Geographic Equity in Highway Funding in the Nine-County San Francisco Bay Area

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EXECUTIVE SUMMARY

Transportation issues are almost always an important concern of the public. People realize the importance of investing in transportation infrastructure, and its implications for the economy as well as their own lives. With that in mind, California voters approved Proposition 1B in November 2006. This historic measure approved the issuance of $19.9 billion in bonds to repair and upgrade the state's aging transportation infrastructure. However, even before the voters approved the bonds, communities and regions around the state already had a laundry list of projects to be funded by the new influx of transportation funding.

In almost all regions around the state, transportation needs far outstrip the available funding for transportation improvements. The San Francisco Bay Area is no different. The region encompasses nine counties, ranging from the urban San Francisco County, to the suburban Contra Costa County, to rural Napa County. With demand so great for transportation funds, how are the funds distributed to each county? Does the distribution of funds match each county's varying need? What might explain any inequities in roadway funding distribution?

This study will examine these issues, and answer the equity question based on seven measures, and using funding over the period of the third federal transportation act reauthorization (known as SAFETEA). It explains how funding is distributed in the Bay Area and California, and also explains the various fund sources available to local agencies for transportation roadway projects. It further examines the funding programmed to each county with data from the region's Federal Transportation Improvement Program, and compares it to seven measures. These measures include population, vehicle-miles traveled, registered vehicles, pavement conditions, and measured congestion. These measures are used to determine each county's need, and are compared to the roadway funding programmed in the FTIP.

The findings show that one county, Contra Costa County, is above the regional average of funding received when compared to need, and three counties, Napa, San Francisco, and Santa Clara, are below the regional average. However, these findings only show part of the story. Large projects not included in the examination time period, "donating" funds to regional priority projects, and fund exchanges are some reasons that could explain the inequities found in this study. In addition to examining the possible explanations to inequity, this study also includes recommendations to ensure equitable distribution of transportation funding.

INTRODUCTION

Transportation decisions affect everyone in the community. Commuters need roads and transit to get to and from work. Shippers need train tracks and roads to be able to accommodate trucks to get their goods to the consumer. Citizens recognize the importance of maintaining the viability of the transportation infrastructure, especially when they are confronted with traffic congestion and potholes on the roads. In the recognition of this link, California voters approved Proposition 1B, which authorizes the state to sell $19.9 billion worth of bonds to improve the state's transportation infrastructure through a variety of programs.

However, even this infusion of cash is not enough to solve California's transportation issues. Each county and region will compete and argue to receive their "fair share" of the Proposition 1B funding pie. How do counties and regions define "fair share"? What measures do they use to justify the correct level of funding they should receive? This paper will examine what fair share might be, specifically for the nine-county San Francisco Bay Area. Equity might be another way of describing fair share. For the purposes of this document, equity means the fair distribution of funding based on a variety of measures. This paper will examine geographic equity in highway funding among the nine Bay Area counties, based on measures to be described later, and will try to answer the question: "Does geographic equity exist among the counties, and what might cause any differences?" Finally, this document will present some recommendations to improve geographic equity if it does not exist, and also recommend improvements to the state's method of distributing highway funding.

Author's Note

This document will only examine equity as it relates to highway funding and a set of non-demographic measures. The author's place of employment, the Metropolitan Transportation Commission (MTC), is currently in a lawsuit that alleges social discrimination in the distribution of transit funding in the Bay Area[1]. The lawsuit claims that MTC inappropriately distributed more funding to rail operators used mainly by affluent commuters, while neglecting bus operators used mainly by more disadvantaged people, such as minorities and the transit-dependent. The topic for this paper was carefully selected to avoid any connection with the social equity in transit funding issue.

Literature Review

In order to gain perspective in this research endeavor, one must also examine the other similar research in the field. As a part of this process, I have examined numerous scholarly articles and chapters in books in order to gain other perspectives, and to also ascertain if any other work related to geographic equity in highway funding has been done previously. The sources consulted came mainly from three sources: the Google Scholar search engine, the Metropolitan Transportation Commission/Association of Bay Area Governments (MTC/ABAG) Transportation Library, and the University of California at Berkeley Transportation Library.

In general, the findings show that there has not been much research done in this field. Most sources found deal primarily with the social equity question in transportation funding. Social equity, or the equitable distribution of transportation funding based on socioeconomic factors, is a hot topic among transportation researchers, as is evident from the number of studies and research pieces on the topic. Other articles that have come close examine the equity and

efficiency in transportation funding nationwide (such as Martin Wach's piece in the Brookings Institute's *Transportation Reform Series* titled "Improving Efficiency and Equity in Transportation Finance" (2003)).

There was one article that is very similar to the research undertaken for this research paper. Lewison Lee Lem, with the UC Berkeley Transportation Center, wrote "California's Highway Funding Apportionment Formula, Geographic Redistribution Among Counties" as a part of the Lewis Center for Regional Policy Studies' *Working Paper Series*. This article closely examines the formula distribution of California highway funds. However, the article was written in 1997, prior to the passage of Senate Bill 45. SB 45, as it is commonly known, redistributes the highway funding in California with three quarters of funding in the State Transportation Improvement Program (STIP) given to the regional agencies for programming, with the remaining quarter given to the California Department of Transportation (Caltrans) for interregional project programming.

Lem's article based geographic equity among California's counties mainly on gas sales and gas consumption (since highway funding comes from gasoline taxes). He found that "there is a weak link between the benefits received and the taxes paid" by each county[2]. In other words, he found that there was no geographic equity in transportation funding based purely on gasoline tax collected and gasoline consumption. He further finds that in general, densely populated counties to a large extent are subsidizing less developed areas, which may prove detrimental to the traffic congestion that mainly exists in more densely populated counties.

Explanation of Measures

POPULATION

The first measure of equity that I will examine is population. Each county has varying number of people, and this indirectly can predict need for transportation dollars. Intuitively, the greater the population, the greater the demand is for transportation, and the larger the transportation infrastructure. For this analysis, the population figures come from population forecasts for 2007 available from the MTC website[3]. Compared to the California Department of Finance's 2007 California county population, these figures do not differ greatly. Additionally, the decision to use MTC's population forecasts is to be consistent with most of the other measures used in this analysis.

VEHICLE-MILES TRAVELED

The second measure of equity is vehicle-miles traveled. This measure reflects the number of miles each vehicle travels within each county, measured on an annual basis. Vehicle-miles traveled, or VMT, is useful in showing the transportation demand in each county. For instance, while a large county may have fewer residents, those residents may have to drive farther to reach their destination. The greater distances may translate into greater demand and need for transportation infrastructure in that county. The source of estimated VMT comes from MTC's "Projections 2003" document[4].

PAVEMENT CONDITION INDEX

The next measure of equity for examination is each county's Pavement Condition Index. PCI is a normalized index of pavement condition, measured on a scale of 0 to 100, with 100 being the

highest level of pavement condition, and 0 being the lowest (i.e. deteriorated) condition of pavement. In the nine-county Bay Area, 99% of the 109 jurisdictions use the MTC Pavement Management software, StreetSaver[5]. The use of common pavement management software makes the normalization of PCI easier by standardizing the pavement condition measurement technique. In the few instances where StreetSaver is not used, a correlated measure is used to translate non-StreetSaver measurements to match those of StreetSaver.

PCI is another measurement of roadway funding need in each county. The measurements are given by each county and city, therefore, a weighted average of PCI was used based on lane miles and PCI per jurisdiction within a county. The PCI measures are from 2005, and these numbers were released in October 2006, with news releases touting a slight improvement in average pavement conditions in the Bay Area over the 2004 figures.

In order to compare funding to PCI, a percentage system was used in order to translate PCI into a quantifiable need. In this case, I took the PCI as a "percentage" of pavement in acceptable condition. Therefore, a county with a PCI of 70 would have 70% of its road miles in acceptable condition, with 30% of its road miles as deficient. The percent of deficient road miles is then multiplied by the total number of lane miles in the county, resulting in the number of deficient lane miles per county. This number is then used to evaluate funding equity in each county.

PAVEMENT LANE MILES

The number of lane miles in each county is another important measure for examining equity in transportation funding. This figure measures the length of miles of each lane within a county. For instance, a road that is 10 miles long and has two lanes of traffic (one lane in each direction) has 20 lane miles of pavement. If that same road were a six lane freeway (with three lanes in each direction), that road would have 60 lane miles of pavement. Lane miles is a much better measure than centerline miles, which measures only the length of the road, regardless of number of lanes (therefore, a 10 mile long road would have 10 centerline miles). This distinction is important to account for more urban areas with greater number of freeways and lanes to accommodate larger volumes of traffic.

The pavement lane mile figures also come from MTC's PCI measurements from the StreetSaver software. The software keeps track of all lane miles in the system in order to measure the pavement conditions on each road. These figures are current as of 2005.

REGISTERED VEHICLES

Another measure of need to evaluate transportation equity is the number of registered vehicles in each county. This measure reflects the number of automobiles registered within the county. The figures for each county come from the California Department of Motor Vehicles (2005), as compiled by MTC[6]. The number of registered vehicles in a county is a similar measure to population – it measures the demand for private transportation within each county.

LICENSED DRIVERS

The number of licensed drivers is another measure that evaluates the demand of private transportation within each county, much like the registered vehicle measure. This number is available from the California Department of Motor Vehicles (2005), also as compiled by MTC[7].

CONGESTION IN HOURS

The final measure of transportation funding equity I will examine is the level of congestion. The level of congestion is measured in vehicle-hours per day, and will be used to show the need for transportation funding to alleviate the congestion in each county. Congestion delay is defined as the difference in travel time between 35 miles per hour and the lower congested speed. The data comes from the California Department of Transportation's annual Highway Congestion Monitoring Program (HICOMP) report; the most current HICOMP report is from 2004[8].

The HICOMP report only measures recurrent delays on state freeways. Therefore, it does not report on weekend or holiday delays, nor does it have information on local road or non-freeway state highway delays. The figures come from data analyzed from loop detectors in roadway pavement, from toll tags from the FasTrak system, or from floating car measurements from test vehicles on the freeway[9].

Explanation of Funding Data Sources

All funding data for this research effort came from the Metropolitan Transportation Commission's Fund Management System (FMS)[10]. MTC's FMS, in its current state, serves mainly as the region's Federal Transportation Improvement Program (FTIP), which is required by the federal government for all Metropolitan Planning Organizations (MPO). The FTIP is the region's blueprint of funding for a period of four years. The current FTIP was adopted in 2006 for the period beginning in Fiscal Year 2006-07, and ends in FY 2009-10.

For this examination, I only took projects programmed in the years of the Safe, Accountable, Flexible and Efficient Transportation Equity Act (SAFETEA), which are the six years beginning in FY 2003-04 and ending and including FY 2008-09. Since the FTIP programs by phase[11] and by year, some project costs occurring outside of these years may not be reflected. For instance, if a project went to construction in FY 2003-04, most likely the earlier phases of the project (such as environmental, design, and right-of-way) occurred before FY 2003-04, and therefore not reflected in the research sample. Similarly, projects with the environmental phase programmed in FY 2008-09 will probably have construction funds programmed in a later year beyond FY 2008-09, and therefore are also not reflected in the sample. Nevertheless, since this survey is not on a project level, but rather on a program level, these differences are negligible.

The FTIP data extracted from the FMS may not include all local funds and funds distributed directly to the local jurisdiction (and bypassing MTC). This may include a city's or county's general fund revenues, or Proposition 42 taxes distributed by the state for road maintenance purposes. While this data is not included, I assume that these funds are generally proportionally the same across all jurisdictions, so therefore it should not have a large bearing on the findings from this data source. For instance, the Proposition 42 local road funds are distributed by formula, which is proportional to a jurisdiction's population and road miles. Taking all Proposition 42 funds out of the analysis should equalize the sample once again.

The raw data available from the FMS included transit capital and maintenance projects that were removed from the sample. What remained were all roadway and highway projects in the region. The first aggregation of highway data showed extremely high funding amounts for Alameda County (over $6 billion, where most other counties were $1 billion). Upon further inspection, the high amount reflects the amount of federal, state, and local funds programmed to the behemoth replacement of the eastern span of the San Francisco-Oakland Bay Bridge project (with about $5

billion programmed in the period of SAFETEA). It was clear that in order to be more consistent, toll bridge projects would also have to be removed from the sample. This mainly affected Alameda County's numbers, but also affected Marin (Richmond-San Rafael Bridge) and San Mateo (San Mateo-Hayward Bridge) Counties to a much lesser extent.

Table 1 Funding Comparison With and Without Toll Bridge Funds

County	Total Funding with Toll Bridge	Total Funding, no Toll Bridge	Difference
Alameda	6,476,194,690	1,692,796,557	4,783,398,133
Contra Costa	1,551,587,532	1,551,587,532	0
Marin	431,597,839	220,748,839	210,849,000
Napa	49,973,000	49,973,000	0
San Francisco	200,341,380	200,341,380	0
San Mateo	769,565,387	769,166,660	398,727
Santa Clara	497,852,561	497,852,561	0
Solano	391,705,630	391,705,630	0
Sonoma	524,618,748	524,618,748	0
Total	**10,893,436,767**	**5,898,790,907**	4,994,645,860

Source: MTC Fund Management System

Regional lump sum funding was also excluded from the FMS sample. These funding sources include projects in the State's State Highway Operations and Protection Program (SHOPP) and Highway Bridge Program (HBP) that are not programmed in the FTIP individually, but rather as a lump sum for the entire fiscal year. Therefore, projects in the lump sum could be in any county, and is specified in a document available online. For this analysis, these lump sum funds will not be included. For certain projects of regional significance, however, SHOPP and HBP funds are included in the FTIP.

PART 1 – FUND PROGRAMMING OVERVIEW

Bay Area Fund Programming Overview

Highway funding in the Bay Area is distributed mainly by the Metropolitan Transportation Commission, serving as the region's Regional Transportation Planning Agency (RTPA) and Metropolitan Planning Organization (MPO). Almost all federal funds distributed to the region for roadway purposes are programmed through MTC. Additionally, all federally funded projects must be listed in the region's Federal Transportation Improvement Program (FTIP), as explained earlier. Most state funding also goes through MTC for programming (except for Proposition 42 local road funds, as explained earlier). In seven of the nine Bay Area counties, there is also a local sales tax for transportation that is programmed directly by the county or county tax authority. The only two counties without a transportation sales tax are Napa and Solano Counties.

The California Department of Transportation (Caltrans), also programs funds as it is the owner and operator of the state highway system. Specifically, it programs SHOPP projects that are for the maintenance and safety of the state highway system. SHOPP funds generally fund projects such as pavement rehabilitation and median barrier installations solely on state highways. Caltrans is also responsible for other federal funds directly related to state highways, including emergency relief (ER) funds. ER funds are used after a disaster or natural event that has caused damage to the state highway system. The most recent and noteworthy example of ER funds being used to rebuild a section of the state highway system was the April 30, 2007 collapse of the I-580 connector in the MacArthur Maze in Oakland. Much of the work to rebuild this important section of roadway will be eligible for ER funds (pending federal approval). ER funds, however, are not generally available to local jurisdictions, and therefore are also not included in this analysis.

California Fund Programming Overview

The State of California generally gives the discretion of programming most highway transportation funds (namely, the Regional Transportation Improvement Program) to the Regional Transportation Planning Agency or Local Transportation Commission. In most cases, these RTPAs and LTCs are the county. Only three regions have RTPA or LTCs that cover more than one county: Alpine-Amador-Calaveras Local Transportation Commissions, the Sacramento Area Council of Governments (SACOG) and the Metropolitan Transportation Commission (MTC). Similarly, for federal funds such as Surface Transportation Program (STP) and Congestion Mitigation and Air Quality Improvement (CMAQ) funds, discretion is given to the Metropolitan Planning Organization, who generally passes that discretion to the RTPA. For instance, in Southern California, while the Southern California Association of Governments (SCAG) is the MPO, each individual county is its own RTPA (including the Los Angeles County Metropolitan Transportation Authority, the Orange County Transportation Authority, and the Riverside County Transportation Commission). Therefore, in both cases, the RTPA has the discretionary authority to program these funds according to their own set of programming policies and procedures.

There are two main types of funding that are distributed to the MPOs and RTPAs, those distributed by formula, and those that are discretionary.

FORMULA DISTRIBUTION

Distribution of funds by formula is where available funds are distributed to individual agencies based on a predetermined set of factors. For instance, funding for the Regional Transportation Improvement Program is distributed first by a north-south split (where the northern counties receive 40% and the southern counties receive 60%), then funding is allocated to each county based on population and state highway centerline miles[12]. Other funding sources that are distributed on a formula basis include STP and CMAQ funds.

DISCRETIONARY DISTRIBUTION

Distribution of funds by discretion is where available funds are distributed to projects (not agencies) based on applications and granting of funds. Distribution of discretionary funds is usually subject to certain criteria and policies that limit what type of projects on which the funds may be used. The most recent example of a discretionary funding source is the Corridor Mobility Improvement Account (CMIA) program, authorized by Proposition 1B. Proposition 1B authorized the California Transportation Commission to develop the guidelines and call for projects from regional agencies and Caltrans for inclusion into the CMIA program. The CTC received numerous proposals from across the state for a part of the $4.5 billion program. In the end, the CTC programmed the full amount based on the guidelines adopted a few months earlier (and with some strong suggestions from state legislators).

Different Pots of Money

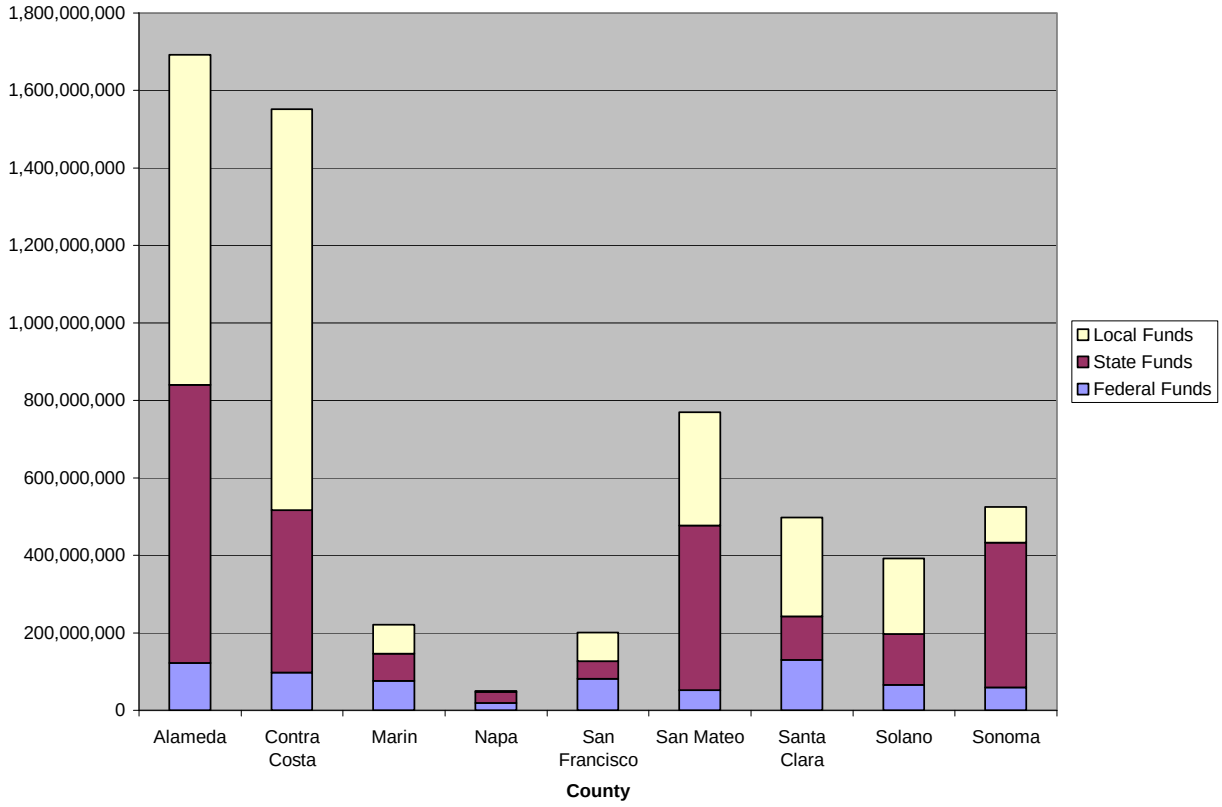
In this analysis, there are three major sources of funds for transportation funding for roads: federal, state, and local sources. Table 1 illustrates the amount of each fund source that is included in this analysis.

Table 2 Fund Type by County (Federal, State, and Local)

		Fund Type		
County	Total Funding	Federal Funds	State Funds	Local Funds
Alameda	1,692,796,557	122,531,457	717,159,000	853,106,100
Contra Costa	1,551,587,532	97,648,204	419,612,000	1,034,327,328
Marin	220,748,839	76,259,789	70,312,050	74,177,000
Napa	49,973,000	18,923,000	28,329,000	2,721,000
San Francisco	200,341,380	81,095,000	46,173,000	73,073,380
San Mateo	769,166,660	52,007,800	425,662,000	291,496,860
Santa Clara	497,852,561	129,948,531	112,981,000	254,923,030
Solano	391,705,630	65,967,000	131,319,000	194,419,630
Sonoma	524,618,748	59,104,150	373,463,000	92,051,598
Total	**5,898,790,907**	**703,484,931**	**2,325,010,050**	**2,870,295,926**

Source: MTC Fund Management System

Figure 1 Bay Area Highway Funding Over SAFETEA Period, by Fund Source



Source: MTC Fund Management System

FEDERAL FUNDS

Federal funds make up the smallest amount of funding examined in this survey used for highway funding in the Bay Area. A variety of federal funds are included in the FTIP source data and included in this analysis. In general, there are three main sources of federal funds that are included in the FTIP. They are Surface Transportation Program (STP) funds, Congestion Mitigation and Air Quality Improvement (CMAQ) funds, and Earmark funds. STP and CMAQ funds are programmed by MTC, while Earmark funds are programmed by Congress as a part of the federal reauthorization process. STP funds are generally used for local road rehabilitation and other activities supporting surface transportation, including some transit and planning activities. CMAQ funds are generally used for projects that will improve air quality, such as high occupancy vehicle (HOV) lanes, bicycle and pedestrian paths and walkways, and certain transit projects. Earmark funds could be used for any transportation purpose, but are generally granted to large capacity-increasing or operational improvement projects, such as the Interstate-80/I-680/State Route (SR)-12 Interchange in Solano County, and large transit projects, such as the San Francisco MUNI Third Street Light Rail Transit project.

Other minor federal fund sources included in this analysis are certain Federal Transit Administration funds, used for roadway improvements to support bus operations, and Transportation Enhancement (TE) funds, used for bicycle and pedestrian enhancements (such as

trails and streetscaping). Since 2004, TE funds have been incorporated into the State Transportation Improvement Program (STIP) process, but still remain federal funds.

STATE FUNDS

The analysis includes numerous state funding sources for roadway transportation projects. The two largest fund sources are from the State Transportation Improvement Program (STIP) – which includes the Regional Transportation Improvement Program (RTIP) and the Interregional Transportation Improvement Program (ITIP). Traditionally, funds from the STIP have come from federal sources, and the STIP automatically matched the federal funds with state funding. However, in recent years, the California Transportation Commission (CTC) has limited federal funds (from the State Highway Account) to be used only in the SHOPP. The STIP now receives state only funding in the form of funds from the Transportation Investment Fund (TIF). Much of the TIF derives from Proposition 42 transfers. Proposition 42 dedicates the sales tax on gasoline sales to transportation purposes.

As provided by Senate Bill 45 (1997), 75% of STIP funds flow to the RTIP, while 25% of STIP funds go to the ITIP. RTIP funds are administered by the Regional Transportation Planning Agencies, while the ITIP is administered by Caltrans for interregional and connectivity projects on the state highway system. In the Bay Area, MTC serves as the RTPA, but allows the county Congestion Management Agencies (CMA) or County Transportation Planning Agency (in Napa County's case), to have discretion over programming the RTIP. The CMAs initiate the call for projects and approves a list to be forwarded to MTC. MTC then compiles the county lists and sends them to CTC for consideration and approval for the STIP. This happens every two years.

The State of California recently approved Proposition 1B, which approves $19.9 billion in bonds to be issued to support the state's transportation infrastructure. As a part of Proposition 1B, two new funding sources were created prior to May 2007. They were the Corridor Mobility Improvement Account (CMIA) and the augmentation to the State Transportation Improvement Account. The CMIA included $4.5 billion of new state funds to support important traffic congestion relief projects, and were programmed by the CTC on February 28, 2007. The augmentation to the STIP included $2 billion of new state funds to be distributed using the STIP funding formula. The regional and interregional proposals were due to CTC on April 2, 2007, and the CTC approved the STIP Augmentation on June 7, 2007. Both of these fund sources are included in the analysis. The STIP Augmentation projects in the analysis are current as of mid-May, 2007. There have been some minor changes since then and the adoption of the augmentation, though relatively minor.

The last major fund source from the State is the Traffic Congestion Relief Program (TCRP). The TCRP Program was created by Governor Gray Davis in 2000 to address the increasing traffic congestion on the state's urban highways. Soon after the approval of the TCRP program, the state's economy took a downturn and funds were no longer available for TCRP projects. Currently, the funds the state borrowed from the Traffic Congestion Relief Fund (TCRF) for the general fund are being paid back, and TCRP projects are once again receiving allocations from the CTC. The anticipated expenditures of TCRP funds are included in this analysis.

LOCAL AND REGIONAL FUNDS

There are two main categories of local funds: local funds and regional funds. Local funds are monies generated by the county or city, and may also include funds distributed directly to the

local jurisdiction from the State. Regional funds are funds that are generated regionally, usually in the form of regional bridge tolls.

Over the past twenty years, sales tax increases to support transportation activities have become increasingly popular as a way to raise funds to expensive infrastructure improvements. This is illustrated by seven of the nine Bay Area counties approving sales taxes to support transportation activities. Napa and Solano Counties currently do not, although Solano has tried numerous times in the past to pass a transportation sales tax. Additionally, the Sonoma-Marin Area Rail Transit Authority is pursuing a sales tax to support the construction and operation of a commuter rail service from Santa Rosa to Larkspur, as an alternative to US-101. Funds from locally-generated sales taxes supplement state and federal funds to alleviate congestion and improve road quality in local jurisdictions. Additionally, local funds may be used as match to state and federal funds, thereby stretching the funds to even greater use.

Local funds may also include sources such as the Proposition 42 local road distribution and general funds from the local jurisdiction. In many cases, these funds are not programmed in the FTIP, and therefore are not reflected in this analysis. Certain Transportation Development Act (TDA) funds are included in the FTIP, mainly for bicycle and pedestrian projects (as a part of TDA Article 3[13]), although TDA funds are generally used to support transit.

For this analysis, regional funds are also classified as local funds, since they do not come from the state or federal governments. In the Bay Area, the major source of regional funds is bridge tolls. In 2004, voters approved Regional Measure 2 (RM2), which increases tolls on the state-owned toll bridges in the Bay Area by $1 and dedicates that funding to support improvements on corridors leading to the bridges. This dollar is used to fund projects defined in legislation, such as the Benicia-Martinez Bridge, Safe Routes to Transit, the Caldecott Tunnel Fourth Bore, and the I-580 HOV Improvements in the Tri-Valley area. The analysis also includes some Transportation Fund for Clean Air (TFCA, created by AB 2766), distributed by the Bay Area Air Quality Management District, also mainly used for bicycle and pedestrian projects[14]. TFCA funds come from a $1 surcharge on each vehicle's registration.

PART 2 – MEASURE EVALUATION

Overview

In this section, I will examine the geographic equity in highway funding in terms of population, vehicle-mile traveled, pavement condition index, pavement lane miles, registered vehicles, licensed drivers, and congestion in hours. In most cases, I will create a ratio and examine each county's figure against the average to determine a county's place. An equitable distribution should result in less than a plus or minus 25% variance from the average ratio overall for the entire region. Then, I will explain some possible reasons why there may (or may not) be geographic inequity in highway funding.

Population

In order to measure the equity level by population, the ratio used is highway funding dollar per resident in the county. Highway funding is the total funding column in Table 2. The highlighted column of Table 3 below shows the funding per capita by county. Overall, the region spends $805 per resident on roadways.

Table 3 shows that only two counties are receiving roadway funding in an equitable manner based on population: Marin and Solano Counties. Four counties are receiving nominally more than their equitable share: Alameda, Contra Costa, San Mateo, and Sonoma Counties. However, three counties are contributing to those counties' funding and are losers in terms of funding received per resident: Napa, San Francisco, and Santa Clara Counties.

San Francisco County had the greatest variance in terms of roadway dollars per capita from the regional average. At only $249 per resident, it was also the lowest amount of any county in the Bay Area. One possible explanation for this discrepancy is that San Francisco has very little freeway mileage when compared to other counties. In the region, it has the least amount of miles on the state highway system at only thirty-two centerline miles[15]. Even though the few miles of freeway San Francisco has are usually congested, there is not much room for expansion of these freeways, and therefore there are few major capacity-increasing freeway projects in San Francisco County. Additionally, San Francisco has a high usage of transit when compared to other counties in the Bay Area, which may illustrate San Francisco's preference for transit dollars instead of highway dollars. San Francisco also has a local transportation sales tax which funds many improvements in the County, which may be a further explanation of its low receipt of roadway dollars in the SAFETEA period.

Santa Clara County also had a low ratio of funding per capita. At $272 per resident, Santa Clara receives over $500 less per resident in programming on roadway projects. Santa Clara is the most populous county in the Bay Area, which may be one explanation of the funding difference. The county may be giving up some funding to support other regionally significant projects in the region, such as the Caldecott Tunnel in Alameda and Contra Costa Counties (which may also explain why Contra Costa's funding per capita ratio is the highest in the Bay Area). Additionally, Santa Clara's sales tax, while a major source of funding for transit, may also generate enough funds to support roadway needs. Santa Clara's wealth of jobs may also help fill the gap between the county's need and what it receives from certain federal, state, and local sources, through business and property taxes.

Napa's situation is harder to explain. Napa has no transportation sales tax to make up for its need, and receives only $368 in roadway funding per resident. Since Napa has no locally-generated sales taxes to match federal and state funding, the result may be its lower roadway funding receipt per capita. Another explanation is that Napa has very few miles of freeway (like San Francisco) and therefore does not need large highway projects. As the most rural county of the Bay Area, there may not be a demand for higher capacity improvements yet. The largest project in Napa County is shared with Solano County: the SR-12 Jameson Canyon Widening, with most funding from the STIP and CMIA. The bulk of this project, however, is programmed in FY 2009-10, which is outside of this funding analysis period. This may also explain why Napa's funding is lower when compared to other counties, since Napa saved its RTIP county share in order to program this $139.5 million project[16].

Table 3 Funding Per Capita, Overall

County	Population	Ratio	Variance	%
Alameda	1,558,600	$1,086.10	$281.06	25.88%
Contra Costa	1,036,600	$1,496.80	$691.76	46.22%
Marin	258,400	$854.29	$49.25	5.76%
Napa	135,700	$368.26	($436.78)	-118.61%
San Francisco	804,300	$249.09	($555.96)	-223.20%
San Mateo	743,000	$1,035.22	$230.17	22.23%
Santa Clara	1,827,900	$272.36	($532.68)	-195.58%
Solano	454,000	$862.79	$57.74	6.69%
Sonoma	508,800	$1,031.09	$226.05	21.92%
Total	**7,327,300**	**$805.04**	**$0.00**	0.00%

Source: MTC Fund Management System, MTC Population Projection for 2007

Vehicle-Mile Traveled

The Vehicle-Mile Traveled measure is the estimate of miles traveled by automobiles in that county in 2005. Table 4 below shows the VMT per county and the amount of roadway funding each county receives per vehicle-mile traveled. Overall, about five counties received their equitable amount of roadway funding based on VMT: Alameda, Marin, San Mateo, Solano, and Sonoma Counties. That is, their variance of roadway funding programmed per vehicle-mile traveled was less than 25% above or below the regional average of $38 per VMT. Contra Costa County received the highest amount of funding per VMT, while Napa, San Francisco, and Santa Clara received the lowest.

The same three counties, Napa, San Francisco, and Santa Clara, were also the lowest recipients of roadway funding based on the population measure. Santa Clara was the worst off in terms of funding received per VMT. This may be explained by the development of Santa Clara County. Many of its highways were built in the 1970s and 1980s, and were built to higher capacity standards than counties with older infrastructure, such as Alameda County. Other explanations given for the population measure also hold true for the VMT measure, including the high density of jobs and its transportation sales tax.

Napa's low amount of funding per VMT may also be explained by the high percentage of its roads being in the state highway system. According to data from the MTC in 2003, 112 miles out of 870 miles of centerline road miles in Napa County are on the state highway system[17]. At 12.9% of the roads in the county, it is the highest percentage of state highway miles as a portion of a county's total road mileage in the region. As a comparison, the region averages 6.7% of all

road miles being on the state highway system. Napa's roughly double amount may mean that Caltrans puts more SHOPP and other state highway funding into Napa County's road system – funding, for the most part, that is not included in this analysis.

Contra Costa County, under this measure, is also the highest recipient of funding per vehicle-mile traveled. As mentioned in the population measure, this may be explained by the number of large projects expected to go to construction within the years of SAFETEA. The projects include the Caldecott Tunnel, with a total project cost of about $420 million, and the widening of Highway 4 from Loveridge to SR-160[18]. These projects have been in the planning stages for much of the previous federal reauthorization period (TEA-21), which may suggest that Contra Costa received fewer roadway dollars in the TEA-21 period while these major projects were under environmental review and design.

Table 4 Funding Per Vehicle-Mile Traveled, Overall

County	VMT	Ratio	Variance	%
Alameda	36,402,500	$46.50	$8.24	17.72%
Contra Costa	20,498,800	$75.69	$37.43	49.45%
Marin	6,701,100	$32.94	($5.32)	-16.15%
Napa	2,805,900	$17.81	($20.45)	-114.83%
San Francisco	8,293,100	$24.16	($14.10)	-58.38%
San Mateo	17,220,200	$44.67	$6.41	14.34%
Santa Clara	40,037,600	$12.43	($25.83)	-207.70%
Solano	11,633,700	$33.67	($4.59)	-13.64%
Sonoma	10,579,100	$49.59	$11.33	22.85%
Total	**154,172,000**	**$38.26**	**$0.00**	0.00%

Source: MTC Fund Management System, MTC Projections 2003

Pavement Condition Index

The Pavement Condition Index measure comparison to overall roadway funding is presented in Table 5 below. As mentioned earlier, in order to measure equity in roadway funding based on PCI, I assumed PCI is the percentage of roadway miles that are of an acceptable quality. The difference between 100 and the PCI would serve as the percentage of roadway miles that are deficient. Multiplying the percentage of deficient miles by the amount of lane miles in each county yielded the number of deficient lane miles in each county. From there, I was able to calculate the roadway funding per deficient lane mile in each county.

The regional average is $457,000 in roadway funding per deficient lane mile. In this measure, there were almost no county that received its equitable level of roadway funding. Only San Mateo County had a variance of less than 25% of the regional average. The only other two counties with a positive variance besides San Mateo County were Alameda and Contra Costa Counties. All other counties received less than the regional average, including Marin, Napa, San Francisco, Santa Clara, Solano, and Sonoma Counties.

Of particular interest is Napa County. While it had the fewest lane miles of any county, it also had the worst PCI (and therefore highest percentage of deficient lane miles). Still, the roadway funding per deficient lane mile is $374,000 less than the regional average. While the explanation given above for the VMT measure for Napa County is still valid (that a higher percentage of road miles in Napa County are state highways), it may not explain the huge variance below the regional average. Another possible explanation could be that since many of the county's roads

are in rural and therefore seldom traveled roads, it is acceptable to have a lower PCI on those roads.

The next greatest variance below the regional average is Santa Clara County. In this case, its low amount of funding per deficient lane mile may be explained by its high PCI. At 75, Santa Clara's PCI is the highest in the region by over five index points. This might show that since Santa Clara's pavement conditions are relatively good, there is less of a need for roadway funding in Santa Clara than there is for other counties with a lower PCI.

This reasoning, however, does not hold true for the next lowest county, San Francisco. At over $215,000 below the regional average funding per deficient lane mile, San Francisco also has one of the lowest PCI scores in the region at 65, a full 10 index points lower than Santa Clara. It is possible that since San Francisco's streets are denser and more urban, that they see much more traffic than streets in other counties. This may imply that these streets deteriorate faster than in other counties.

The highest two counties again are Alameda and Contra Costa Counties, with variances above the regional average by $253,000 and $344,000 per deficient lane mile, respectively. Since this table lists the overall funding regardless of project type (state highway versus local road versus bicycle and pedestrian projects), it is possible that the variance is caused by large projects in those counties. Contra Costa's large projects were explained in the VMT measure. Alameda has a number of large projects expected to be under construction within the SAFETEA period, such as the I-580 High-Occupancy Vehicle and Auxiliary Lanes project in the eastbound direction, with a total cost of $153 million.

Table 5 Funding Per Deficient Lane Mile, Overall

County	PCI	Deficient	Deficient Lane Mi.	Ratio	Variance	%
Alameda	69.53	30.47%	2,382.80	$710,423.78	$253,560.39	35.69%
Contra Costa	68.16	31.84%	1,937.27	$800,912.81	$344,049.42	42.96%
Marin	64.5	35.50%	678.76	$325,223.70	($131,639.69)	-40.48%
Napa	60.5	39.50%	600.40	$83,232.84	($373,630.54)	-448.90%
San Francisco	65	35.00%	831.25	$241,012.19	($215,851.20)	-89.56%
San Mateo	66.24	33.76%	1,323.80	$581,027.56	$124,164.17	21.37%
Santa Clara	75.07	24.93%	2,290.88	$217,319.28	($239,544.11)	-110.23%
Solano	65.87	34.13%	1,186.53	$330,128.08	($126,735.31)	-38.39%
Sonoma	65.5	34.50%	1,679.81	$312,309.31	($144,554.07)	-46.29%
Total			**12,911.50**	**$456,863.39**	**$0.00**	**0.00%**

Source: MTC Fund Management System, MTC Pavement Condition Index 2005

Pavement Lane Miles

Related to the PCI measure is the Pavement Lane Mile measure. Table 6 shows the ratio in each county of funding per pavement lane mile. The regional average is $143,000 in roadway funding per lane mile. In this measure, only one county fell within the "equitable" range of plus or minus 25% of the regional average: Marin County. Four other counties fell within plus or minus 35% of the regional average: Alameda, San Mateo, Solano, and Sonoma Counties.

Under this measure, Contra Costa County had the highest positive variance at over $111,000 above the regional average, while again, Napa, San Francisco, and Santa Clara had the largest negative variances. These variances could be caused by the same reasons as mentioned for the

previous measures; it is clear that a trend is developing in terms of transportation funding equity in roadways.

Table 6 Funding Per Pavement Lane Mile, Overall

County	Lane Miles	Ratio	Variance	%
Alameda	7,821	$216,442.47	$73,153.16	33.80%
Contra Costa	6,084	$255,027.54	$111,738.23	43.81%
Marin	1,912	$115,454.41	($27,834.89)	-24.11%
Napa	1,520	$32,876.97	($110,412.33)	-335.83%
San Francisco	2,375	$84,354.27	($58,935.04)	-69.87%
San Mateo	3,921	$196,165.94	$52,876.64	26.96%
Santa Clara	9,188	$54,185.09	($89,104.22)	-164.44%
Solano	3,477	$112,656.21	($30,633.10)	-27.19%
Sonoma	4,869	$107,746.71	($35,542.59)	-32.99%
Total	**41,167**	**$143,289.31**	**$0.00**	0.00%

Source: MTC Fund Management System, MTC Pavement Condition Index 2005

Registered Vehicles and Licensed Drivers

The next two measures are closely related. Both measures come from the California Department of Motor Vehicles (DMV), and measure the demand for private transportation in each county. Table 7 shows the amount of highway funding for each registered vehicle in a county. The regional average is $1,088 of funding per registered vehicle. Table 8 shows the amount of roadway funding for each licensed driver in a county. The regional average is $1257 of funding per licensed driver.

The findings for both measures are fairly similar. In both cases, four counties are deemed "equitable" in terms of the relationship between roadway funding and DMV measure: Marin, San Mateo, Solano, and Sonoma Counties. Alameda County is slightly above the 25% threshold to be considered equitable at about 28% for both measures. Again, the major beneficiary in transportation highway funding based on the DMV measures is Contra Costa County, with the greatest positive variances. As in previous measures, the three counties with the greatest negative variances for both DMV measures are Napa, San Francisco, and Santa Clara Counties. These DMV measures further support the trend for roadway funding over the SAFETEA period.

Table 7 Funding Per Registered Vehicle, Overall

County	Registered Vehicles	Ratio	Variance	%
Alameda	1,108,005	$1,527.79	$439.49	28.77%
Contra Costa	804,453	$1,928.75	$840.45	43.57%
Marin	215,890	$1,022.51	($65.79)	-6.43%
Napa	114,049	$438.17	($650.13)	-148.37%
San Francisco	435,244	$460.30	($628.00)	-136.43%
San Mateo	657,280	$1,170.23	$81.93	7.00%
Santa Clara	1,353,808	$367.74	($720.56)	-195.94%
Solano	324,128	$1,208.49	$120.19	9.95%
Sonoma	407,334	$1,287.93	$199.63	15.50%
Total	**5,420,191**	**$1,088.30**	**$0.00**	0.00%

Source: MTC Fund Management System, California Dept. of Motor Vehicles (2005)

Table 8 Funding Per Licensed Driver, Overall

County	Licensed Driver	Ratio	Variance	%
Alameda	964,454	$1,755.19	$498.00	28.37%
Contra Costa	684,670	$2,266.18	$1,009.00	44.52%
Marin	184,993	$1,193.28	($63.90)	-5.36%
Napa	89,006	$561.46	($695.73)	-123.91%
San Francisco	514,156	$389.65	($867.53)	-222.64%
San Mateo	490,895	$1,566.87	$309.68	19.76%
Santa Clara	1,167,714	$426.35	($830.84)	-194.87%
Solano	267,754	$1,462.93	$205.75	14.06%
Sonoma	328,428	$1,597.36	$340.18	21.30%
Total	**4,692,070**	**$1,257.18**	**$0.00**	0.00%

Source: MTC Fund Management System, California Dept. of Motor Vehicles (2005)

One further examination to try to explain the funding numbers could be the amount of registered vehicles and licensed drivers per resident. It is possible that counties with a lower number of vehicles and drivers per capita require less roadway support than counties that have a greater proportion of its residents driving and owning vehicles. Table 9 below calculates the ratio of registered vehicles and licensed drivers per capita in each county, and also assigns a region-wide rank to each county.

The findings under this table, however, are inconclusive. Contra Costa County, the county with the greatest positive variance in the DMV measures, ranks fifth region-wide in registered vehicles per resident, and third in number of licensed drivers per resident. These rankings put Contra Costa in the middle of the region in terms of rank. For the counties with the greatest negative variance in the DMV measures, San Francisco ranks last in the number of registered vehicles per resident, but ranks sixth in the number of licensed drivers per resident. The low ranking of San Francisco in the number of registered vehicles per capita supports the reasoning that the county perhaps requires fewer roadway dollars because of the low percentage of car registrations in the county. This does not, however, take into account the daytime inflow of workers and automobiles into the county, since San Francisco is one of the region's major job centers[19]. San Francisco's ranking in number of licensed drivers per capita is in the lower third of the region, which may also support this theory.

Santa Clara County's rankings are similar to that of San Francisco. In both DMV measures, Santa Clara County is in the lower third in the region, ranking sixth in number of registered vehicles per capita, and seventh in number of licensed drivers per capita. These rankings seem to also support the idea that these counties require less roadway funding because they have relatively fewer registered vehicles and licensed drivers per capita when compared to other counties.

Napa County, however, is the anomaly in this theory. Napa County has one of the highest ratios of registered vehicles per resident at 84%, and ranks fourth in number of licensed drivers per resident. Similarly, this idea is not supported when looking at the other lower third counties on the list. Particularly, Alameda County, which has generally fared well in the amount of highway funding received when compared to the above measures, ranks eighth out of nine counties in both registered vehicles and licensed drivers per resident. Similarly, Solano County, while

scoring within the "equitable" range in respect to funding per registered vehicle and licensed driver, also ranks in the lower third of the measures when ranked per capita. Unfortunately, these findings do not support the idea that counties with lower ratios of registered vehicles and licensed drivers per capita also receive fewer roadway dollars as a result.

Table 9 Registered Vehicles and Licensed Drivers Per Capita by County

County	Population	Registered Vehicles	Ratio	Rank	Licensed Drivers	Ratio	Rank
Alameda	1,558,600	1,108,005	71.09%	8	964,454	61.88%	8
Contra Costa	1,036,600	804,453	77.60%	5	684,670	66.05%	3
Marin	258,400	215,890	83.55%	3	184,993	71.59%	1
Napa	135,700	114,049	84.04%	2	89,006	65.59%	4
San Francisco	804,300	435,244	54.11%	9	514,156	63.93%	6
San Mateo	743,000	657,280	88.46%	1	490,895	66.07%	2
Santa Clara	1,827,900	1,353,808	74.06%	6	1,167,714	63.88%	7
Solano	454,000	324,128	71.39%	7	267,754	58.98%	9
Sonoma	508,800	407,334	80.06%	4	328,428	64.55%	5

Source: MTC Population Projection for 2007, California Dept. of Motor Vehicles (2005)

Congestion in Hours

The final measure of geographic equity I will examine is the congestion in each county. Table 10 shows the number of daily hours of recurring congestion on each county's freeways. There were no measured delays in only one county, making this measure of little use to evaluate Napa County. Napa County has fewer than five miles of freeways within its borders. Overall, the region spends $47,500 in highway funding to combat each vehicle-hour of delay. Of particular interest is that Alameda County, which in previous measures has a positive variance from the regional average, is under the regional average by $14,000 of funding per vehicle-hour of delay. Also, under this measure, there are no counties that are within the "equitable" threshold of plus or minus 25% of the regional average.

Still, two counties stand out as having the greatest negative variance from the regional average: San Francisco and Santa Clara Counties. This final measure supports the overall trend that these two counties consistently fall short of their need, based on this set of measures. Similarly, Contra Costa continues to be a county with a positive variance, but not the greatest. In fact, under this measure, Contra Costa has the lowest positive variance in the group. San Mateo, Solano, and Sonoma Counties all have a greater positive variance than Contra Costa. Solano and Sonoma Counties are relatively more rural than their southern neighbors, and therefore have fewer freeway miles than their more urban counterparts. Therefore, it is possible that the HICOMP measure of recurring vehicle-hours of delay for those counties is low, since the HICOMP report only measures delay on freeways (and not other roads such as state highways or local roads). With a lower HICOMP congestion number, their ratios of funding per vehicle-hour of delay may be inflated.

Table 10 Funding Per Vehicle-Hour of Recurring Congestion on Freeways, Overall

County	Hours Delay	Ratio	Variance	%
Alameda	50,540	$33,494.19	($14,003.92)	-41.81%
Contra Costa	18,520	$83,779.02	$36,280.91	43.31%
Marin	7,410	$29,790.67	($17,707.45)	-59.44%
Napa	0	#DIV/0!	#DIV/0!	#DIV/0!
San Francisco	8,860	$22,611.89	($24,886.22)	-110.06%
San Mateo	7,800	$98,611.11	$51,113.00	51.83%
Santa Clara	22,910	$21,730.80	($25,767.32)	-118.58%
Solano	2,830	$138,411.88	$90,913.77	65.68%
Sonoma	5,320	$98,612.55	$51,114.43	51.83%
Total	**124,190**	**$47,498.12**	**$0.00**	0.00%

Source: MTC Fund Management System, Caltrans HICOMP 2004 Report

Another examination may isolate this measure for just state highway funding. Since this measure specifically measures delay on freeways, it would be more appropriate to take out funding for local roads and bicycle and pedestrian projects and isolate the state highway funding to compare with the vehicle-hour of delay measure. Table 11 presents the funding for state highways and its ratio over the vehicle-hours of delay. One drawback of this examination, however, is that all state highways are included in the state highway funding numbers – it does not isolate the freeways only.

Even when only examining state highway funding, the numbers are generally the same. San Francisco and Santa Clara Counties still fall well under the regional average of $33,432 of state highway funding per vehicle-hour of delay, while San Mateo, Solano, and Sonoma lead the way with over $55,000 above the regional average. Unfortunately, this examination does not yield any further insight into this measure than the original numbers shown in Table 10.

Table 11 State Highway Funding Per Vehicle-Hour of Recurring Congestion on Freeways

County	Funding (State Hwy)	Ratio	Variance	%
Alameda	1,023,926,000	$20,259.72	($13,172.72)	-65.02%
Contra Costa	1,074,714,000	$58,029.91	$24,597.47	42.39%
Marin	148,674,000	$20,063.97	($13,368.47)	-66.63%
Napa	36,827,000	#DIV/0!	#DIV/0!	#DIV/0!
San Francisco	91,191,000	$10,292.44	($23,140.00)	-224.83%
San Mateo	702,012,000	$90,001.54	$56,569.10	62.85%
Santa Clara	323,104,531	$14,103.21	($19,329.23)	-137.06%
Solano	277,123,000	$97,923.32	$64,490.88	65.86%
Sonoma	474,403,150	$89,173.52	$55,741.08	62.51%
Total	**4,151,974,681**	**$33,432.44**	**$0.00**	0.00%

Source: MTC Fund Management System, Caltrans HICOMP 2004 Report

PART 3 – RESEARCH SUMMARY

Research Findings

The findings from this analysis have proven surprising. While some level of inequity was expected in highway funding, the author had not expected the inequity to be so focused on three particular counties. Table 12 below depicts a summary of all seven measures evaluated in this examination. Fields marked in green are measures where the county's variance from the regional average was above 25%, while the fields marked in pink are measures where the county's variance from the regional average was below 25%. White fields indicate that they fall within the "equitable" range of variance for this study.

Overall, five counties were within the equitable range for the amount of roadway funding received over the SAFETEA period: Alameda, Marin, San Mateo, Solano, and Sonoma Counties. The average variance for Solano and Sonoma Counties were most on par with the regional averages. Those counties' negative variances for the PCI and Pavement Lane Mile measures were made up for by their large positive variance for the Congestion Delay measure. Alameda and Marin had positive variances around the 20% range on average. Alameda County consistently had a mild positive variance above the 25% mark, but its large negative variance for the Congestion Delay measure brought its average variance to within the equitable range. San Mateo County had fairly equitable variances for five of the seven measures, and had two measures with a positive variance exceeding 25% in two measures: Pavement Mile and Congestion Delay. Marin County, on the other hand, was similar to San Mateo with five of seven measures within the equitable variance level (although all slightly negative, with San Mateo's all slightly positive), and had two measures with a negative variance exceeding 25% in PCI and Congestion Delay.

Contra Costa County was the only county in the Bay Area to consistently score a positive variance over 25% for all measures evaluated in this survey. Interestingly enough, the variances were all within four percentage points of each other. Contra Costa's success in bringing large highway projects to construction within the SAFETEA period is the likely reason for its high positive variance. Projects such as the SR-24 Caldecott Tunnel Fourth Bore project, with a total cost of $420 million, the SR-4 Widening from Loveridge to SR-160, I-680 HOV Lane projects, and local road improvements such as on Vasco Road, all contribute to Contra Costa's large sum of highway funds programmed in the FTIP for the SAFETEA period. While outside the scope of this study, it may be possible that Contra Costa's roadway funding amount for the last reauthorization period, TEA-21, was lower than its equitable share because the county was saving funds for the construction phases of these projects. In the meantime, Contra Costa could have been pursuing the pre-construction (such as environmental, design, and right of way) phases to ensure these large projects go to construction in the next federal reauthorization period (SAFETEA).

Table 12 Overall Findings of Geographic Equity Based on Seven Measures

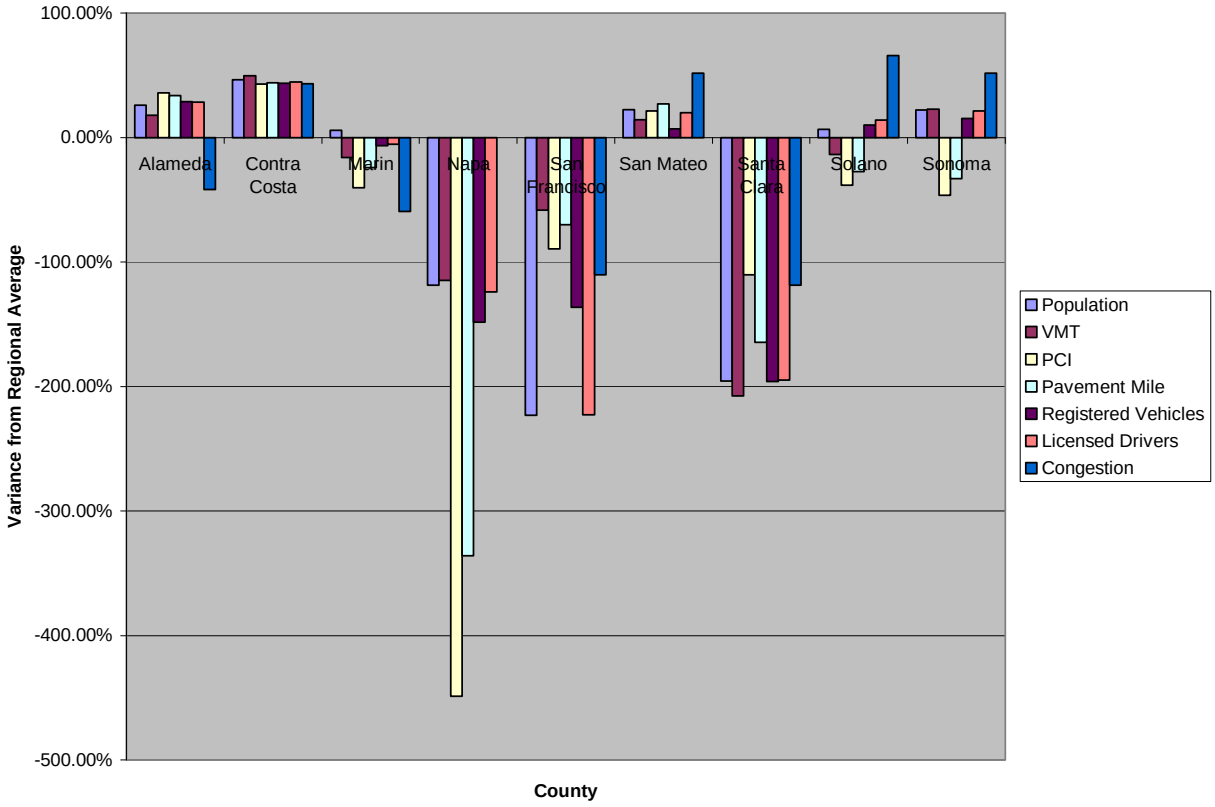
County	Popul'n.	VMT	PCI	Pvmt. Mile	Reg. Vehicles	Licensed Drivers	Delay	Average
Alameda	25.88%	17.72%	35.69%	33.80%	28.77%	28.37%	-41.81%	**18.35%**
Contra Costa	46.22%	49.45%	42.96%	43.81%	43.57%	44.52%	43.31%	**44.83%**
Marin	5.76%	-16.15%	-40.48%	-24.11%	-6.43%	-5.36%	-59.44%	**-20.89%**
Napa	-118.61%	-114.83%	-448.90%	-335.83%	-148.37%	-123.91%	#DIV/0!	**-215.08%**
San Francisco	-223.20%	-58.38%	-89.56%	-69.87%	-136.43%	-222.64%	-110.06%	**-130.02%**
San Mateo	22.23%	14.34%	21.37%	26.96%	7.00%	19.76%	51.83%	**23.36%**
Santa Clara	-195.58%	-207.70%	-110.23%	-164.44%	-195.94%	-194.87%	-118.58%	**-169.62%**
Solano	6.69%	-13.64%	-38.39%	-27.19%	9.95%	14.06%	65.68%	**2.45%**
Sonoma	21.92%	22.85%	-46.29%	-32.99%	15.50%	21.30%	51.83%	**7.73%**

The three counties with the greatest negative variance are now very familiar after reviewing each individual measure. Napa, San Francisco, and Santa Clara Counties had extremely large negative variances for all seven measures examined in this analysis. One measure for Napa County could not be compared due to Caltrans finding of no recurrent freeway congestion in that county. Still, the magnitude of the negative variances shows a strong inequity of roadway distribution to these counties.

Figure 2 below illustrates in a chart the full magnitude of the negative variances for each measure from the regional average. While all other counties show a slight positive variance (except for Marin, with a slight negative variance), the counties of Napa, San Francisco, and Santa Clara show a much greater negative variance up to eight times the average variance of the other five counties. As discussed in the individual examinations of each measure, there are a few explanations that could shed light on the reason of these counties' extreme negative variances from the regional average.

The first explanation could be that the counties are saving up for a larger construction project to take place at a time outside of the SAFETEA period examined in this analysis. For instance, Napa County has been saving its RTIP county share for many STIP cycles in order to program $26.5 million in RTIP funds for the SR-12 Jameson Canyon Widening[20]. Napa and Solano Counties have also secured state funding from the Corridor Mobility Improvement Account for over $70 million. These funds, however, are programmed in the 2009-10 fiscal year. The SAFETEA period analyzed for this report ends in the 2008-09 fiscal year. Therefore, this large influx of roadway funding is not reflected in this report. This may also be true of San Francisco and Santa Clara Counties. For instance, San Francisco's top highway project is the replacement of the US-101 Doyle Drive structure. This project is currently estimated to cost over $800 million[21]. However, the funds for the construction of this project are not programmed until FY 2010-11, which also falls outside of the SAFETEA period examined for this analysis.

Figure 2 Overall Findings of Geographic Equity Based on Seven Measures



Other explanations can be offered from the preceding research. Examples of possible reasons for these three counties' low equity variances include:

- These counties are "donating" their funds to regional priority projects while their priority projects are under development;
- In San Francisco and Santa Clara's case, both counties are job centers for the region, and they may attract additional tax revenue from business enterprises that could help make up the gap in state and federal roadway funding;
- Napa has the highest percentage of roads in the state highway system, which may mean that Caltrans spends SHOPP funds for road maintenance at a higher proportion than in other counties;
- Napa County's rural roads may be allowed to have a lower Pavement Condition Index, since rural roads are less traveled;
- Santa Clara County's high PCI may indicate that fewer funds are required to maintain good pavement condition;
- San Francisco County's urban roads may deteriorate faster due to the high volume of urban traffic that traverse its roads, and may explain its low PCI; and

- Santa Clara and San Francisco's percentage of registered vehicles and licensed drivers as a proportion of population is among the region's lowest, which may suggest less need for roadway funding (and may indicate a preference for transit funding instead).

Another possible explanation not previously discussed is the exchange of funds. Fund swaps, as they are sometimes called, allow for agencies to change the "color of money" used to construct a project. The color of money generally refers to the different source of funds – federal, state, local, and various subtypes under these sources. Counties with large amounts of local funds, such as San Francisco and Santa Clara, may choose to use fund swaps to fund roadway projects. The counties may program transit funds to an existing transit project originally funded by local sales tax funds. This frees up local sales tax funds to be used for other purposes, such as roadway improvements.

The most recent example of this type of fund swap is in the programming of the 2006 RTIP Augmentation. Santa Clara County chose to request a fund swap for the entire portion of their county share – $57.5 million – for a single transit project. This transit project, the Capitol Light Rail Extension to Eastridge, is fully funded by sales tax measure funds. By programming STIP Public Transportation Account to this project, the same amount of local sales tax funds is freed up, and able to be spent on other projects like cash. Santa Clara Valley Transportation Authority (VTA), Santa Clara's CMA, originally proposed to spend the exchanged funds for roadway projects, including interchange improvements on US-101, HOV improvements on I-680 and I-880, and $20 million for general local streets and county roads rehabilitation[22].

This type of swap effectively "washes" the funds so that projects funded by local sales tax funds do not show up in the FTIP. Therefore, it might seem that Santa Clara, in this case, has a much higher transit amount programmed than highway programming. However, because of the fund swap, $57.5 million is effectively being programmed to highway projects. This action is not picked up by this analysis, and may explain further the negative variances found in San Francisco and Santa Clara Counties, since those counties have both local sales tax measures and large transit operations.

PART 4 – RECOMMENDATIONS AND CONCLUSIONS

Recommendations

The study's findings suggest that four of the five counties are generally inequitable in roadway funding when compared to the seven measures selected for the study. However, additional information and background, as well as a deeper look at the raw data, suggest that there is more behind the inequity than is at first apparent. Much of the inequity was caused by a few regionally-significant projects going to construction within the SAFETEA period examined for this study, while leaving out other major planned construction projects outside of the SAFETEA period. Still, all regions should strive for long term equity in transportation funding decisions.

A few recommendations resulting from this study are listed below. It is hoped that these recommendations will assist in achieving a more equitable transportation program.

- Keep a consistent and better record of equity measures and funding decisions in relation to those measures. Funding decisions should have some acknowledgement of need that may be illustrated by these measures.
- Require regular evaluations of equity in funding programs' policies and procedures. Some consideration of past inequities should factor in to funding decisions.
- Justify regionally significant projects and prioritize counties in future funding cycles that gave up funding to support the regional priorities. Recognizing that one project may require more funding in order to be completed, all counties should contribute to support regionally significant projects that may be in other counties. Inevitably, each county will receive a regionally significant project delivered earlier than what otherwise would be possible without regional support.
- Continue to pool regional funds in order to support regionally significant projects, even though it may contribute to geographic inequity. Regionally significant projects should be carefully selected and the region should have a consensus as to the list and sequence of regionally significant projects.
- For a full picture, transit projects should also be examined in determining equity. This may help to explain the negative variances from the regional average in San Francisco and Santa Clara Counties. While highway funds were specifically selected for examination in this study, the real world transportation mix also includes transit, and a balance should be struck between those modes based on density and local preference.
- Expand the sample time period. While the SAFETEA period served as a good beginning to examine the region's geographic equity in highway funding, it does not reflect the long term decisions and long lead times for project development. A longer sample time period would include large projects in the "negative variance" counties, such as the SR-12 Jameson Canyon Widening project in Napa County and the US-101 Doyle Drive Replacement project in San Francisco County.
- Counties should continue to keep "shelf-ready" projects under development in lean transportation funding times, or when supporting a regionally significant project in another county. This will allow those projects to take advantage of funding when it

becomes available, such as the recent case with CMIA funds. Projects that had relatively shelf-ready projects and were successful in securing CMIA funds include the SR-24 Caldecott Tunnel Fourth Bore project in Alameda/Contra Costa Counties, the SR-12 Jameson Canyon Widening Project in Napa/Solano Counties, and the US-101 projects in Sonoma County.

Conclusion

With transportation funds in short supply, despite the recent influx of bond funding resulting from Proposition 1B, each local jurisdiction strives to receive as much as the funding pie as possible. When they do not receive enough, they might point to not receiving their "fair share". This argument has been explored in this analysis, but only for a limited time period and from one regional listing of funding. From this limited analysis, we find that inequities do indeed exist in the nine-county Bay Area in respect to roadway funding, based on seven measures.

However, upon further evaluation and background information on Bay Area fund programming, it is clear that the whole picture is not evident from just this analysis. It would seem that, from this study, there was one clear "winner" (Contra Costa) and three clear "losers" (Napa, San Francisco, and Santa Clara). This, however, could be explained by a number of factors, including large highway projects not being programmed in the six years that encompass SAFETEA, and that fund swaps may not be reflected in the MTC Fund Management System data source. Additionally, in order to gain a complete understanding of Bay Area fund programming, one must also examine funding from the other piece of the transportation mix: transit funding. While the scope of this study was limited, a larger study that accounts for the shortcomings of this analysis may be worthwhile to determine the full extent of Bay Area geographic equity in transportation funding.

This study also brings other interesting topics that may be worthy of further exploration. Notwithstanding the explanations for Contra Costa County's top positive variance mentioned in this study, suburban sprawl could be yet another explanation. Much of Contra Costa's development is centered in the eastern portion of the county, and a quick examination of the top roadway transportation projects being constructed in the SAFETEA time period tends to support this development pattern. These projects include the Vasco Road Improvements (as a main thoroughfare to I-580), SR-4 widening in the Pittsburg-Antioch area (to support commuters to the inner core of the Bay Area who live in communities such as Brentwood and Discovery Bay), and the SR-24 Caldecott Tunnel Fourth Bore (to further facilitate commuter traffic to job centers such as Oakland and San Francisco). A transportation and land use study to analyze the link in Contra Costa's case would certainly be interesting, but beyond the scope of this study.

Despite the appearance that three counties are extremely disadvantaged in their equitable share of highway funding, the fact that there are no complaints show that there is more at play behind the scenes. The explanations given in this study lend some understanding of what may not be obvious by the numbers. A greater explanation of the lack of complaints about equity in the Bay Area, however, is the spirit of cooperation the Bay Area counties have in addressing transportation problems. They understand that all of the regions' transportation issues cannot be fixed in one day (or one funding cycle), and recognize the importance of working together, regionally, to solve transportation problems. These problems may be in other counties, but eventually the problem will be in their home counties. When that time comes, they can rely upon

regional support to fund that solution. It is this region's spirit of cooperation that serves as a positive example and "best practice" for other metropolitan areas to follow.

APPENDICES

Exhibit 1 San Francisco Bay Area Highway System

Source: Metropolitan Transportation Commission

ENDNOTES

[11] Darensburg v. MTC
[2] Lem (1997), 12.
[3] http://www.mtc.ca.gov/maps_and_data/datamart/stats/vmt.htm (accessed 4/18/07)
[4] ibid.
[5] 2005 Bay Area Local Streets and Roads Pavement Condition Summary, Kevin Fung, Sui Tan and Theresa Romell, MTC, October 2006. Press release available at http://www.mtc.ca.gov/news/press_releases/2006/rel376.htm
[6] http://www.mtc.ca.gov/maps_and_data/datamart/stats/drivlic.htm (accessed 4/18/07)
[7] http://www.mtc.ca.gov/maps_and_data/datamart/stats/drivlic.htm (accessed 4/18/07)
[8] http://www.dot.ca.gov/hq/traffops/sysmgtpl/HICOMP/index.htm (accessed 4/18/07)
[9] ibid., page 1-2.
[10] http://www.mtc.ca.gov/funding/fms_intro.htm
[11] Generally, the four phases of construction are environmental, design, right-of-way, and construction.
[12] http://www.lao.ca.gov/2000/051100_cal_travels/051100_cal_travels_decisions.html
[13] http://www.mta.net/projects_programs/tda.htm
[14] http://www.baaqmd.gov/pln/grants_and_incentives/tfca/index.htm
[15] http://www.mtc.ca.gov/maps_and_data/datamart/stats/cardmile.htm
[16] Cost information from approved CMIA Project Baselines, May 2007, http://www.mtc.ca.gov/funding/infrastructure/index.htm
[17] http://www.mtc.ca.gov/maps_and_data/datamart/stats/cardmile.htm
[18] Cost information from approved CMIA Project Baselines, May 2007, http://www.mtc.ca.gov/funding/infrastructure/index.htm
[19] http://www.mtc.ca.gov/maps_and_data/datamart/stats/cntycomm.htm
[20] MTC's 2006 RTIP Policies and Procedures, http://www.mtc.ca.gov/funding/STIP/2006RTIP/RES-3689_Attachment-1.pdf
[21] Cost information from approved CMIA Project Baselines, May 2007, http://www.mtc.ca.gov/funding/infrastructure/index.htm
[22] http://www.vta.org/inside/boards/packets/2007/02_feb/18.pdf. VTA approved the action at their Feb. 1, 2007 meeting of the Board of Directors (item 18).

ACRONYMS AND ABBREVIATIONS

Below is a listing of commonly-used abbreviations in this paper and supporting documents, and their meanings.

Abbreviation	Meaning
ABAG	Association of Bay Area Governments
AC	Asphalt Concrete
AC Transit	Alameda-Contra Costa Transit District
ACCMA	Alameda County Congestion Management Agency
ADA	Americans with Disabilities Act
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit District
BR	Bridge
BRT	Bus Rapid Transit
Caltrain/JPB	Caltrain / Peninsula Joint Powers Board
Caltrans	California Department of Transportation
CC	Contra Costa
CCAG	[San Mateo] Cities/County Associated Governments
CCCTA	Central Contra Costa Transit Authority
CCTA	Contra Costa Transportation Authority
CCTV	Closed-Circuit Television
CHP	California Highway Patrol
CMA	Congestion Management Agency
CMAQ	Congestion Mitigation Air Quality Improvement
CMIA	Corridor Mobility Improvement Account
CO	County
CON	Construction
CTC	California Transportation Commission
DMV	California Department of Motor Vehicles
DPW	Department of Public Works
E/B	Eastbound
E/O	East of
ECCTA	Eastern Contra Costa Transit Authority
ENV	Environmental
ER	Emergency Relief (or Response)
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FMS	Fund Management System
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
FY	Fiscal Year
GGBHTD	Golden Gate Bridge, Highway, and Transportation District
HBP	Highway Bridge Program
HBRR	Highway Bridge Replacement and Rehabilitation Program (replaced by HBP)

HES	Hazard Elimination/Safety
HICOMP	Highway Congestion Monitoring Program
HOT	High Occupancy – Toll
HOV	High Occupancy Vehicle
I/C	Interchange
I/S	Intersection
IM	Interstate Maintenance
ITIP	Interregional Transportation Improvement Program
ITS	Intelligent Transportation Systems
LAVTA	Livermore Amador Valley Transit Authority
LTC	Local Transportation Commission
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
MUNI	San Francisco Municipal Railway
N/B	Northbound
N/O	North of
NCTPA	Napa County Transportation Planning Agency
NWPRR	Northwestern Pacific Railroad
OA	Obligation Authority
OC, O/C	Overcrossing
PCC	Portland Cement Concrete
PCI	Pavement Condition Index
PE	Preliminary Engineering
PM	Postmile
PS&E	Plans, Specifications, and Estimates
PTA	Public Transportation Account
PTAP	Pavement Technical Assistance Program
RM2	Regional Measure 2
ROW, R/W, RW	Right of Way
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
RTPA	Regional Transportation Planning Agency
S/B	Southbound
S/O	South of
SACOG	Sacramento Area Council of Governments
SAFETEA	Safe, Accountable, Flexible, Efficient Transportation Equity Act
SamTrans	San Mateo County Transit District
SB	Senate Bill
SC, SCL	Santa Clara
SCAG	Southern California Association of Governments
SCTA	Sonoma County Transportation Authority
SF	San Francisco
SFCTA	San Francisco County Transportation Authority
SHA	State Highway Account
SHOPP	State Highway Operations and Protection Program
SM	San Mateo

SR	State Route
SRTS, SR2S	Safe Routes to Schools
STA	State Transit Assistance
STA	Solano Transportation Authority
STIP	State Transportation Improvement Program
STP	Surface Transportation Program
TAM	Transportation Authority of Marin
TBJPB	Transbay Joint Powers Board
TCRF	Traffic Congestion Relief Fund
TCRP	Traffic Congestion Relief Program
TDA	Transportation Development Act
TE	Transportation Enhancements
TEA	Transportation Enhancement Activities
TEA-21	Transportation Efficiency Act for the 21st Century
TETAP	Traffic Engineering Technical Assistance Program
TFCA	Transportation Fund for Clean Air
TIF	Transportation Investment Fund
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TMP	Traffic Management Plan
TOS	Traffic Operations System
UC, U/C	Undercrossing
VMT	Vehicle-Mile Traveled
VTA	Santa Clara Valley Transportation Authority
W/B	Westbound
W/O	West of
Westcat	Western Contra Costa Transit Authority
ZEB	Zero-Emissions Bus

BIBLIOGRAPHY

Adams, Matthew, Rachel Hiatt, Mary C. Hill, Ryan Russo, Martin Wachs and Asha Weinstein. "Financing Transportation in California: Strategies for Change." University of California Institute of Transportation Studies, March 2001, http://www.its.berkeley.edu/publications/UCB/2001/rr/UCB-ITS-RR-2001-2.pdf.

Barbour, Elisa and Michael Teitz. "A Framework for Collaborative Regional Decision-Making." Public Policy Institute of California, May 2001, http://www.regionalism.org/pdf/barbour-teitz.pdf.

Bell, Michael, David Brunori, Royce Hanson, Changyong Choi, Lori Metcalf, Bing Yuan. "State and Local Infrastructure Financing: A Review of Spending Patterns and Financing Mechanisms." National Center for Real Estate Research State and Local Fiscal Research Institute, January 2006, http://www.sima2006.org/ncrer.nsf/files/Infrastructure1.pdf/$FILE/Infrastructure1.pdf.

California Department of Transportation. "Highway User Charges: Administrative Costs, Compliance Costs, and Non-Compliance and Enforcement, User Equity, Public Finance Considerations, and Impacts on the State Economy." Prepared by Peat Marwick Main & Co. for the California Highway Cost Allocation and Tax Alternatives Study, December 1987.

Cohen, Stuart and Jeff Hobson. "Transportation Choices in the San Francisco Bay Area." In *Highway Robbery: Transportation Racism and New Routes to Equity*, edited by Robert Doyle Bullard, Glenn Steve Johnson, and Angel O. Torres, 99-120 (Cambridge, MA: South End Press, 2004).

Crabbe, Amber, Rachel Hiatt, Susan D. Poliwka, and Martin Wachs. "Local Transportation Sales Taxes: California's Experiment in Transportation Finance." California Policy Research Center, 2002, http://www.ucop.edu/cprc/ltstrpt.pdf.

de Alth, Shelley and Kim Rueben. "Understanding Infrastructure Financing for California." Public Policy Institute of California, June 2005, http://www.ppic.org/content/pubs/op/OP_605SAOP.pdf.

Ernst, Michelle, James Corless, and Kevin McCarty. "Measuring Up, Trend towards voter approved tax measures." Surface Transportation Policy Project, http://www.sactaqc.org/Resources/Literature/funding/STPP_Referenda.pdf.

Garrett, Mark and Brian Taylor. "Reconsidering Social Equity in Public Transit." *Berkeley Planning Journal* 13 (1999): 6-27, http://www.uctc.net/papers/701.pdf.

Hanak, Ellen and Kim Rueben. "Funding Innovations for California Infrastructure: Promises and Pitfalls." USC Keston Institute for Infrastructure, March 2006, http://www2.urban.org/UploadedPDF/1000943_california_infrastructure.pdf.

Lem, Lewison Lee. “California’s Highway Funding Apportionment Formula: Geographic Redistribution Among Counties.” Lewis Center for Regional Policy Studies Working Paper Series #21, April 11, 1997, http://lewis.sppsr.ucla.edu/publications/workingpapers/21lemfin.pdf.

Litman, Todd. “Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning.” Victoria Transport Policy Institute, March 8, 2006, http://www.vtpi.org/equity.pdf.

Pallagst, Karina. “Growth Management in the San Francisco Bay Area: Interdependence of Theory and Practice.” University of California, Berkeley Institute of Urban and Regional Development, Working Paper 2006-02, http://www-iurd.ced.berkeley.edu/pub/WP-2006-02.pdf.

Pozdena, Randall J. “Where The Rubber Meets The Road: Reforming California's Roadway System.” Reason Foundation, August 1995, http://www.rppi.org/transportation/ps191.html.

Pucher, John. “Equity in Transit Finance: A Quantitative Assessment of the Impacts of Transit Subsidies on Low-Income and Minority Groups.” Prepared for the Urban Mass Transportation Administration, November 1981.

Seaman, Mark and Allison L. C. de Cerreño. “Dividing the Pie: Placing the Transportation Donor-Donee Debate in Perspective.” Rudin Center for Transportation Policy & Management, May 2003, http://www.nyu.edu/wagner/transportation/files/flows.pdf.

Snyder, Mary Gail. “Opportunity for All: Growth, Equity and Land Use Planning for California’s Future.” University of California, Berkeley Institute of Urban and Regional Development, Working Paper 2001-05, http://www-iurd.ced.berkeley.edu/pub/WP-2001-05.PDF.

Talberth, John, et al. “Building a Resilient and Equitable Bay Area: Toward a Coordinated Strategy for Economic Localization.” Redefining Progress, et al, November 2006, http://www.regionalprogress.org/Building%20a%20Resilient%20and%20Equitable%20Bay%20Area.pdf.

Transportation Research Board. “Metropolitan-Level Transportation Funding Sources.” Prepared by Institute of Transportation Studies in Berkeley, CA and ICF Consulting in Fairfax, VA, as part of National Cooperative Highway Research Program, Project 08-36, Task 49, December 2005, http://www.transportation.org/sites/planning/docs/NCHRP%208-36(49)%20Final%20Report.pdf.

Transportation Research Board. “Performance-Based Measures in Transit Fund Allocation: A Synthesis of Transit Practice.” Transit Cooperative Research Program Synthesis 56, http://www.trb.org/publications/tcrp/tcrp_syn_56.pdf.

Wachs, Martin. “Improving Efficiency And Equity In Transportation Finance.” The Brookings Institute Center on Urban and Metropolitan Policy, April 2003, http://www.brookings.edu/es/urban/publications/wachstransportation.pdf.

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