

Appendix A: Current Conditions - Annotated Bibliography

The following section summarizes current resources that address a second transbay crossing or are relevant to the current conditions for a third crossing. These resources from federal and state documents, regional and local public agencies, non-profit and for-profit organizations, and academic research.

Annotated Bibliography Contents

Federal and State Documents

- State Rail Plan (2013), *Caltrans*
- Title VI Circular to 4702.1B (2012), *Federal Transit Administration*
- Vulnerability Assessment Scoring Tool (2015) *US Department of Transportation*

Regional and Local Public Agency Documents

- 2015 State of the Region, *ABAG*
- San Francisco Bay Area Rapid Transit District (BART) Climate Change Adaptation Assessment Pilot (2013), *Federal Transit Administration*
- Bay Area Regional Rail Plan (2007), *MTC, BART, Caltrain and California High Speed Rail Authority*
- Bay Bridge Corridor Congestion Study, (October 2010 draft), *AC Transit*
- Bay Bridge Forward Initiative (2016), *Partnership MTC, Caltrans, AC Transit, WestCat, and WETA*
- Building a Better BART (2014), *BART*
- Capitol Corridor Vision Plan (2014) *Capitol Corridor*
- Core Capacity Transit Study (CCTS) (2016), *Metropolitan Transportation Commission*
- Disparate Impact and Disproportionate Burden Policy (adopted 2013), *BART*
- Plan Bay Area (2013), *MTC and ABAG*
- Plan Bay Area, "Equity Analysis" (2013), *MTC and ABAG*
- San Francisco Bay Crossings Study (2000), *Metropolitan Transportation Commission*
- WETA 2016 Strategic Plan (the San Francisco Bay Ferry)

Non-Profit and For Profit Organization Documents

- ConnectOakland Vision
- Designing the Bay Area's Second Transbay Rail Crossing (2016), *SPUR*
- Equity Considerations for a Second Transbay Crossing - Executive Summary (2015; full report forthcoming), *TransForm*
- SPUR "New Transbay Transit Crossing" Event: Hosted by SPUR (April 2016)
- The Case for a Second Transbay Crossing (2016). Bay Area Council Economic Institute Global Infrastructure Initiative 2015: Post-event summary. McKinsey & Company

- The Northern California Megaregion: Innovative, Connected, Growing (2016), Bay Area Council Economic Institute
- The Northern California Megaregion (2007), SPUR

Academic and Other Research, Selected

- E. Deakin, K. Trapenberg Frick, R. Cervero et. al.: *Bay Bridge Toll Evaluation Final Report* (2011)
- Heller, Jeffrey (February 15, 2014). "2nd BART tube under the bay would serve region well" *San Francisco Chronicle*.
- Barnes, K. Trapenberg Frick, E. Deakin, and A. Skarbardonis: *Impact of Peak and Off-Peak Tolls on Traffic in San Francisco-Oakland Bay Bridge Corridor in California* (2012)
- K. Trapenberg Frick, S. Heminger, and H. Dittmar: *Bay Bridge Congestion-Pricing Project: Lessons Learned to Date* (1996)
- R. Cervero: *Traffic Impacts of Variable Pricing on the San Francisco-Oakland Bay Bridge, California* (2014)
- Trapenberg Frick, K.: *Remaking the San Francisco-Oakland Bay Bridge: A Case of Shadowboxing with Nature* (Routledge, 2016)

Federal and State Documents

State Rail Plan (2013), Caltrans. Federal regulations require that states produce a state rail plan at least every five years to receive funding for traditional passenger rail and high speed rail. The 2013 State Rail Plan is the most recent update for California. It is a wide ranging document that covers current conditions, customer and public outreach, and future plans for state rail. The 2018 plan currently is in development and discussion with individuals aware of the process indicate that a transbay crossing will be discussed in the updated plan. Available from:

http://www.dot.ca.gov/californiarail/docs/Final_Copy_2013_CSRP.pdf

Title VI Circular to 4702.1B (2012), Federal Transit Administration. This Circular outlines instructions for recipients of Federal Transit Administration transportation funding to comply with the U.S. Department of Transportation's Title VI requirements, as outlined in 49 CFR Part 21. Transit agencies that have operations of greater than 50 fixed route vehicles during peak period and operate in urbanized areas with a population greater than 200,000 must continually monitor and evaluate their transit service to understand if minority populations are receiving equal transit service as non-minority populations. Furthermore, whenever there is a proposed change of service or fares, agencies must first conduct equity analyses to ensure that minority populations are not disparately impacted. This type of analysis would most likely be required for any third crossing project. Available from:

https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Title_VI_FINAL.pdf

Vulnerability Assessment Scoring Tool (2015), US Department of Transportation. Guide and instrument for a tool created by DOT to help transportation agencies assess vulnerability of assets. Vulnerability is measured in terms of exposure, sensitivity and adaptive capacity for individual assets. Includes an application to infrastructure in the Gulf Coast region around Mobile, AL. Available from: http://www.fhwa.dot.gov/environment/climate_change/adaptation/adaptation_framework/modules/scoring_tools_guide/vast_users_guide.pdf

Regional and Local Public Agency Documents

2015 State of the Region, ABAG. This report was prepared by the Association of Bay Area governments to build on other resources tracking trends and regional conditions on the topics of the economy, population and demographics, as well as housing. The report was intended to identify how effectively state and regional planning strategies have been leading regional growth and change. A major theme in the report is the strong economic recovery that the Bay Area has experienced since the Great Recession, along with slow steady population growth. The report identifies challenges such as reduced financing availability for new residential construction, uncertain continued availability of affordable housing for residents of all incomes, and whether new growth will be transit-oriented and transit-accessible. The report touches on the ongoing challenge for the region to meet growing housing demands. Available from: <http://reports.abag.ca.gov/sotr/2015/executive-summary.php>

BART Climate Change Adaptation Pilot Study (2013). Pilot study funded by FTA to determine climate change related risk and potential adaptation strategies for BART assets. Frameworks were developed to address climate change adaptation, including understanding climate change scenarios, assessing vulnerability, asset management and potential adaptation strategies. The report recommends as a next step that BART devise a funding plan for a system-wide vulnerability and risk review of the operating system and assets. Available from: https://www.transit.dot.gov/sites/fta.dot.gov/files/FTA_Report_No._0074.pdf

Bay Area Regional Rail Plan (2007), MTC, BART, Caltrain and California High Speed Rail Authority (CHSRA). The Bay Area Regional Rail Plan is the first comprehensive, regional rail plan in over 50 years that describes a long-range vision for passenger rail in the Bay Area. In addition to addressing transportation improvements needed, the report describes the value of rail in addressing issues such as environmental goals, economic development and compact, dense development. The vision describes the potential of high speed rail to support regional travel improvements, particularly in light of the Bay Area as part of an emerging megaregion. The plan describes the need for a new governance structure to deliver high-speed infrastructure and service, including a discussion of several different governance structures types. The plan includes a series of alternatives, one of which addresses in part the need to provide another transbay tube to relieve congestion. The vision also includes a description of supportive land use strategies needed in tandem with rail investments. Available from: <http://mtc.ca.gov/sites/default/files/BARegionalRailReport-ExSum.pdf>

Bay Bridge Corridor Congestion Study, (October 2010 draft), AC Transit – The report evaluates future performance of bus service on the Bay Bridge and evaluates employing altered metering or physical improvements for improving service. The physical improvements include extending the HOV system further east into Oakland and addition of a contra flow lane. Extending the HOV network is critical for addressing the concern that queues at the Bay Bridge toll plaza on the east side will extend far enough to HOV bypass lanes preventing efficient running of bus service. Available from: http://www.actransit.org/wp-content/uploads/2010_10_14_bay_bridge_report_v5d.pdf

Bay Bridge Forward Initiative (2016), Partnership MTC, Caltrans, AC Transit, WestCat, and Water Emergency Transit Agency – The initiative is a series of strategic investments (\$40 million) for

the next ten years to increase the number of people moving across the Bay Bridge during peak commute hours. Projects include integration of traffic management systems at all bridge entrances, improvements to HOV and bus only on-ramps in Oakland, transit signal priority for buses, higher frequency ferry service, and support for casual carpool. Initiative projects are included in the MTC Core Capacity study capacity estimates and listed in more detail in press release included below. Available from: <http://mtc.ca.gov/whats-happening/news/bay-bridge-forward-deliver-congestion-relief-san-francisco-oakland-bay-bridge>

Building a Better BART – Report specifies two primary challenges: maintaining and upgrading existing infrastructure; and, increasing capacity to meet growing ridership during peak periods. The report does not specifically address a potential future transbay crossing. However, the report considers three methods for increasing peak capacity: 1) Increasing capacity at Embarcadero and Montgomery stations in Downtown San Francisco; 2) Creating track redundancy to ensure trains can bypass broken down trains or other obstructions, and 3) Creating new turnarounds that allow trains to be more efficiently redeployed. Available from:

<https://www.bart.gov/sites/default/files/docs/Executive%20Summary%20Building%20a%20Better%20BART.pdf>

Capitol Corridor Vision Plan (2014), Capitol Corridor - The 2014 Capitol Corridor Vision Plan describes the plan for the regional rail system, including short and medium term plans over the next 10 years and a longer term vision over the next 40 to 50 years. Capitol Corridor, overseen by the Capitol Corridor Joint Powers Authority (CCJPA), operates between Sacramento and the Bay Area and BART provides staff support. The Plan describes how it will benefit from new revenues from the state Cap and Trade program, which will allow for expanded investments in services, as well as federal funding for high-speed rail. The Plan is intended to build on other existing plans, including the California High Speed Rail planning efforts, the Bay Area Regional Rail Plan and the Northern California Emerging Megaregion Plan. In terms of the transbay corridor, the short and medium term plans focus on increasing service frequency and travel times between Oakland and San Jose. The longer term vision focuses on the service as a “transit spine” for the megaregion. Key principles in the plan include integrating service connections, schedules and fares across providers and developing redundancy to protect against system vulnerabilities from sea-level rise. The Plan discusses how some alternatives for future development would be considered based on a potential new third crossing, including connections to a potential future station in West Oakland or Jack London Square. Available from:

<http://www.capitolcorridor.org/downloads/CCJPAVisionPlanFinal.pdf>

Core Capacity Transit Study (CCTS) (2016), Metropolitan Transportation Commission. The study, slated for completion in Spring 2017, provides a comprehensive review of demand and capacity across the Transbay Corridor and the San Francisco Metro Corridor. The Metro Corridor refers to the BART, Caltrain and MUNI transit networks in San Francisco. Materials developed include a Transbay problem statement, a capacity and demand summary, and an initial engineering study for a future crossing. The report is framed within the context of building transit capacity to serve morning peak demand on the corridor for entering the San Francisco core. MTC argues that the Bay Bridge currently is filled at vehicle capacity during the morning commute and thus in the absence of significant increase in average vehicle occupancy, any increase in capacity will need to come from additional transit provision. Proposed short-term and mid-term projects will increase capacity on transit to meet near-term increases in demand. The projects include, but are not limited to new BART cars, BART train control

modernization, new Transbay bus terminal, bus only lanes on approach to Bay Bridge, expansion of ferry service. Still, transit will be unable to meet long-term demand under all but the most conservative estimates. The study includes an engineering study of Transbay crossing that identifies promising alignments; however, the report does not recommend a crossing as a long-term solution but instead recommends further study of a crossing. Available from: <http://mtc.ca.gov/our-work/plans-projects/other-plans/core-capacity-transit-study>

Disparate Impact and Disproportionate Burden Policy (adopted 2013), BART - This policy outlines BART's thresholds for disparate impacts and disproportionate burden as required by the Federal Transit Administration's Title VI Circular 4702.1B. For fare and service changes, BART determines "disproportionate impact" by assessing how the change would impact "protected" versus "non-protected" riders, with "protected riders" defined as minority or low-income populations. A third crossing would most likely be subject to both fare and service equity analyses. Available from: <https://www.bart.gov/sites/default/files/docs/Final%20DI.DB%20Policy.pdf>

Plan Bay Area (2013), MTC and ABAG. As the regional transportation and land use agencies, MTC and ABAG developed the Bay Area's regional Sustainable Communities Strategy (SCS) to comply with SB 375. The plan focuses 78% of the region's planned new housing and 62% of the region's planned new jobs in Priority Development Areas (PDAs) near transportation facilities. This concentration of housing and jobs near transportation options is intended to help the region reduce its greenhouse gas emissions by 15% by 2035. The plan is currently being updated and as part of the update MTC is evaluating a new preferred scenario that incorporates feedback from the public and policy makers (the draft of the preferred alternative is available online now). Available from: <http://planbayarea.org/plan-bay-area.html>

Plan Bay Area, "Equity Analysis" (2013), MTC and ABAG – This report provides a framework for the regional plan's land use and transportation strategies and policies for advancing opportunity for communities of concern in the region. The report includes baseline data for communities of concern, as well as an analysis on Title VI requirements, and environmental justice analysis and an equity analysis. Available from: <http://planbayarea.org/the-plan/plan-details/equity-analysis.html>

San Francisco Bay Crossings Study (2002, updated in 2012), Metropolitan Transportation Commission. This study, prompted by Senator Dianne Feinstein's request of Governor Gray Davis, investigates the current and forecast transbay travel conditions, as of 2000. The study found that such a crossing was not appropriate at the time, given constraints of cost and the performance of models used by MTC to simulate one. While it did not rule out the possibility circumstances changing, they recommended a number of lower-cost measures be carried out in the near term. Summary available from: http://www.baycrossings.com/Archives/2002/06_July/mtc_bay_crossings_study.htm; 2012 update of study available from: www.mtc.ca.gov/sites/default/files/BC_Study_Update_May_2012.pdf

Water Emergency Transportation Authority (WETA) 2016 Strategic Plan (the San Francisco Bay Ferry) – The plan provides the agency's 20-year vision for providing ferry service to the Bay Area. The document describes WETA's work to develop new services and ferry network. The plan also describes WETA's role in providing alternative transportation service during emergencies or disruptions to other transportation services. Available from: <http://sanfranciscobayferry.com/weta/strategic-plan>

Non-Profit and For Profit Organization Documents

ConnectOakland Vision - ConnectOakland is a plan developed an advocacy group made up of volunteers including residents and professional in the design and planning fields to transform the Interstate 980 corridor from a freeway to an at-grade boulevard that would reconnect West Oakland and Downtown. The vision discusses the possibility of using the suppressed land beneath the existing interstate to run a rail tunnel that could serve either BART or Standard Rail. Their proposal would create 21 blocks of new and revitalized land for development or parkspace. Available at <http://www.connectoakland.org/>

Designing the Bay Area's Second Transbay Rail Crossing (2016), SPUR. This white paper provides SPUR's case for a second bay crossing and argues that planning should start now and provides recommendations for how to proceed with planning and design processes. SPUR, the San Francisco Bay Area Planning and Urban Research Association, is a non-profit civic planning organization. In this white paper, SPUR emphasizes that a third crossing is needed to add to transit capacity, enable rail maintenance necessary for transit redundancy, and support mobility and access for the region's projected population and employment growth. The white paper describes many important planning and design decisions need to be made, such as which transit service providers would be involved, what the alignment of the proposed crossing would be, what infrastructure is needed, and how the construction could be phased. SPUR then makes recommendations for next steps, such as funding, prioritization and governance structures. These recommendations emphasize building on existing projects and plans, such as ongoing proposals for tearing down I-980 that runs between West Oakland and Downtown Oakland. Available from: <http://www.spur.org/publications/white-paper/2016-02-10/designing-bay-areas-second-transbay-rail-crossing>

Equity Considerations for a Second Transbay Crossing - Executive Summary (2015; full report forthcoming), TransForm. TransForm is in the process of releasing a white paper that focuses on social equity issues that the region and state should address during planning for a third crossing. Transform is a non-profit advocacy organization focused on transportation in the Bay Area and California. While the paper has not yet been released, Transform has made available an executive summary with brief highlights. The executive summary describes potential equity benefits, including improved transit service for low income communities, and reduced air pollution associated with regional increases in transit ridership. The summary describes that the paper will address key issues around equity in major infrastructure projects, such as who benefits and who pays, and who is involved in the decision making process. A series of recommendations are included, such as seeking anti-displacement measures, improving current issues in transit service, and seeking out equitable financing. The final report is expected to be released in the coming months. The Executive Summary is available from: <http://www.transformca.org/transform-report/second-transbay-crossing>

SPUR "New Transbay Transit Crossing" Event: Hosted by SPUR (April 2016) - This event was held in SPUR's Oakland office and served as an opportunity to bring a wide range of stakeholders into the same room to discuss a new transbay crossing. The event was open to the public, moderated by the San Francisco County Transportation Authority, and began with presentations from representatives from non-profits SPUR and Transform and also representatives from the private sector, specifically the Bay Area Council and McKinsey & Company. The focus of these presentations included speaker perspectives on why a new crossing is needed (SPUR and Bay Area Council Economic Institute),

recommendations for how to promote social equity within the transbay transportation system (Transform), and recommendations for how a project of this scale could be delivered (McKinsey & Company and Bay Area Council Economic Institute). Following the presentations, representatives from the public agencies - Metropolitan Transportation Commission, BART, California State Transportation Agency, and the City of Oakland - spoke about what a new transbay crossing could potentially mean at the local, regional, interregional, and state levels. The non-profit, private sector, and public agency representatives then fielded audience questions. A video of the event is available at:

<https://www.youtube.com/watch?list=PLT3WgisWww-kIqM0YVMgUGmh6r2GWFAA¶ms=OAFIAVgI&v=jXzXiCwOBBU&mode=NORMAL&app=desktop>.

The Case for a Second Transbay Crossing (2015), Bay Area Council Economic Institute. This report analyzes the current transbay travel constraints, focusing on the corridor between San Francisco and Oakland. The report argues that the current systems create an economic drag on the Bay Area, analyzes several options for an additional transbay rail crossing, identifies the benefits of such a crossing, and provides some examples of various contracting and funding models that might lead to a transit crossing projected being built efficiently and effectively. The report identifies the challenges of capacity and congestion on the rail and highway systems, as well as the challenge of resiliency in this critical transportation link in general. The report has description and diagrams depicting specific design elements and alignments of a possible new rail line. Available from:

<http://www.bayareaeconomy.org/report/the-case-for-a-second-transbay-transit-crossing/>.

Global Infrastructure Initiative 2015: Post-event summary. McKinsey & Company. This report was issued following the Global Infrastructure Initiative event that was held in San Francisco in 2015. The event and the report explored how innovation and technology can improve infrastructure delivery. The event convened experts and officials to discuss a key focus project: a new transbay transit tunnel between San Francisco and Oakland. The report summarizes themes and ideas that could be applied to major infrastructure projects around the world based on discussions and learning at the event. It describes specific strategies related to project planning, finance, construction, and operations. On the transbay tunnel project in particular, the report sets three primary recommendations: defining the problem, involving a wide variety of stakeholders, and determining ownership structure and governance model to cover all stages of the project. Available from:

<http://www.globalinfrastructureinitiative.com/downloads/GII-2015-Post-event-Summary.pdf>.

The Northern California Megaregion: Innovative, Connected, Growing (2016), Bay Area Council Economic Institute. This report analyzes conditions of the larger megaregion that includes the traditional nine-county Bay Area as well as six counties in the Sacramento metropolitan area, three counties in the northern San Joaquin Valley, and the Monterey Bay Area. The report identifies the extent to which these areas have grown and begun to interact across regional boundaries. based on population and employment growth patterns, as well as commuter travel across regional boundaries, the report argues that planning at the megaregional level is necessary, especially for improved transportation connections. It suggests economic development structures that cross county lines, statewide tax credit programs, and expanded service on interregional rail lines. Additionally, the report touches on opportunities for leveraging the innovation system of companies and universities, as well as improving the efficiency and sustainability of goods movement in the megaregion. Available from:

<http://www.bayareaeconomy.org/report/the-northern-california-megaregion/>.

The Northern California Megaregion (2007), SPUR. This report argues that the Bay Area is part of a larger megaregion of Northern California by analyzing data on land consumption, transportation flows and commute patterns, economic integration, and cultural integration. Based on the analysis, the report proposes several different ways to define a megaregional boundary. The report finally argues that several important problems could be addressed at this scale: a northern California rail network, landscape preservation in the Central Valley, and a megaregional equity agenda. Available from: https://www.spur.org/sites/default/files/publications_pdfs/SPUR_The_Northern_California_Megaregion.pdf.

Academic and Other Research, Selected:

E. Deakin, K. Trapenberg Frick, R. Cervero et. al.: Bay Bridge Toll Evaluation Final Report (2011). This report is an independent study by the University of California, Berkeley on the effects of the toll structure changes made in 2010 for the Bay Bridge. The new toll structure created higher tolls during weekday peak-periods (5-10am and 3-7pm) and instituted a toll for carpoolers who had previously traveled for free. The goal of the new toll policy was to finance earthquake retrofits, but also to encourage off-peak travel and switching to other modes. The study evaluates a series of questions, including the effects of the tolls on traffic volumes, the impact on carpooling and transit ridership, and public perceptions of the toll changes. The study found that traffic volumes overall decreased by 1% during the first year, and that shifts occurred from peak to off-peak times. There was a 26% decrease in carpoolers, many of whom switched to other modes. The results of the public perception surveys indicated a “resigned acceptance.” These findings provide valuable insights for consideration as part of a Performance Pricing alternative for a third crossing. Available from: http://apps.mtc.ca.gov/meeting_packet_documents/agenda_1764/Bay_Bridge_Toll_Evaluation_Final_Report_final.pdf

Heller, Jeffrey (February 15, 2014). "2nd BART tube under the bay would serve region well" San Francisco Chronicle. Bay area architect and Bay Area Council Board Director Jeffrey Heller proposes a second BART tube. It would connect in Oakland at MacArthur BART and run through Jack London Square and Alameda. It would cross the bay to San Francisco with a stop at the AT&T ball park and continue through San Francisco's Dogpatch and Bayview-Hunter's Point to the San Francisco Airport. An alignment image and Opinion piece published in the San Francisco Chronicle are available at: <http://www.sfgate.com/opinion/article/2nd-BART-tube-under-the-bay-would-serve-region-5236682.php>

I. Barnes, K. Trapenberg Frick, E. Deakin, and A. Skarbardonis: Impact of Peak and Off-Peak Tolls on Traffic in San Francisco-Oakland Bay Bridge Corridor in California (2012) – Report is a study of the impact of toll changes on bridge traffic. The report finds that carpool rates decreased significantly after the institution of toll of carpool users (it previously had been free for carpool vehicles). The findings have applications for considering the possibility of increasing capacity on the Bay Bridge through more aggressive carpool / non-carpool tolling differences.

K. Trapenberg Frick, S. Heminger, and H. Dittmar: Bay Bridge Congestion-Pricing Project: Lessons Learned to Date (1996) – The paper discusses an early unsuccessful attempt to apply congestion pricing—varying the toll with the time of day and level of congestion—to the Bay Bridge. It provides a series of lessons learned for future consideration of congestion pricing and reported on

public perception of using pricing to improve capacity on the Bay Bridge, including recommendations for providing a toll discount to low-income drivers.

R. Cervero: *Traffic Impacts of Variable Pricing on the San Francisco-Oakland Bay Bridge, California (2014)*. This study considers how the new tolling structure introduced in 2010 for the Bay Bridge impacted travel behaviors. The analysis found that the toll increase on carpoolers resulted in more significant travel changes than the peak pricing for regular (non-HOV) traffic. This indicates that peak trips may be nondiscretionary. Carpoolers did not become single occupant vehicle (SOV) drivers, rather switched modes to transit or chose off-peak travel times. The paper raises questions around how equity issues associated with peak-pricing can be resolved. Some recommendations that are described include reinvesting toll revenue into BART service improvements or partial toll vouchers for lower income populations. Available from: <http://trrjournalonline.trb.org/doi/abs/10.3141/2278-16>

Trapenberg Frick, K.: *Remaking the San Francisco-Oakland Bay Bridge: A Case of Shadowboxing with Nature (Routledge, 2016)* – This book details the history of the development of the Bay Bridge's new east span. The book is framed within megaproject and other literature and concludes with recommendations for improving megaproject planning and implementation. The book also includes the history of the original San Francisco-Oakland Bay Bridge in 1936 as prologue to a discussion of the bridge's ultimate (and fraught) renovation and East Span replacement. It also discusses the history of the "Second Crossing." Since the completion of the first bridge, many proposals and plans were made for subsequent crossings within the core of the Bay Area. Trapenberg Frick discusses the wartime concern for the security of the region, the proposals through which BART's tunnel was ultimately created, and post-BART revivals of "Southern Crossing" proposals connecting Alameda County with Southern parts of San Francisco and the SF Peninsula.

Appendix B: MTC's Communities of Concern definition for Plan Bay Area 2040¹⁸²

<i>Disadvantage Factor</i>	<i>% Regional Population</i>	<i>Concentration Threshold</i>
1. Minority	58%	70%
2. Low Income (<200% Federal Poverty Level - FPL)	25%	30%
3. Limited English Proficiency	9%	20%
4. Zero-Vehicle Household	10%	10%
5. Seniors 75 Years and Over	6%	10%
6. People with Disability	9%	25%
7. Single-Parent Family	14%	20%
8. Severely Rent-Burdened Household	11%	15%

Definition – census tracts that have a concentration of BOTH minority AND low-income households, OR that have a concentration of 3 or more of the remaining 6 factors (#3 to #8) but only IF they also have a concentration of low-income households.

¹⁸² Metropolitan Transportation Commission Deputy Executive Director, Policy. (2015, December 31). MTC Resolution No. 4217: Equity Framework for Plan Bay Area 2040. Memorandum. Retrieved from <https://mtc.legistar.com/LegislationDetail.aspx?ID=2542165&GUID=D89FCABA-8814-4F0C-990D-B6803291A4D5&Options=&Search=>

Appendix C: Transbay Travel Patterns

Transbay Corridor 2015 Peak Hour Occupancy Levels by Mode

2015 Morning Peak-Hour Westbound Travel (Person-trips)			
	Trips	Capacity	Occupancy
Total All Modes	38,800	37,100	105%
Auto	9,900	9,900*	100%
BART	25,000	22,700	110%
Bus	2,700	2,900	93%
Ferry	1,300	1,650	77%

*Assumes existing vehicle occupancy.

Source: MTC http://mtc.ca.gov/sites/default/files/CCTS_TransbayCapacityandDemandSummary_FINAL.pdf

Change in Peak Hour, Peak Direction Demand Transbay Transit, 2010-2015

	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%

Source: MTC http://mtc.ca.gov/sites/default/files/CCTS_TransbayCapacityandDemandSummary_FINAL.pdf

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%

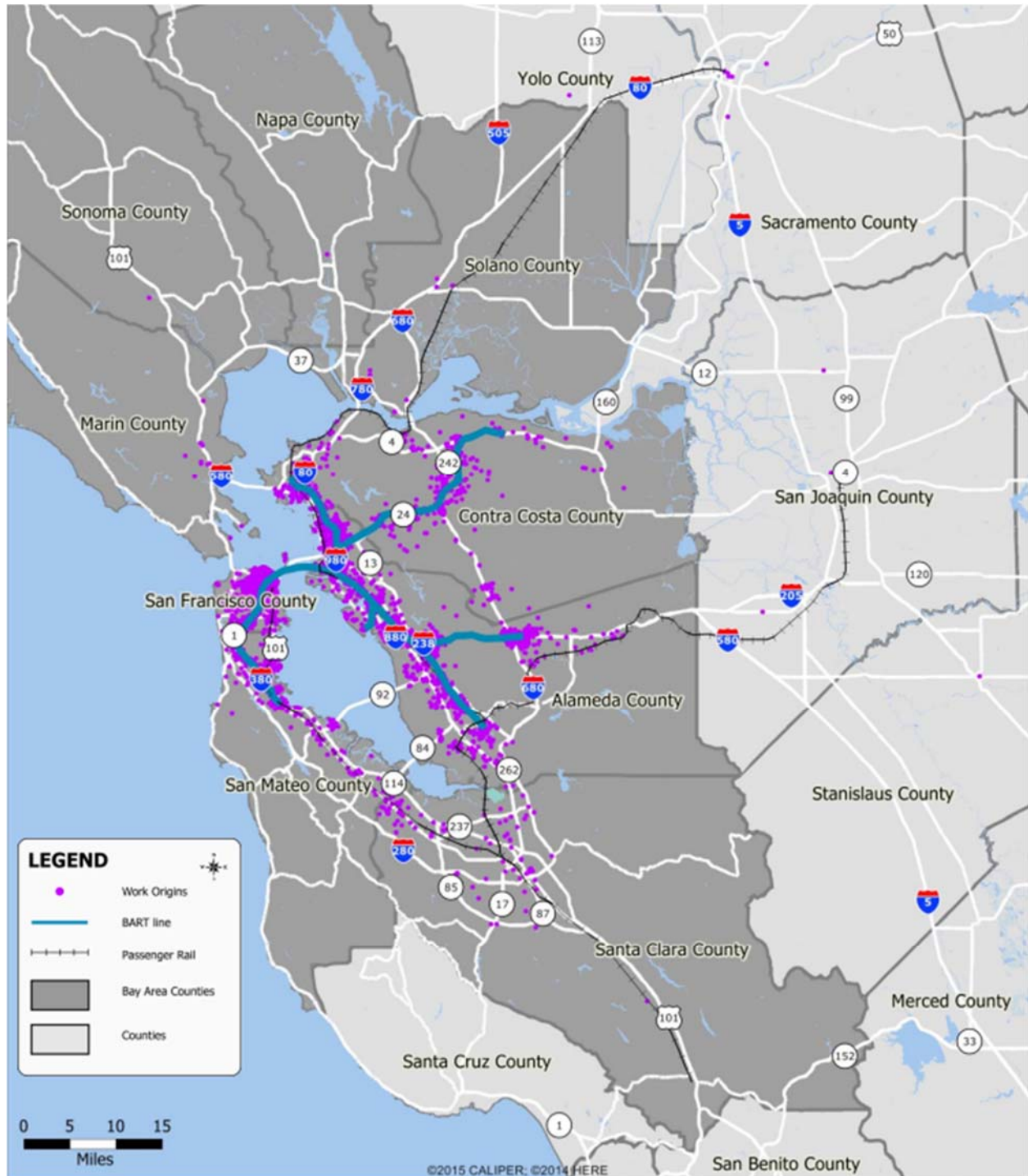
Source: MTC http://mtc.ca.gov/sites/default/files/CCTS_TransbayCapacityandDemandSummary_FINAL.pdf

2015 Peak Hour, Peak Direction Transit Capacity by Time Period & 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

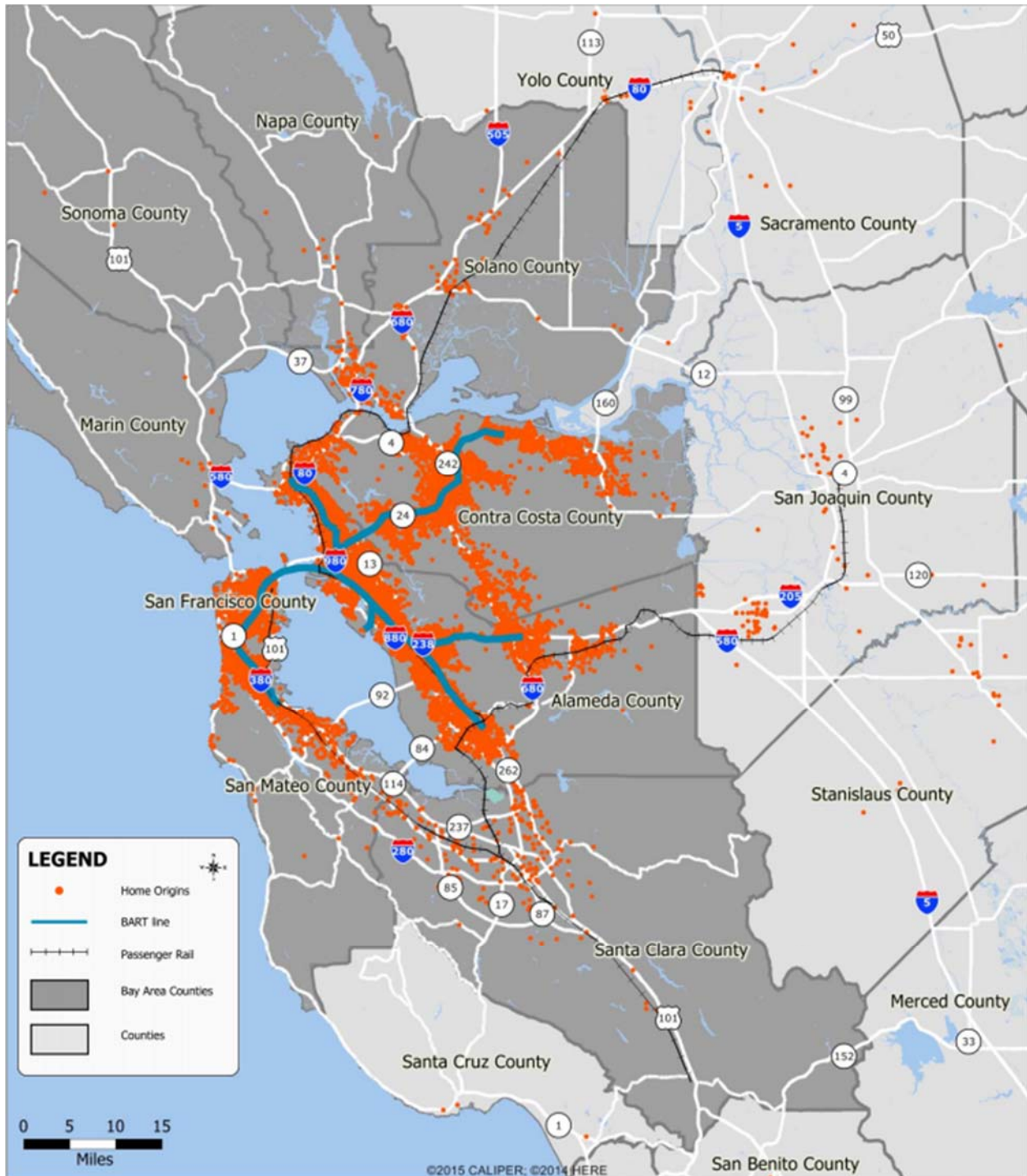
Source: MTC http://mtc.ca.gov/sites/default/files/CCTS_TransbayCapacityandDemandSummary_FINAL.pdf

Work Locations of BART Riders, 2015 BART Station Profile Survey



Source: <http://www.bart.gov/about/reports/profile>

Home Locations of BART Riders, 2015 BART Station Profile Survey



Source: <http://www.bart.gov/about/reports/profile>

Appendix D: Performance Metric Sources & Methodology

Problem Category	Metric	Methodology	Data Sources
Social Equity	Health Metric	Using forecasted traffic volumes from SFCTA SF-CHAMP 4 travel model, tools were used in a 2011 HIA by SFDPH to estimate future walk and bike trips and burdens of traffic collisions and emissions.	Travel Model One for traffic volumes; May not have access to other predictive tools.
Social Equity	Displacement Metric	Use current available data on housing and transportation costs as a % of income. Use of inventories of households, businesses, and non-profits.	Housing and Transportation Affordability Index (for current data) ACS, Census, transit service inventories, business, household and service inventories, surveys. Some possible data gaps.
Accessibility and Connectivity	Transit Access	Use land use model or GIS	Land use model or GIS
Accessibility and Connectivity	Jobs Access	Use BLS job statistics on location of jobs and expected education needs to see where transportation could connect residents with job centers.	BLS job statistics, land use model
Accessibility and Connectivity	Healthcare Access	Use location of primary care doctors within ¼ mile of transit stop	InfoUSA for location of primary care doctors
Accessibility and Connectivity	Recreational Access	Use GIS layers from SF Open Data to identify open space and park locations to create a buffer of sites within ¼ mile of transit; geocode parks outside SF to add to layers	SF Open Data and geocoded data from other city parks departments
Accessibility and Connectivity	Intermodal Connectivity	Manual count of service connections and description of whether overnight service is included; service includes transit and bikeshare	Service provider schedules and maps
Resilience and Adaptation	Redundancy	Passenger capacity for alternatives compared to capacity for network in partial shutdown.	Capacity expectations for alternatives. Existing capacity for transbay crossing.
Resilience and Adaptation	Sea Level Rise and Flooding	Comparing location of facilities to projected sea level rise and flooding.	ABAG: SLR and flooding projections.

Resilience and Adaptation	Seismic vulnerability	Comparing location of facilities to liquefaction risk.	ABAG: liquefaction hazard by fault.
Climate Change Mitigation	Transportation related CO2 Mitigation	Analyze CO2 emission data outputs from transportation demand models for all transportation modes in the region for a given time period	Travel Model One, Plan Bay Area Model
Climate Change Mitigation	Land use related CO2 Mitigation	Analyze CO2 emission data outputs from land use models for all changes in land use within ¼ mile buffer of new transbay transit stations	UrbanSim land use model, Plan Bay Area Model
Land Use/Economic Growth	Population Growth	Change in population by geographic location within the Bay Area and within transit station areas	Travel model or data from the American Community Survey and/or Census with geographic transit location data
Land Use/Economic Growth	Job Growth	Change in employment by geographic location within the Bay Area and within transit station areas	Travel model or LEHD employment data with geographic transit location data
Land Use/Economic Growth	Land Development Opportunities Adjacent to Stations	Amount/area of prime developable land (low intensity uses) within ½ mile of transit station	UrbanSim land use model or analysis of satellite imagery to identify vacant parcels and surface parking lots
System Performance	Time Periods that Demand Exceeds Capacity	Specific hours of the day when ridership or use of facilities exceeds official capacity on each transportation link	Travel Model One, MTC data, and BART Operations Planning data (not currently available publicly).
System Performance	Westbound to Eastbound Person Trip Balance	Westbound to eastbound ratio of morning peak trips in transbay corridor	Travel Model One, data from BART, BATA, WETA and MTC.
System Performance	Net Investment Cost of Alternative	A net present value analysis of upfront costs, operating losses or revenues (for increased tolling), and long-run maintenance cost.	Travel Model One, existing data or estimates of revenue and capital operating costs from MTC, BART, BATA, Caltrans, and other transit operators

Appendix E: Land Use Scenario Outputs for Various Model Runs compared to Control Run

Difference in non-residential square footage within ½ mile of stations for various model runs compared to control run.

Station	Business-as-usual Land Use Scenario			Preferred Land Use Scenario		
	BART 1	BART 2	Standard Rail	BART 1	BART 2	Standard Rail
11th/Broadway	-61,410	-253,116	-156,248	254,096	252,455	174,143
14th Street	575,207	5,636	140,222	644,361	120,298	121,121
15th/Franklin	-132,217	-136,604	-91,522	293,578	134,302	127,533
3rd/Mission	135,748	51,258	5,760	321,462	318,398	321,462
4th/Brannan	-2,774	6,035	6,035	9,852	-45,013	-27,588
6th/Brannan	20,567	21,004	-18,315	78,406	13,546	59,591
Alameda	0	0	0	0	0	0
Ballpark	6,894	6,894	-355	-43,290	-43,290	-43,290
Berkeley (standard rail, existing)	531,942	23,227	36,226	-5,320	-33,020	19,798
Eastlake	9,610	-15,515	-42,396	64,596	-52,574	230,754
Emeryville (standard rail, existing)	28,342	2,225	2,225	-362,581	-394,970	-421,751
Fillmore	198,589	12,351	-4,200	80,435	92,720	-63,713
8th/Howard	109,493	114,838	100,294	193,987	198,301	171,561
Howard Terminal	49,697	52,029	400,587	335,980	851,465	513,489
Hyde/McAllister	-2,325	-51,643	-11,335	103,138	80,601	103,904
Jack London Square	-69,666	-249,726	52,191	-73,909	-12,726	64,117

Mission Rock	0	0	0	0	0	0
Richmond (standard rail, existing)	-15,992	-16,437	-14,639	-34,635	47,052	-69,861
Transbay Transit Center (standard rail, exists in baseline)	3,371	-17,816	4,989	96,040	97,105	97,105
Union Square	3,550	5,550	135	-3,849	-21,868	-11,043
Van Ness	14,160	13,095	-3,720	-26,709	-54,038	-27,016
Total	1,402,786	-426,716	405,935	1,925,637	1,548,745	1,340,316

Note: Control run is business-as-usual land use scenario with no crossing alternative in 2035.

Difference in residential units within ½ mile of stations for various model runs compared to control run.

Station	No-Project Land Use Scenario			Preferred Land Use Scenario		
	BART 1	BART 2	Standard Rail	BART 1	BART 2	Standard Rail
11th/Broadway	-296	141	-112	-669	-606	-339
14th Street	378	455	431	-214	-229	-183
15th/Franklin	-553	-229	-233	-873	-1,105	-761
3rd/Mission	-1,024	-250	-55	-1,676	-1,619	-1,663
4th/Brannan	40	-37	-38	-65	536	-17
6th/Brannan	-38	-13	83	-267	-61	101
Alameda	39	12	10	13	8	9
Ballpark	-154	-155	-45	-2	-6	1
Berkeley (standard rail, existing)	36	-41	-1	10	52	-2
Eastlake	-67	-32	34	221	330	186

Emeryville (standard rail, existing)	-77	-55	-52	429	508	958
Fillmore	-71	-74	-22	2,173	2,135	1,506
8th/Howard	-442	-409	-236	-803	-757	-778
Howard Terminal	-199	-188	-167	-324	-454	-708
Hyde/McAllister	83	334	36	-393	-134	-439
Jack London Square	-33	110	-97	-350	-158	-509
Mission Rock	379	-4	-3	-1	-3	-2
Richmond (standard rail, existing)	6	5	27	5,241	5,189	5,715
Transbay Transit Center (standard rail, exists in baseline)	-245	-43	-206	-256	-444	-444
Union Square	100	-23	12	14	165	101
Van Ness	-10	-25	52	485	621	477
Total	-2,148	-521	-582	2,693	3,968	3,209

Note: Control run is no-project land use scenario with no crossing alternative in 2035.