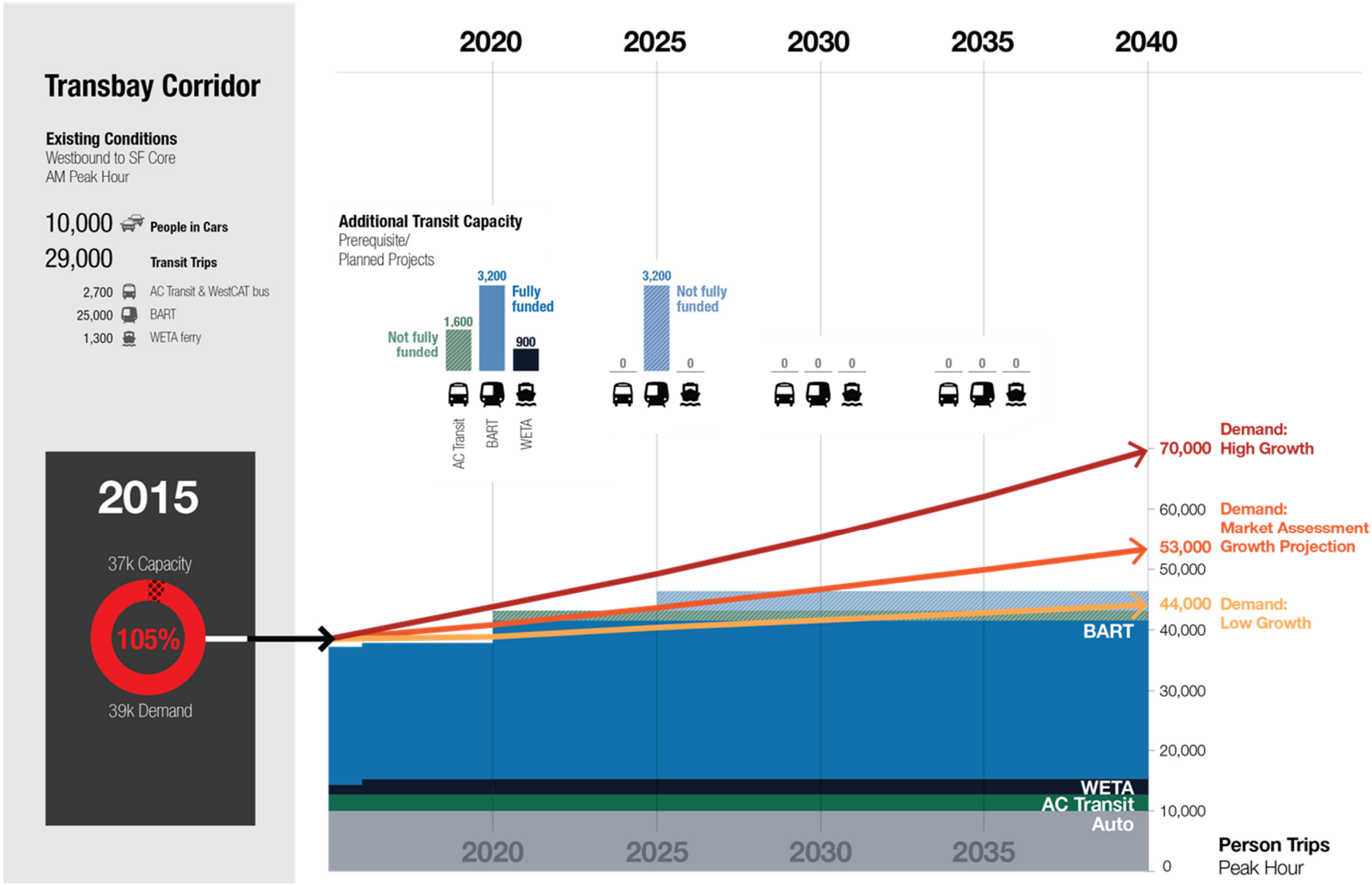


Figure 7; Growth Scenarios and Prerequisite Projects



7 Findings

In 2013, San Francisco's Core housed more than 350,000 jobs[28], with more than 40% of workers living in and traveling from the East Bay. Because workers travel through the constrained Transbay Corridor, there are only three options for traveling to the Core:

- Bay Bridge (automobiles – including carpools and buses)
- BART's Transbay Tube
- Ferry

Capacity challenges can be summarized as follows:

1. Since 2010, peak hour actual realized automobile capacity across the Bay Bridge decreased 12% (due to lower throughput and lower vehicle occupancy) resulting in an overall Transbay Corridor capacity decrease of 3%.

2. Since 2010, peak hour overall travel demand increased by 23% and transit demand grew 42%.

3. Demand is consuming 106% of peak hour capacity in the Transbay Corridor. The observed growth in demand has outpaced the average growth predicted in the MTC Plan Bay Area forecasts (4.2% compared to a forecast of 0.6%). While Plan Bay Area forecast 19% AM peak hour trip growth over 30 years, that entire 30 year demand was exceeded within the first five years.

4. Over the next few decades, planned improvements would result in additional peak hour transit capacity increases that would accommodate more than 11,000 trips (about a 40% increase in corridor person trip capacity). Each transit operator has significant growth planned:
    - 27% increase in BART capacity
    - 55% increase in AC Transit capacity
    - 215% increase in ferry service

5. In the short term (2015 - 2020), new transit investments include:
    - The Transbay Terminal
    - Increased AC Transit express service

    In the medium term (2020 - 2025), additional planned transit investments include:

    - Increased BART service, with longer trains
    - Additional WETA service

    Only a small increase in ferry service has been indentified as a long-term (2030-2040) transit investment.

[28] 2013 LEHD calculates 353,000 jobs in the Core

6. Planned transit investments, if all implemented, could increase AM peak hour transit capacity to almost 49,000 person trips in the Transbay Corridor.

7. The ability of these investments to meet demand will depend upon the rate of future growth. The transit growth rate in the last few years (4.5% per annum) reflects the economy's current growth trend, and it is unknown how long this rate will continue. Longer term trends from previous regional forecasts suggest that future growth per annum can be bracketed between a low forecast of 0.6% (based on Plan Bay Area 2010) and 2.35% (based on Transportation 2035). A recent review of the employment market for the Core suggests an annual growth rate of about 1.35%.

8. Under all forecast scenarios, without other investments, transit in the near term will continue to experience at-capacity or over-capacity conditions. The short term investments will bring some relief but will not address capacity issues under the higher growth scenarios. The medium term investments scheduled to come on line in 2025 will address overall transit demand but other investments will be needed to address demand in the long term (2030 and beyond).

9. Depending on overall future growth, additional capacity and/or other efficiency measures (e.g., higher bridge throughput, higher automobile occupancy, etc.) may be required beyond measures or policy changes planned by transit operators and other agencies.

CORE CAPACITY
TRANSIT STUDY

MEMORANDUM

APPENDIX A

Methodology – Transit Capacity and Demand Assumptions

The methodology used to calculate current and planned transit capacity, current observed volume of automobile trips, and summarize the MTC Plan Bay Area forecasts outputs for existing and forecasted demand is generally specific for the Transbay Corridor, with exception of the geographic boundaries of the Core.

The methodology for this memo includes:

1) Establish the Core Traffic Analysis Zones (TAZ)
2) Establish screenlines
3) Identify guiding policy documents for transit capacity

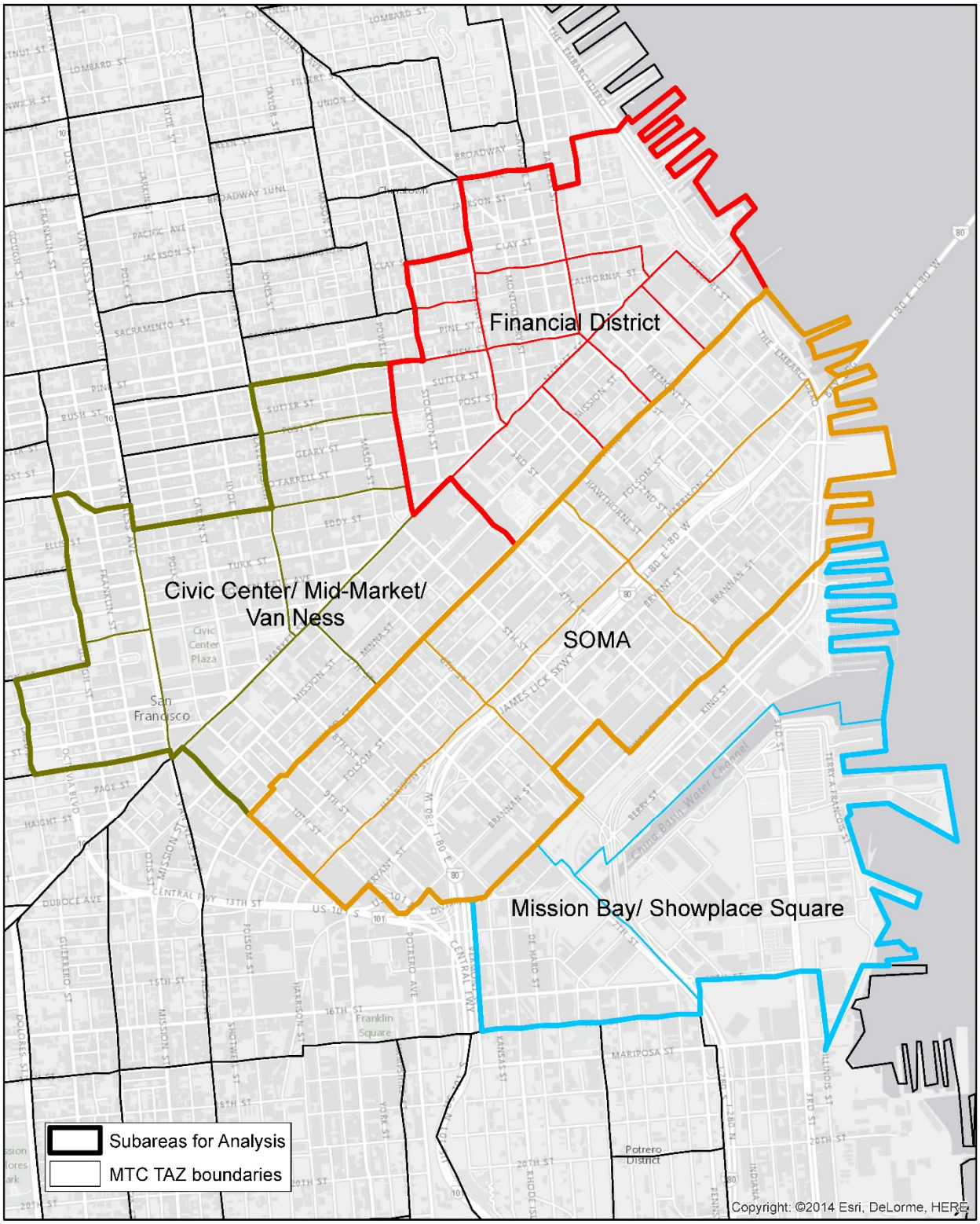
Core Geography

The Core is defined by four sub-areas:

- Financial District
- Mid-Market
- Mission Bay/Showplace Square
- South of Market (SoMa)

The boundaries of the sub-areas are defined by the MTC Travel Analysis Zones (TAZs). Trips that end within the Core are calculated to understand the amount of capacity (both vehicular and transit) that service the Core and the demand for those trips. Trips to sub-areas or TAZs outside of the Core are not considered for this study. Figure A1 shows the Core boundary and TAZs.

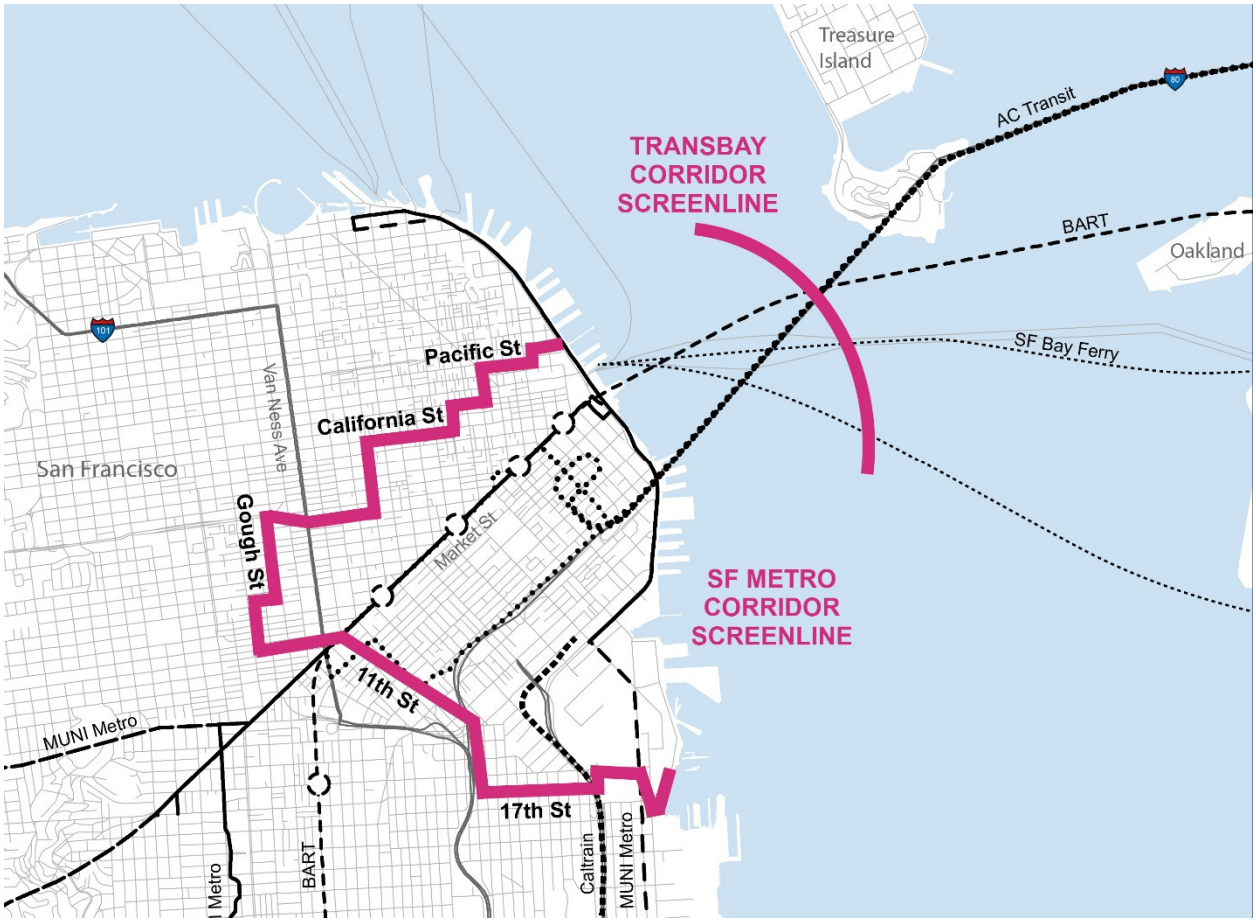
Figure A1: Core Sub-Areas



Screenlines

The Transbay Corridor screenline captures the specific transit routes and automobiles that cross en route to the San Francisco Core and includes BART's Transbay Tube, WETA ferry routes, AC Transit Transbay bus routes, and the Bay Bridge. The Transbay Corridor does not include either SFMTA Treasure Island bus routes or proposed WETA Treasure Island services. A future memorandum will detail the San Francisco Metro Corridor, and its screenline includes Caltrain, SFMTA surface and underground routes, and BART service from Daly City/Millbrae. The screenlines are shown in Figure A2.

Figure A2: Transbay and San Francisco Metro Screenlines



Guiding Policies on Capacity and Service

Each transit agency calculates capacity independently. For consistency purposes, capacity calculations were informed by the relevant policy documents from each agency, summarized in Table A2. Total capacity is calculated by determining the number of services per hour, the number of vehicles per hour, and the capacity per vehicle. Total service is also calculated using relevant policy documents, summarized in Table A3. Automobile capacity is calculated by determining the number of vehicle trips service into the downtown San Francisco Core during the peak hour. This number is then multiplied by the average observed occupancy.

AC Transit

Current service information for AC Transit came from AC Transit's Supervisor Point Check 1503SP form. This form lists all scheduled services arriving and departing at Temporary Transbay Terminal on weekdays effective Spring 2015. Planned services for the agency were derived from AC Transit's Core Capacity Program bus expansions, and assigned half of the 79 buses to Transbay services. In addition, other external documents researched included the Downtown San Francisco Ferry Terminal Expansion Project (2014) and the Caltrain Downtown Extension and Transbay Ridership Analysis (2008). Assumptions include:

- Planned Capacity Target Year – 2035-2040
- Vehicle Capacity – 40[29]
- Service Frequency – Calculated from the Supervisor Point Check form, using highest 60 minute departing volumes (this corresponded to morning peak hour of 8:15-9:15 and the afternoon peak hour between 5:15 and 6:15).

BART

BART capacity referenced the BART Sustainable Communities Operations Analysis (2013). Assumptions include:

- Planned Capacity Target Year – 2040
- Vehicle Capacity – All current and planned vehicle capacity figures were derived from the SCOA document.
- Service Frequency –The service frequency for the proposed new line was added to the service frequency for the Yellow Line.

Water Emergency Transit Authority

The San Francisco Bay Area Water Emergency Transit Authority's Implementation and Operations Plan from 2003 listed planned ferry lines, and the Downtown San Francisco Ferry Terminal Expansion Project (2014) provided ridership projections with the planned lines and capacity increases.

- Planned Capacity Target Year – The ridership projections in the Downtown Terminal Expansion document used 2035 for its ridership and capacity growth analyses.
- Vehicle Capacity – Individual ferry vessel capacity provided by WETA PMT member; vessel capacity ranges from 250 to 399 to 500.
- Service Frequency – WETA staff have identified capacity increases to serve projected ridership. These increases occur in two steps – 2025, when the current capacity of about 1,650 increases to about 3,700 (an increase of 2,100), and again in about 2035 when capacity increases to 6,800 (an increase of about 3,100). This is inclusive of the two additional lines within the Bay Bridge Corridor (Berkeley – SF, Richmond – SF).

[29] AC Transit Policy 550 identifies a 1.0 seating ratio as the policy capacity for Transbay bus services. AC 2010 and 2014 capacity based on AC bus vehicle assignments (with vehicles having 32, 36 and 57 seats respectively).

Table A1: Vehicle/Vessel Capacity

	Passenger Capacity	Either Seated or Standing Passengers	Source
AC Transit (Transbay buses)	32, 36, 57 (depending on vehicle size)	-	AC Transit Board Policy No. 550 – no standees by policy
BART	107	-	BART Sustainable Communities Operations Analysis (2013) – Includes standees
Muni Bus – 40 ft	-	54	2014 SFMTA Transit Fleet Management Plan
WETA	250-500	-	Coast Guard Regulations

Table A2: Service Guiding Documents

	Source
AC Transit	Core Capacity Challenge Grant Downtown San Francisco Ferry Terminal Expansion Project (2014) Caltrain Downtown Extension and Transbay Ridership Analysis (2008)
BART	BART Sustainable Communities Operations Analysis (2013)
SFMTA	Muni Forward Implementation Workbook (2015)
WETA	Implementation and Operations Plan (2003) Downtown San Francisco Ferry Terminal Expansion Project (2014)

Demand Forecasts

Plan Bay Area forecast forms the basis for future demand forecasts. The 2010 actual counts (and in some cases forecasts) are the baseline year. The forecast year is 2040. All trips have a given specific departure hour[30].

Plan Bay Area trip tables (original Plan Bay Area – RTP) for trips originating in the greater East Bay and destined for the Core (via the Transbay Corridor) were consulted to:

- Determine the forecast peak hour
- Determine the overall numbers of trips originating in the peak hour.

For Transbay trips, this grouping of TAZs originated from Alameda, Contra Costa, Napa, Santa Clara – northeast from Berryessa Station, and Solano Counties. Table 3 shows the specific TAZs grouped for travel through the Transbay screenline.

[30] *Plan Bay Area forecast* data and information can be found here: http://mtcgis.mtc.ca.gov/foswiki/Main/TravelModel.

Table A3: Study Area Traffic Analysis Zones (TAZs)

Screenline	TAZs	County
Transbay	595-638	Santa Clara County - northeast
	715-1039	Alameda County
	1040-1210	Contra Costa County
	1211-1290	Solano County
	1291-1317	Napa County

CORE CAPACITY
TRANSIT STUDY

MEMORANDUM

APPENDIX B

Historical (2010) and Existing (2015) Transit Capacity –

Detailed Table

Table B1: Transbay Peak Direction Screenline Core Capacity – Historical Conditions (2010)

			AM Peak Hour					PM Peak Hour				
Transit Operator	Transit Service	Service Description	Services per hour	Average Headway (mins)	Vehicles per Hour	Capacity per Vehicle	Peak Hour Capacity	Services per hour	Average Headway (mins)	Vehicles per Hour	Capacity per Vehicle	Peak Hour Capacity
AC Transit - 40ft (ST40 and TB40)	Bus	All lines	27	2.2	27	36	972	44	1.4	44	36	1,584
AC Transit - 40ft (VH40 and FC 40)	Bus	All lines	4	15.0	4	32	128	7	8.6	7	32	224
AC Transit - 45ft (MCI)	Bus	All lines	32	1.9	32	57	1,824	37	1.6	37	57	2,109
BART	Heavy Rail	Richmond - Millbrae Service (Red Line)	4	15.0	35	107	3,745	4	15.0	35	107	3,745
BART	Heavy Rail	Pittsburg / Bay Point - SFO Airport (Yellow Line)	11	5.5	103	107	11,021	11	5.5	103	107	11,021
BART	Heavy Rail	Dublin / Pleasanton - Daly City (Blue Line)	4	15.0	35	107	3,745	4	15.0	35	107	3,745
BART	Heavy Rail	Fremont - Daly City	4	15.0	39	107	4,173	4	15.0	39	107	4,173

			AM Peak Hour					PM Peak Hour				
Transit Operator	Transit Service	Service Description	**Services per hour**	**Average Headway (mins)**	**Vehicles per Hour**	**Capacity per Vehicle**	**Peak Hour Capacity**	**Services per hour**	**Average Headway (mins)**	**Vehicles per Hour**	**Capacity per Vehicle**	**Peak Hour Capacity**
San Francisco Bay Ferry AO - SF	Ferry	Alameda / Oakland - SF	1	60.0	1	290	290	2	30.00	2	290	580
San Francisco Bay Ferry HB - SF	Ferry	Harbor Bay - SF	1	60.0	1	200	200	1	60.00	1	200	200
San Francisco Bay Ferry VJO - SF	Ferry	Vallejo - SF	2	30.0	2	271	542.4	2	30.00	2	271	542.4
WestCAT	Bus	LYNX	3	20.0	3	57	171	3	20.0	3	57	171
Total Screenline Capacity			**93**	**0.6**	**282**	**-**	**26,811**	**120**	**0.5**	**312**	**-**	**28,094**

`

Table B2: Transbay Peak Direction Screenline Core Capacity – Existing Conditions (2015)

			AM Peak Hour					PM Peak Hour				
Transit Operator	Transit Service	Service Description	**Services per hour**	**Average Headway (mins)**	**Vehicles per Hour**	**Capacity per Vehicle**	**Peak Hour Capacity**	**Services per hour**	**Average Headway (mins)**	**Vehicles per Hour**	**Capacity per Vehicle**	**Peak Hour Capacity**
AC Transit – 40ft	Bus	All lines	41	1.5	41	36	1476	67	0.9	67	36	2412
AC Transit – 45ft	Bus	All lines	22	2.7	22	57	1254	22	2.7	22	57	1254
BART	Heavy Rail	Richmond - Millbrae	4	15.0	35	107	3745	4	15.0	35	107	3745
BART	Heavy Rail	Pittsburg / Bay Point - SFO Airport	11	5.5	103	107	11021	11	5.5	103	107	11021
BART	Heavy Rail	Dublin / Pleasanton - Daly City	4	15.0	35	107	3745	4	15.0	35	107	3745
BART	Heavy Rail	Fremont - Daly City	4	15.0	39	107	4173	4	15.0	39	107	4173
WETA	Ferry	Alameda / Oakland - SF	2	30.0	2	290	580	2	30.0	2	290	580
WETA	Ferry	Harbor Bay - SF	1	60.0	1	200	200	1	60.0	1	200	400
WETA	Ferry	Vallejo - SF	2	30.0	2	271.2	542.4	2	30.0	2	271.2	542.4

WestCAT	Bus	Hercules - SF	3	20.0	3	57	171	3	20.0	3	57	171
Total Screenline Capacity			**94**	**-**	**283**	**-**	**26,907**	**120**	**-**	**309**	**-**	**28,043**

CORE CAPACITY
TRANSIT STUDY

MEMORANDUM

APPENDIX C

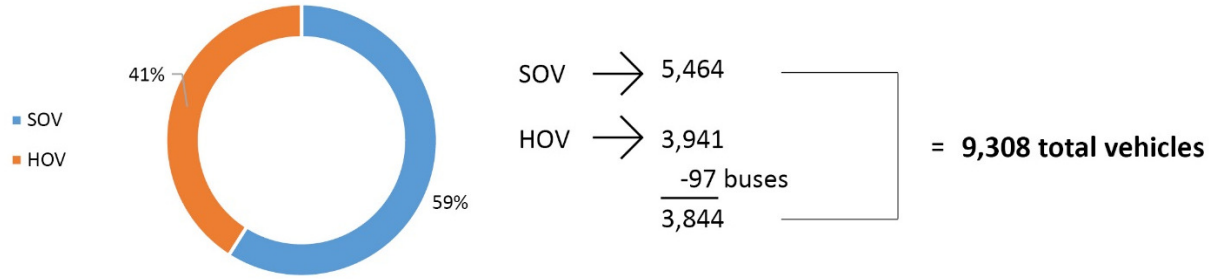
Calculations for Historical and Existing Automobile Trips

Appendix C details the process for calculating the historical and existing automobile trips through the Transbay Corridor to the Core.

The Bay Area HOV Lane report[31] annually details total vehicle volume, high occupancy vehicle (HOV) and single occupancy vehicle (SOV) vehicle share, and average occupancy rates for both HOV and SOV vehicles. The most recent reports span the years 2010-2013. The most recent data on the Bay Bridge was published in the 2012 report. A new report has not been released since 2013.

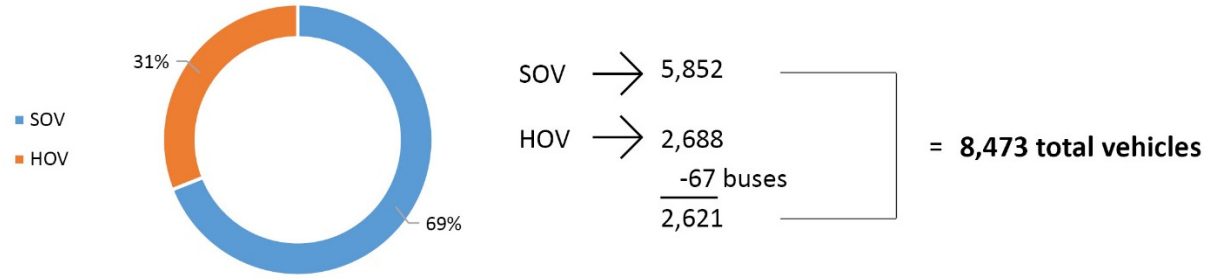
The 2010 report[32] showed a total Bay Bridge capacity, excluding buses, of 9,308 vehicles in the peak morning hour from 7:00AM – 8:00AM[33]. Of this total, 41% were HOV and 59% SOV. The 2010 volumes are visualized in Figure C1.

Figure C1: Auto Trips Delivered (2010)



The 2012 report[34] published lower vehicle and passenger numbers for the Bay Bridge than had been published in the 2010 report. The total number of vehicles in the morning peak hour[35] (again reported as 7:00AM – 8:00 AM) was 9% lower at 8,473 vehicles. The HOV share of all traffic also declined from a reported 41% to 31%. The 2012 volumes are visualized in Figure C2.

Figure C2: Auto Trips Delivered (2012)



[31] 2010 Bay Area HOV Lanes, Caltrans District 4, http://www.dot.ca.gov/dist4/highwayops/docs/hov_report_2010.pdf.
[32] Bus vehicles and passengers are excluded from the auto person trips counts
[33] Observations conducted 5/13/10 at the SFOBB Toll Plaza (2010 Bay Area HOV Lanes, Caltrans District 4, http://www.dot.ca.gov/dist4/highwayops/docs/hov_report_2010.pdf. Page 45)
[34] 2012 Bay Area Managed Lanes, Caltrans District 4, http://www.dot.ca.gov/dist4/highwayops/docs/Final-Managed-Lane-2012.pdf.
[35] Observations conducted 6/6/12 at the SFOBB Toll Plaza (http://www.dot.ca.gov/dist4/highwayops/docs/Final-Managed-Lane-2012.pdf. Page 51)

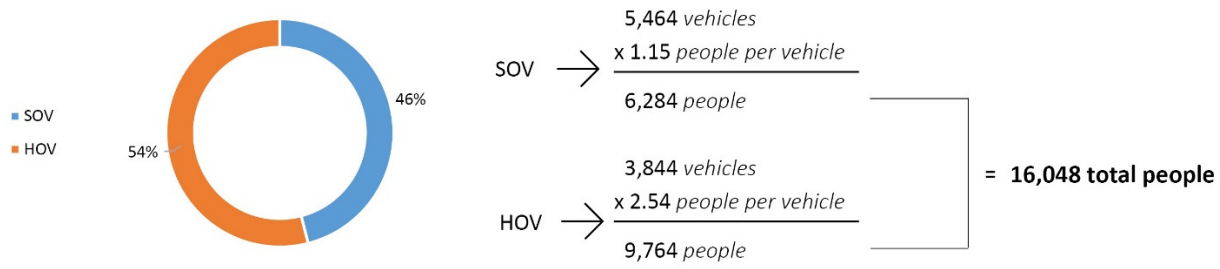
Table C1 shows the percentage change between 2010 and 2012.

Table C1: Change in Capacity (2010, 2012 Peak Hour)

	2010	2012	Change	
	AM Capacity	**AM Capacity**	**Number**	**Percent**
Auto Trips Served	9,308	8,473	-835	-9%
Total	**9,308**	**8,473**	**-835**	**-9%**

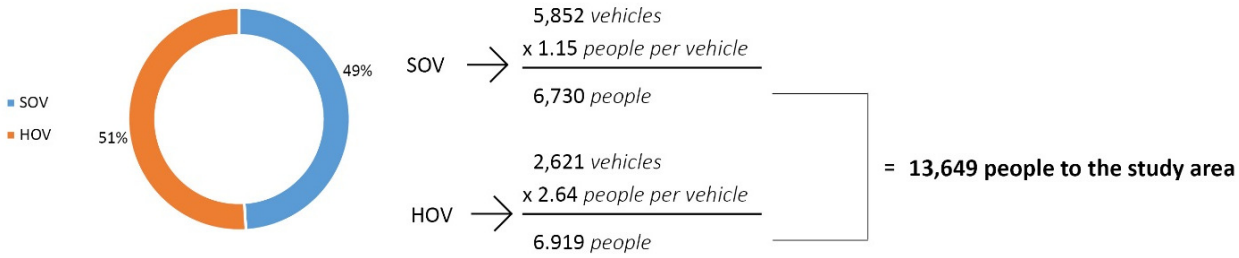
Excluding bus passengers, the occupancy rates per vehicle in the 2010 report was 2.54[36] people per HOV and 1.15 people per vehicle in the mixed flow lanes. The total number of people crossing the Bay Bridge in the morning peak hour was 16,048, excluding 3,395 bus passengers. This is visualized in Figure C3.

Figure C3: Vehicle Occupancy – People Delivered through the Corridor (2010)



The 2012 report found average occupancy remained relatively flat with SOV unchanged at 1.15 people per vehicle and HOV at a slightly higher 2.64[37] people per vehicle. This is visualized in Figure C4.

Figure C4: Vehicle Occupancy – People Delivered through the Corridor (2012)



[36] The rate is calculated by removing the bus passenger counts from the total number of passenger counts (2010 Bay Area HOV Lanes, Caltrans District 4, http://www.dot.ca.gov/dist4/highwayops/docs/hov_report_2010.pdf. Page 45)
[37] The HOV rate was calculated using the same methodology as for the 2010 figures

The reduction in vehicles through the corridor reduced the total number of person trips on the Bay Bridge by more than 2,000. Table C2 shows the overall reduction and the percentage change between 2010 and 2012.

Table C2: Change in People Delivered through the Corridor (2010, 2012 Peak Hour)

	2010	2012	Change	
	AM Capacity	**AM Capacity**	**Number**	**Percent**
People Trips Served	16,048	13,649	-2,399	-15%
Total	**16,048**	**13,649**	**-2,399**	**-15%**

While the Bay Bridge provides a natural pipeline to capture trips traveling through the corridor, not all trips are going to the Core. To determine what percentage of vehicles pass through the Core, observed traffic conditions were compared the Plan Bay Area forecast estimates of the number of vehicles that travel to the Core. Plan Bay Area forecast estimates that 65% of vehicle trips travel to the Core.

Observed traffic was noted for evening traffic for the entire month of May 2015[38]. The selection of an average of one month's capacity to represent automobile traffic loosely follows the methodology used in the Bay Bridge Corridor Congestion Study. Daily traffic patterns vary with little consistency, so the Bay Bridge Corridor Congestion Study methodology selects the most representative one day (in practice, the day that is closest to the median of the observed data). This methodology was approved by Caltrans. For the purposes of this memo, the entire month of May 2015 was selected and averaged to represent current auto capacity.

Evening traffic was calculated from eastbound traffic at the on-ramps[39] in the Core. Evening on-ramp counts were used because Westbound AM peak hour off-ramp counts are unavailable. The on-ramp counts were use to calculate the proportion of vehicles traveling from the Core. On average, 8,800 vehicles are traveling eastbound on the bridge during the evening peak, and using on-ramps counts, found 6,501 vehicles traveling from the Core. If applied as the AM peak hour, this indicates that almost 74% of vehicles are traveling to the Core.

Using the Plan Bay Area forecasts estimates and the evening eastbound observed data presents challenges. Given that both the model and the observed data do not independently provide an complete account, the memo assumes an average between the two percentages (65%, 74%). This equated to an assumption that 70% of vehicle trips across the corridor are heading to the Core. This number was applied to all auto person trip totals for 2010 and 2012. The total vehicles traveling to the Core in 2010 was 6,516, and 5,931 in 2012. This is visualized in Figures C5-C6.

[38] The detector station used was 402814 at (absolute) postmile 2.79.

[39] Ramp 1 (Bryant St): 948 vehicles/hour, Warriors Arena DEIR, 2015 http://www.sfocii.org/index.aspx?page=61. Ramp 2 (5th St): 876 vehicles/hour, Bay Bridge Corridor Congestion Study, 2010 http://www.actransit.org/wp-content/uploads/2010_10_14_Bay_Bridge_Report_V5D.pdf. Ramp 3 (8th St): 1250 vehicles/hour, Bay Bridge Corridor Congestion Study, 2010 http://www.actransit.org/wp-content/uploads/2010_10_14_Bay_Bridge_Report_V5D.pdf. Ramp 4 (Essex St): 1639 vehicles/hour, Caltrans PeMS, July 2015. Ramp 5 (1st St): 1988 vehicles/hour, Caltrans PeMS, July 2015.

Figure C5: Vehicles Traveling to Core (2010)

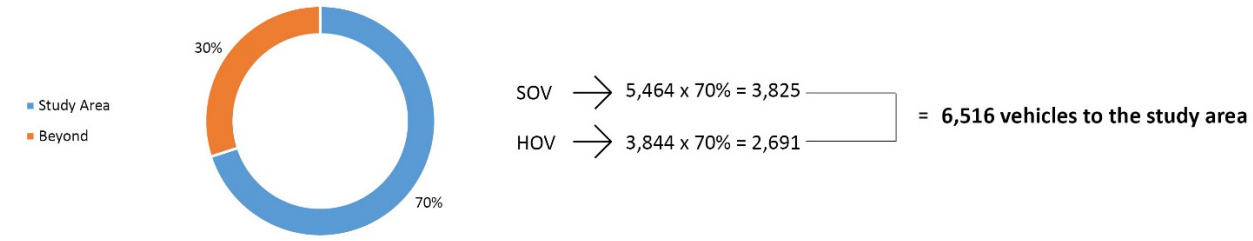
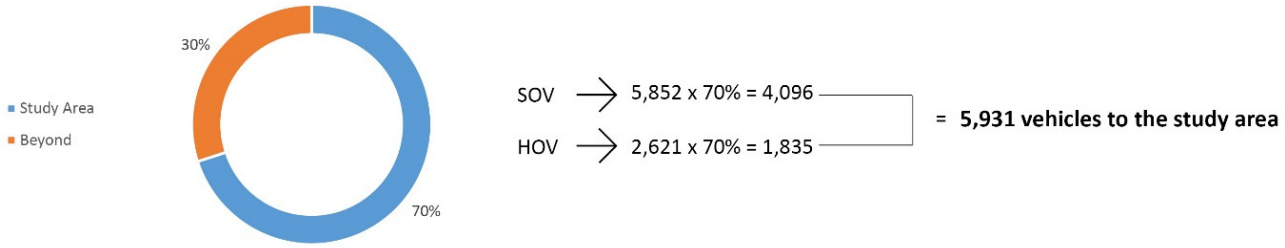


Figure C6: Vehicles Traveling to the Core (2012)



The total people traveling in vehicles to the study area in 2010 was 11,234 and 9,554 in 2012. This is visualized in Figure 7-8.

Figure C7: People Traveling to the Core (2010)

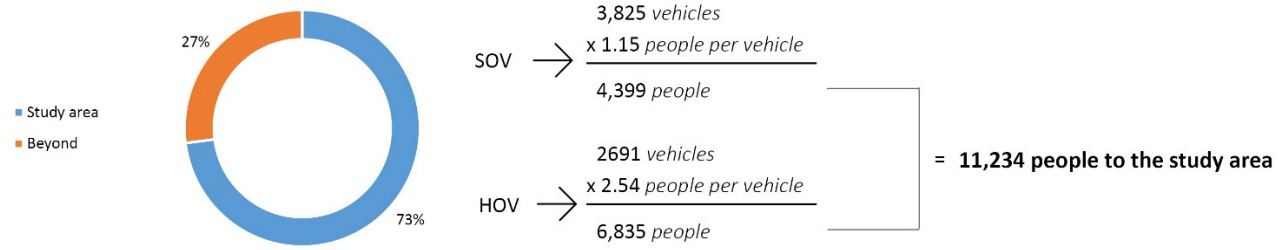
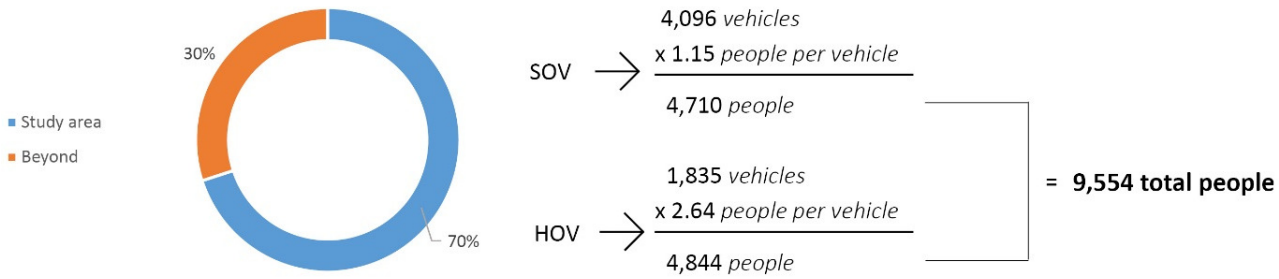


Figure C8: People Traveling to the Core (2012)



Automobile Volumes (2014)

The most recently issued Bay Area HOV Lane report is from 2012. While 2014 observed data can be collected, the HOV and SOV vehicle share, and average occupancy rates for both HOV and SOV vehicles have not been reported since 2012. To ensure consistency with the transit capacity figures that are calculated through 2015, an exercise was undertaken to derive 2014 automobile volumes based on the 2012 published data and early 2015 traffic counts.

Observed 2015 traffic volume was gathered from a PeMS detector in westbound traffic west of the toll plaza and metering lights[40]. Similar to the 2012 counts, the entire month of May was observed and averaged to represent a typical day[41]. A rolling 60-minute average from 7:00AM – 8:00AM for each day was used to determine the average and median of those numbers. In May 2015, an average of 8,489 and a median of 8,546 vehicles traveled westbound on the bridge during the peak morning hour.

Using the 2012 report data as a baseline, rates from the report were combined with observed data collected by the Bay Area Toll Authority[42] to derive a likely percentage of HOVs. The 2012 report stated that HOVs had an average share of 31% for all trips. In 2010[43], a carpool fee was implemented, which may explain the decline in HOV share from 41% to 31% reported between the 2010 and 2012, with 2012 reporting the first year following the fee implementation. To account for the decline, HOV rate changes were compared from 2011 to 2014. Table C3 shows the reported changes. BATA reports that HOV rates fell between 2010- 2011 from 28.9% to 25.6% but increased to 27.8% in 2014, an increase of 8%.

Table C3: HOV Reported Rates 2011-2014

	2010	2011	**2014**	Change 2011-**2014**
HOV Rate	**28.9%**	**25.6%**	**27.8%**	**+8%**

The 8% increase was applied to the 2012 Caltrans rate (31%) to reach an average total of HOV split at 33.5%, rounded to 34%. Applying the 2012 rates to the median, 2,863 vehicles are high occupancy. The findings are visualized in Figure C9.

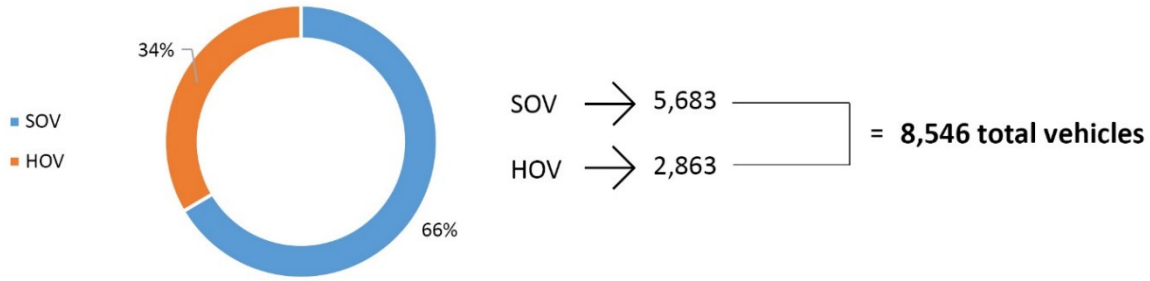
[40] Detector 406542 on the east span of the bridge. The detector was checked to ensure full operations and reporting 100%

[41] Data for non-holiday Tuesdays-Thursdays were selected and analyzed over a full 24-hour period

[42] The lane type chart has likely occupancy splits: http://analytics.mtc.ca.gov/foswiki/Main/TypicalWeekdayBridgeTransactions.

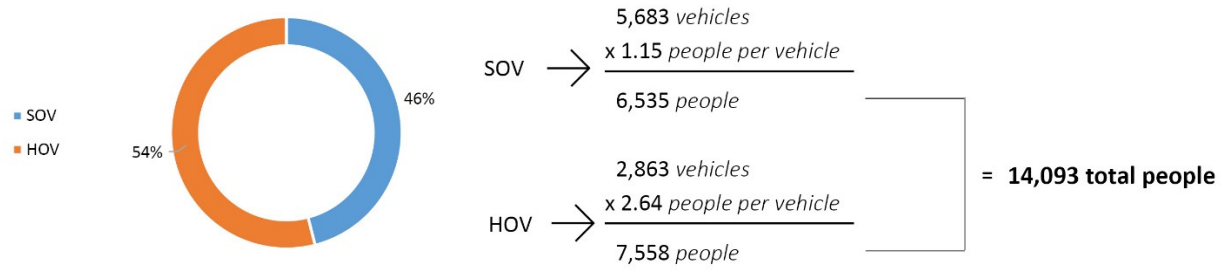
[43] "On July 1, 2010, the Bay Area Toll Authority (BATA) raised the tolls on the seven state-owned bridges in the San Francisco Bay Area. […] On the San Francisco-Oakland Bay Bridge…. the peak period 3+ person carpool toll was set at $2.50, the same as on other bridges." Bay Bridge Toll Evaluation: Final Report, http://www.uctc.net/research/papers/UCTC-FR-2012-11.pdf.

Figure C9: Automobile Trips Delivered (2014)



The 2012 average occupancy levels for SOV (1.15 people per vehicle) and HOV (2.64 people per vehicle) were applied to the 2015 vehicle counts, since no updated occupancy rates are available post-2012. This is visualized in Figure C10.

Figure C10: Vehicle Occupancy – People Delivered through the Corridor (2014)



A total of 14,093 people are traveling the Transbay Corridor in automobiles. Capturing the number of trips ending in the Core presents similar challenges faced with estimating the Core-based trips in 2012. The memo assumed the same percentage (70%) that was used for the 2012 volumes. This equated to 9,866 people traveling to the Core in 5,982 vehicles. This is visualized in Figure C11-C12.

Figure C11: People Traveling to the Core (2014)

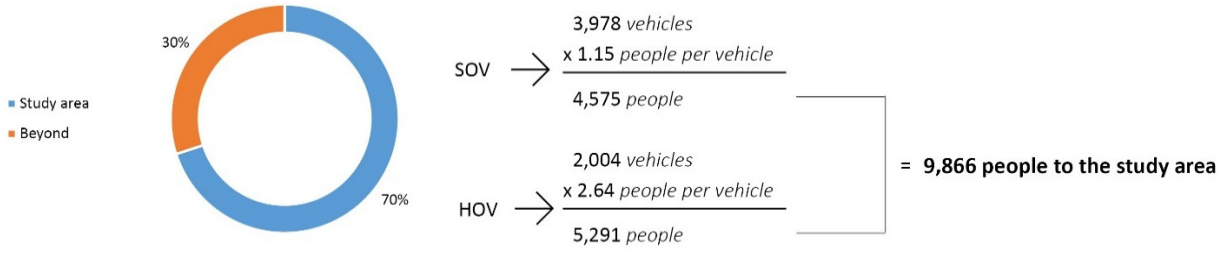
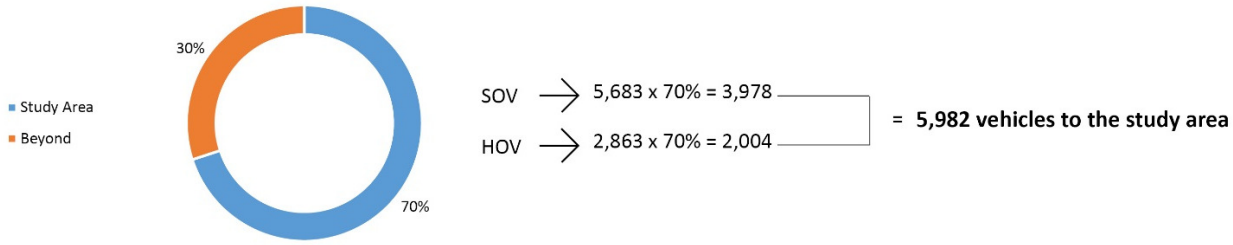


Figure C12: Vehicles Traveling to the Core (2014)



CORE CAPACITY
TRANSIT STUDY

MEMORANDUM

APPENDIX D

Planned Capacity – Detailed Table

Transbay Peak Direction Screenline Core Capacity – Planned Capacity (2040)

			AM Peak Hour					PM Peak Hour				
Transit Operator	Transit Service	Service Description	**Services per hour**	**Average Headway (mins)**	**Vehicles per Hour**	**Capacity per Vehicle**	**Peak Hour Capacity**	**Services per hour**	**Average Headway (mins)**	**Vehicles per Hour**	**Capacity per Vehicle**	**Peak Hour Capacity**
AC Transit	Bus	All lines	103	0.6	103	42	4330	129	0.5	129	41	5266
BART	Heavy Rail	Richmond - Millbrae Service	5	12.0	50	107	5350	5	12.0	50	107	5350
BART	Heavy Rail	Pittsburg / Bay Point - SFO Airport	11	5.5	110	107	11770	11	5.5	110	107	11770
BART	Heavy Rail	Dublin / Pleasanton - Daly City	5	12.0	50	107	5350	5	12.0	50	107	5350
BART	Heavy Rail	Fremont - Daly City	6	10.0	60	107	6420	6	10.0	60	107	6420
WETA	Ferry	All lines	15	-	15	278	4,168	15	-	15	278	4,168
WestCAT	Bus	Lynx	3	20.0	3	57	171	3	20.0	3	57	171
Total Screenline Capacity			**145**	**-**	**388**	**-**	**37,559**	**171**	**-**	**414**	**-**	**38,495**