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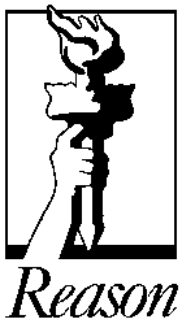
Addressing California's Transportation Needs:

Problems with Proposition 1B and Alternative Approaches

By Ted Balaker, Adrian T. Moore, Ph.D., George Passantino, Robert W. Poole, Jr., Adam Summers, and LanlanWang

POLICY STUDY 341



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Executive Summary

California's population is projected to reach 48 million by 2030, an increase of 11 million people. The majority of this growth will occur in the state's three major urban regions (Los Angeles, San Francisco, and San Diego). Vehicle miles traveled by individuals will increase by 30 to 50 percent in these regions, with truck traffic growing even faster, especially in greater Los Angeles. Yet California's urban freeway systems are already nearing capacity, with pervasive congestion during ever-lengthening peak periods

By 2030, if current long-range transportation plans are implemented, congestion in the three largest urban areas will be much worse than today's already intolerable levels. The Los Angeles metro area already leads the nation in congestion, with the Bay Area ranking fourth. To eliminate the most severe congestion requires adding enough highway capacity to more than keep pace with projected growth in vehicle travel. A recent Reason Foundation study projects that between now and 2030, California would need to add 13,132 new lane-miles to do this. That amount of new capacity would cost $122 billion, or about $5 billion per year over 25 years.

While these are not small numbers in any sense, they are reasonable in the grand scheme of transportation spending. In response to this growing crisis, California's leaders have offered a dismal response.

Proposition 1B, the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006, would authorize more than $19.9 billion in General Obligation debt, with an annual debt

service of $1.3 billion and a total cost to taxpayers of approximately $38.9 billion. The funds would be spent as follows:

- $4.5 billion to congested highway capacity projects
- $2 billion to highways, local roads and public transit systems
- $2 billion to local roads
- $1 billion to State Route 99 through the Central Valley
- $1.75 billion to local transportation projects and to state highways.
- $4 billion to capital projects for local transit systems and intercity rail systems.
- $2 billion to goods movement via ports, highways and rail
- $1.2 billion to reduce air emissions and replace/retrofit old school buses.
- $1.1 billion to security and disaster response on transit systems and in publicly owned ports and harbors
- $325 million to railroad crossings and to retrofit local bridges and overpasses

While that is an impressive looking list and it would seem that $19.9 billion could make a substantial improvement to the state's transportation system, only a limited portion of this money will be used to invest in new infrastructure, and an even smaller portion for new roads and highways. Most funds may go to ongoing maintenance and rehabilitation and to other non-infrastructure uses such as retrofitting buses or improving security on local transit systems. And since most of the money will be apportioned by the legislature if Proposition 1B is approved, we should expect plenty of it to go to local pork barrel projects.

This attention to California's transportation infrastructure is overdue, but good intentions and recognition of the problem alone do not make good public policy. In reality, this bond proposal is an easy way for California's leaders to look as if they're addressing the congestion problem while passing the buck on to future generations and making very little in the way of real long-term improvement.

Californians recognize these doubts. In spite of the overwhelming support for the bond among state leaders and groups like AAA, the Chamber of Commerce, etc., the latest PPIC survey shows only 50 percent of likely voters say they would vote yes on Proposition 1B if the election were held today.

Even more damning is an innovative survey conducted by researchers from San Jose State University and Portland State University as a project for the Mineta Transportation Institute at San Jose State University. They surveyed Californians on different ways to fund transportation projects, and their question about using general obligation bonds like that of Proposition 1B explained that "paying off the bonds from the state's general fund over 30 years would use money that otherwise might be spent for other state programs and services." With that reality included,

only 29.9 percent of those surveyed said they would support using general obligation bonds like Proposition 1B.

Fundamental problems with the approach of Proposition 1B include:

- **Roads should be funded by user fees**. General obligation bonds paid out of general tax revenues require many Californians to pay for roads they will never use and don't need. Gasoline taxes at least come close to relating how much you pay to how much you use the system. The use of direct fees—tolls—to pay for many new roads and lanes is increasingly popular with drivers and makes the most economic sense. Gas tax funds could then focus on roads that cannot be toll funded.
- **Proposition 1B is a drop in the bucket that would decrease momentum for long-term solutions**. Many argue that something is better than nothing, but based on impact, 1B would be very close to doing nothing. The bond will not provide congestion relief on interstate freeways. A portion of the funds would be unavailable to the most of the state—$1 billion is devoted specifically to State Route 99. An unknown portion of a $2 billion component of the bond devoted to traffic safety and congestion relief may be spent on public transit. But conventional transit is unlikely to offer much in the way of congestion relief and Proposition 1B's passage would not change that reality. If the bond passes many will be satisfied that "something" has been done about transportation when what we really need is a radical overhaul of California's approach to transportation infrastructure.
- **Essential infrastructure ought to be a priority for general revenue funding**. By allowing the legislature to bond for essential infrastructure, taxpayers remove the pressure on the legislature to prioritize the general budget. In 1960-1961 bonds accounted for only 16 percent of infrastructure funding, but by 2002-2003 the figure had grown to 76 percent. Voters have approved bond after bond, and yet here we are again. An expert panel assembled by USC's Keston Institute "believes that the Department of Finance is singling out transportation to pay a disproportionate share of the General Fund deficit." This bond would allow our leaders to lean on the crutch of borrowing yet again and continue their habit of shortchanging transportation in the general fund.
- **Proposition 1B allows poor prioritization to continue**. State leaders and local MPOs have refused to make cutting congestion a priority. Officials hope to slow congestion's rate of growth, but they fully expect conditions to grow much worse in the future. Policymakers claim they simply do not have the money to actually make conditions better, but that is not the case. The MPOs for our state's three largest regions (Los Angeles, San Francisco, San Diego) plan to spend $265 billion over the next couple of decades, but the majority will go toward transit, not toward reducing congestion on our roads. Our MPOs do have the money necessary to actually reduce congestion by 2030.

    - Los Angeles plans to spend 58 percent of transportation funds on transit. Devoting the same percentage to expanding capacity would eliminate gridlock by 2030.

- San Francisco plans to spend 64 percent of transportation funds on transit. Devoting just 25 percent of planned funds to expanding capacity would eliminate gridlock by 2030.
- San Diego plans to spend 49 percent of transportation funds on transit. Devoting just 24 percent of planned funds to expanding capacity would eliminate gridlock by 2030.

- **California's bonded indebtedness is already at record levels**. The state issued 2.5 times as much debt in FY 2005-06 as it did in FY 1995-96, and over 10.5 times as much as in FY 1985-86. We have already authorized the state to go nearly $80 billion in debt. It is fiscally risky to increase the state's level of debt by the amount proposed in this and the other bond measures on the November ballot.

There are three main parts to the way California *ought* to be approaching our transportation infrastructure needs.

First, make better use of current funds. Proposition 1B is a pork-laden mess and much less than half the money will go to projects that will relieve congestion. That is typical of our transportation spending. While transit is important and needs appropriate funding, current spending plans allocate very disproportionate funds to transit. The three largest metro areas plan to spend about $154 billion on transit over the next 25 years, vs. $109 billion on roads, and most of the road money will go to maintenance and upgrades, not new capacity. If even one-third of the money going to transit were shifted to roads we could get three to five times more congestion relief than Proposition 1B will accomplish.

Second, give transportation its share of the budget. We used to devote a reasonable share of the general fund to transportation infrastructure. Now, even though the state budget has grown considerably, we don't devote the same share of general fund revenue to infrastructure that we used to. If Proposition 1B passes, we will pay $38.9 billion to get less than $20 billion in current funds for projects, and we'll be paying for that with about $1.33 billion each year out of the general fund. It makes more sense to take a responsible look at our bloated budget and cut less essential spending so that we could allocate about $4-5 billion per year out of the general fund for what is surely one of the most core functions of the state. Some bonding for large infrastructure investments might still be good policy, but prioritizing spending of the revenue we have should come first. We have plenty of good examples of such an approach. Nineteen counties in California have put in place local sales taxes for local transportation funding and used them to combine pay-as-you-go financing with bonding.

Third, California is falling far short of making full use of public-private partnerships for transportation projects. We are far behind states like Virginia, Massachusetts, and Florida in outsourcing highway maintenance, which would free up gas tax funds to help fund new road projects. More importantly, the private sector would happily invest capital in providing major new highway projects. If we aggressively pursued PPPs and tolled some of the new facilities and lanes

added, private capital could fund at least 25 percent of what the bond could do if all the bond funds were spent on roads.

We recommend improving an existing public-private partnership law to incorporate state-of-the-art learning on this issue. The legislation would authorize both CalTrans and other levels of government (cities, counties, joint powers authorities, etc.) to initiate toll-funded transportation infrastructure projects, and permit them to partner with the private sector to carry out such projects, using both RFPs and procedures for dealing with unsolicited proposals. The appropriate approval process would occur within the responsible government entity (the MPO, or CalTrans, for example). This would enable California to enter the global capital markets, as well as tap world-class expertise for modernizing its vitally important highway system. With the private sector to provide investment for these large-scale projects, scarce public money can be spent on things only the public sector can do.

For more information on this issue and others on California's November Ballot, go to reason.org/californiaballot/

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Part I

Introduction

It is an often-repeated observation that California's transportation system is in bad shape and fast headed for a real crisis. We have underinvested in the system for years, while experiencing tremendous growth. In the last several decades, California spent only $92 per capita on highways and roads, while the national average was $192 per capita. [1] Now, to have and maintain an adequate transportation system to support the state's economy and Californian's lifestyles, we are going to have to make some dramatic investments.

The nearly $20 billion bond represented by Proposition 1B on the November ballot represents the first step by the legislature and Gov. Schwarzenegger to address the need to invest in our transportation system. But the bond proposal is deeply flawed, a pork-laden cop-out on the fiscally responsible approach. Californian's don't have to accept this dirty band-aid, but can demand the legislature and the governor deliver a more realistic, responsible, and comprehensive plan.

A. The Growing Demand

California is projected to add 11 million people in the next 25 years, from close to 37.2 million in 2006 to 48 million in 2030.[2] About 6.8 million of that growth will be in the state's three major metropolitan areas: greater Los Angeles, the San Francisco Bay Area, and greater San Diego. And the inland area will see a 53.9 percent population increase over the next 25 years. Meanwhile, annual vehicle miles traveled on state highways increased about 1.72 times faster than the population from 1990 to 2000.[3] During the same period, daily vehicle-hours of delay in California increased even more—by 113 percent—1.83 times faster than population growth. [4] From 2000 to 2030, the growth in vehicle miles traveled (VMT) is projected to continue outpacing population growth (by 74.3 percent vs. 42 percent).

At the same time, by 2020, port container traffic and air cargo volumes are expected to triple.[5] Annual truck miles traveled are projected to jump 71 percent from 2005 to 2030, with the majority of this growth in the three major metropolitan areas.[6] Goods movement in California is also heavily reliant on the road and highway systems. 2002 FHWA data indicated that over 76 percent of total tonnage of freight was shipped by truck.[7]

Today, urban freeway systems in California are operating at or beyond their capacity. The Los Angeles area has ranked as the nation's most congested for more than a decade; and the San Francisco, San Diego, and Sacramento metropolitan areas are in the top ten. According to the most recent annual mobility report from the Texas Transportation Institute[8], in 2003, drivers in California's five largest metro areas wasted over $16 billion stuck in traffic. Public transit cannot play much role in sharing this increasing travel demand. In the year 2000, only 4.8 percent of work trips in Los Angeles, 10.9 percent in the Bay Area, and 5 percent in San Diego were taken by public transit.[9]

Under this growth pattern, California's major cities will slow to a crawl—with dire social and economic consequences—unless we make major changes in transportation planning.

Congestion—the result of dramatic increases in motorized travel and limited infrastructure capacity to keep pace with the demand—has been and will remain a major problem in California. The Los Angeles area currently has the most appalling congestion in the country. It takes 75 percent longer to get somewhere in Los Angeles during peak-travel times than it would under free-flowing traffic conditions. Researchers call this a Travel Time Index (TTI) of 1.75, and 1.18 is the baseline for "severe" congestion. By 2030, Los Angeles will have an even higher TTI, of 1.94, and San Francisco-Oakland, San Diego, Riverside-San Bernardino, San Jose, and Sacramento will all have TTI's worse than 1.50, and six other urban areas in the state will be over the 1.18 severe baseline.[10]

Table 1: California's Severely Congested Cities, 2030

Urbanized Area	Congestion Index 2003	Congestion Index 2030
Los Angeles-Long Beach	1.75	1.94
San Francisco-Oakland	1.54	1.86
San Diego	1.41	1.70
Riverside-San Bernardino	1.37	1.64
San Jose	1.37	1.65
Sacramento	1.37	1.73
Fresno	1.14	1.30
Oxnard-Ventura	1.23	1.46
Modesto	1.05	1.21
Indio-Palm Springs	1.05	1.21
Santa Rosa	1.05	1.19
Simi Valley	1.04	1.24
Fairfield	1.04	1.25

B. Investment Needs and Planned Spending

California's freeways and arterials simply cannot handle the amount of traffic that will exist by 2030. A recent report from Reason—*Building Roads to Reduce Traffic Congestion in America's Cities*—estimates that California needs to build 13,132 lane miles of road by 2030 to eliminate severe congestion. Taking into account California's construction costs, and the additional cost of adding capacity through elevated structures and tunnels for dense urban areas, the total price tag for that is $122 billion (2005 dollars). That's a cost of approximately $139 per resident each year, which would save over 1.8 billion hours annually, statewide, now spent sitting in traffic.

While the cost per delay-hour saved seems reasonable, the transportation system in California does not have the funds to make this level of investment. Federal and state gas taxes (currently 18.4 and 18 cents per gallon, respectively) don't create as much revenue these days thanks to inflation and to cars being more fuel efficient. The value of state fuel-tax revenue per vehicle mile traveled is now only 36 percent of what drivers paid in 1970.[11] Some counties have passed local sales taxes to supplement state money and fund local transportation projects. Most transportation spending from the dwindling gasoline taxes has been and will be used to operate, maintain, and rehabilitate the existing freeways and transit systems. Only a small fraction is spent to expand the capacity of the highway system that will continue to carry more than 90 percent of all commute trips and the vast majority of freight over the next 25 years.[12]

Challenges with the total amount of money available for transportation spending are only part of the problem. In the most congested areas, existing transportation plans are to spend most of the money on transit, which carries only a small fraction of travelers. In essence, the three major metro areas in California are choosing to let congestion get worse.

- SCAG (LA metro area) plans to spend 42 percent of funds on roads that carry 88 percent of travel.
- MTC (Bay Area) plans to spend 36 percent of funds on roads that carry 81 percent of travel.
- SANDAG (San Diego metro area) plans to spend 25 percent of funds on roads that carry 88 percent of travel.

Since past investments in transit in California and elsewhere outside New York City have never led to a smaller share of travel using the roads, these funding decisions amount to a decision to let congestion get worse.

With current plans to spend $49 billion (Table 2) on roads in urban areas, but the need to spend $122 billion to build enough roads to eliminate severe congestion by 2030, there is a big gap to fill.

Table 2: Total Lane Mile Costs and Planned Investment Fund in MPOs				
MPO	**Name**	**Total Lane-Miles Needed 2030**	**Total Lane Mile Costs to Relieve Severe Congestion 2030 ($M)**	**Highway Improvement Investment Baseline/ Constrained ($M)**
SCAG	Southern California Association of Governments	5,907	74,769	22,000
MTC	Bay Area Metropolitan Transportation Council	2,905	31,899	5,000
SANDAG	San Diego Association of Governments	1,439	7,501	11,030
SBCAG	Santa Barbara County Association of Governments	138	434	419
SACOG	Sacramento Area Council of Governments	889	3,240	2,049
COFCG	Council of Fresno County Governments	534	941	2,385
KCOG	Kern Council of Governments	210	421	1,800
SJCOG	San Joaquin Council of Governments	321	907	568
StanCOF	Stanislaus Council of Governments	431	909	425
AMBAG	Association of Monterey Bay Area Governments	231	543	1,617
TCAG	Tulare County Association of Governments	53	85	N/A
MCAG	Merced County Association of Governments	12	35	1,096
SHASTA	Shasta County Regional Trans. Planning Agency	17	69	N/A
BCAG	Butte County Association of Governments	12	29	N/A
SLOCOG	San Luis Obispo Council of Governments	35	145	788
	California (Urban Area)	13,132	121,925	49,177

Part 2

November's Transportation Bond—Proposition 1B

This November, Californians will vote on another transportation bond package, Proposition 1B: Highway Safety, Traffic Reduction, Air Quality, Port Security Bond Act of 2006. If this proposition passes, California would borrow $19.925 billion by issuing bonds that must be paid off from the state's general fund. The main revenue source for the general fund is state tax revenue. The Legislative Analyst estimates that it would cost the state $38.9 billion to pay off the principal and interest of these bonds over next 30 years. Annual payments would require expenditures from the general fund of about $1.33 billion per year, which averages out to be about $116 for every California household per year.

Proposition 1B specifies criteria for spending about half of the $19.925 billion loan that would be authorized if it is approved, leaving the other half up to whatever conditions and criteria the legislature sets in the future, and disburses the money into eleven newly established state funds and accounts as follows:

Roads, Highways, and Congestion ($11.250 billion)

- **$4.5 billion** would be deposited into a newly created "Corridor Mobility Improvement Account." Each year, the legislature would appropriate funds from that account to be spent by CalTrans on "performance improvements on the state highway system, or major access routes to the state highway system on the local road system that relieve congestion by expanding capacity, enhancing operations, or otherwise improving travel times within these high-congestion travel corridors." So these bond funds may be spent on infrastructure or on operations. Specific projects would be identified by CalTrans and regional or local transportation agencies, pursuant to various criteria and procedures spelled out in Proposition 1B.

- **$2 billion** would be deposited into the newly created "Transportation Facilities Account," which the legislature can appropriate to CalTrans for miscellaneous state transportation improvement projects.

- **$2 billion** would be deposited into the newly created "Local Streets and Road Improvement, Congestion Relief, and Traffic Safety Account of 2006" to be transferred to cities and counties according to a formula that takes into account population and road-miles maintained. The funds may be used by local governments for a wide variety of road and mass transit projects.

- **$1 billion** would be designated for appropriation by the legislature to CalTrans for "safety, operational enhancements, rehabilitation, or capacity improvements" for State Route 99 in the Central Valley.

- **$1 billion** would be deposited into the new "State-Local Partnership Program Account" and be appropriated by the legislature to CalTrans to fund local transportation projects, pursuant to whatever conditions and criteria the legislature establishes in the future. But to apply for these funds, local transportation agencies must provide a dollar-for-dollar match.

- **$750 million** would be deposited into the newly created "Highway Safety, Rehabilitation, and Preservation Account" to be appropriated by the legislature and spent by CalTrans on highway operation and protection, one third of which will be spent on technology-based improvements for local roads.

Public Transportation ($4 billion)

- $**4 billion** would be deposited into another new fund, the "Public Transportation Modernization, Improvement, and Service Enhancement Account," which would become available for appropriation by the legislature to CalTrans and the Controller to spend on a variety of mostly unspecified rail, bus, and other transit projects. $400 million of this would be directed to inter-city rail, while $3.6 billion would go to local transit projects.
- An unknown amount of the $2 billion disbursed to local governments via the "Local Streets and Road Improvement, Congestion Relief, and Traffic Safety Account of 2006" may also be spent on mass transit-related projects.

Freight, Air Quality, Safety and Security ($4.675 billion)

- **$3.1 billion** would be deposited into a newly created "California Ports Infrastructure, Security, and Air Quality Improvement Account."

    - The legislature would have the authority to transfer **$2 billion** from this account into the newly created "Trade Corridors Improvement Fund," to be spent by the California Transportation Commission for "infrastructure improvements" along trade corridors, subject to whatever conditions and criteria the legislature decides

to establish in the future.

- The legislature would have the authority to appropriate **$1 billion** from the account to the State Air Resources Board for "emission reductions, not otherwise required by law or regulation, from activities related to the movement of freight" along the state's trade corridors. That appropriation would also be subject to whatever future conditions and criteria the legislature establishes.

- The legislature would have the authority to appropriate the remaining **$100 million** from that account to the Office of Emergency Services which would award the money in the form of grants to publicly owned ports, harbors, and ferry operators for "security improvements."

- **$1 billion** would be deposited into the newly created "Transit System Safety, Security, and Disaster Response Account," which the legislature can spend as it specifies in the future for projects that "provide increased protection against a security and safety threat" and that aid transit operators in developing "disaster response transportation systems."
- **$250 million** would be deposited into the "Highway-Railroad Crossing Safety Account" to be appropriated by the legislature and spent by CalTrans on grade separation and railroad crossing safety improvements.
- **$200 million** would be available for the legislature to spend on retrofitting and replacing schoolbuses.
- **$125 million** would be deposited into the newly created "Local Bridge Seismic Retrofit Account" to provide the 11.5 percent match required for federal funding for seismic work on local bridges, ramps, and overpasses identified by CalTrans.

California already spends about $20 billion per year on transportation system maintenance, operations and improvements, with revenue provided on a "pay-as-you-go" (rather than debt-financed) basis as follows:

- About $9.5 billion from local governments, derived from local taxes and transit fares
- About $4.5 billion from federal gasoline and diesel tax revenues
- About $3.4 billion from the state's 18 percent gas tax
- About $2 billion from the sales tax on gasoline and diesel
- About $900 million from weight fees on trucks

Since 1990, voters have approved $5 billion in general obligation transportation-related bonds, primarily for transit systems and earthquake safety. By authorizing $20 billion in general revenue bonds (at an estimated cost of another $20 billion over 30 years) to fund nearly every conceivable transportation system improvement and maintenance project, Proposition 1B represents an approach unprecedented in size and scope for transportation funding in California.

Part 3

Problems with Proposition 1B

This attention to California's transportation infrastructure is overdue, and it is encouraging that a substantial piece of the bond money is dedicated to roadway improvements. This indicates an acknowledgement on the part of the legislature and the governor's office that additional road capacity is part of the solution.

Unfortunately, good intentions and recognition of the problem alone do not make good public policy. In reality, this bond proposal is an easy way for California's leaders to look as if they're addressing the congestion problem while passing the buck on to future generations and making very little in the way of real long-term improvement.

Californians recognize these doubts. In spite of the overwhelming support for the bond among state leaders and groups like AAA, the Chamber of Commerce, etc., the latest PPIC survey shows only 50 percent of likely voters say they would vote yes on Proposition 1B if the election were held today.[13]

Even more damning is an innovative survey conducted by researchers from San Jose State University and Portland State University as a project for the Mineta Transportation Institute at San Jose State University.[14] They surveyed Californians on different ways to fund transportation projects, and their question about using general obligation bonds like that of Proposition 1B explained that "paying off the bonds from the state's general fund over 30 years would use money that otherwise might be spent for other state programs and services." With that reality included, only 29.9 percent of those surveyed said they would support using general obligation bonds like Proposition 1B.

Problems with Proposition 1B
▪ General Obligation Bonds Neglect the User-Fee Principle.
▪ Proposition 1B is a Drop in the Bucket That Would Decrease Momentum for Long-Term Solutions.
▪ Essential Infrastructure Ought to be a Priority For General Revenue Funding.
▪ Proposition 1B Allows Poor Prioritization to Continue.
▪ Funds Will Not Be Spent as Wisely as They Should Be.
▪ Projects Will Not Be Completed As Quickly as They Should Be.

A. General Obligation Bonds Neglect the User-Fee Principle

User fees for public goods, in this case fuel taxes and tolls on roadways, tie the costs of the infrastructure directly to the users instead of distributing the costs to the rest of the population. General obligation bonds paid out of general tax revenues require many Californians to pay for roads they will never use and don't need. In passing this bond proposal, Californians would also pass up a golden opportunity to correct key problems with how roads were funded during the mid-20th century.

The federal Interstate system (which was initiated in 1956) and California's own road-building efforts of the 50s and 60s addressed the important issues of mobility and traffic congestion. Expanded capacity improved mobility, but funding it through the federal highway program locked Californians into a flawed form of transportation policy.

Today Californians expect roads to be governments' domain, but that is not always the case elsewhere. For example, France's tolled motorway system (the equivalent of our interstate system) is investor-owned, but in America nearly all aspects of transportation policy suffer because they have been separated from the market. Where and when roads get built is usually determined by politics and arcane funding formulas. In contrast, investors rarely fund bridges to nowhere; instead they determine where projects make sense by responding to consumer demand.

The use of user taxes (mainly fuel taxes) is far preferable to the use of general obligation bonds, but our current system has made motorists skeptical of an even better approach—tolls. Expanding capacity with toll revenue bonds sidesteps the unpredictable political process. Private investors fund projects and—unlike what occurred with the new Bay Bridge—private sector investors, not taxpayers, elect to shoulder the risks of cost overruns and revenue shortfalls. And under long-term concessions, the private sector remains responsible for ongoing maintenance and improvements. It is the difference between building assets and building liabilities that will continue to burden taxpayers.

In addition to providing a way to raise revenue, tolling also serves an important traffic management function. If motorists paid each time they used a road (instead of all at once at the pump) they would think twice before piling onto roads at rush hour.

New technology that wasn't available in the 50s has made tolling more sophisticated. Motorists who use modern toll roads do not even have to slow down for toll booths, because electronic toll collection has made them obsolete. Economists and interest groups from across the political spectrum have long touted the congestion relief benefits of tolling, yet policymakers have been slow to embrace this approach largely because they fear a backlash by voters who regard tolling as double taxation.

However, tolling *new* capacity is not double taxation. It merely allows motorists to choose to use a service that would not be available otherwise. Further, there is reason to believe that politicians

have overestimated the public's aversion to tolling. Surveys show that citizens are warming to the idea and often prefer it to an increase in fuel taxes. Even those who are initially skeptical are often won over by tolling.

The evolution from suspicion to satisfaction is one that has occurred regarding HOT lanes in California as well as the new facility in Minneapolis. The more motorists experience it, the more they like tolling. Couple that with widespread evidence that private investors are willing to invest huge amounts of money in California and a decision that would take us further away from the user-pays principle seems even more ill-conceived. Increasing our reliance on borrowing would sink our state deeper into debt and gridlock.

B. Proposition 1B Is a Drop in the Bucket that Would Decrease Momentum for Long-Term Solutions

If passed, Proposition 1B would allow our state's lawmakers to congratulate themselves for addressing an important issue. In reality little will have been done to improve transportation in California. Our state faces the nation's worst traffic congestion and we need $122 billion just to eliminate the most severe form of it by 2030. Even that sizable figure is overshadowed by the funding needed simply to maintain the existing roadway and transit systems we currently have. Next to our enormous needs, Proposition 1B's $11 billion for congestion relief represents little more than the familiar "drop in the bucket."

Many argue that something is better than nothing, but based on impact, 1B would be very close to doing nothing. Below we will examine why the money probably will not be spent as wisely as we would hope, but what follows here are three reasons why the actual impact of 1B's congestion relief component would likely be much smaller than its $11 billion dollar figure suggests.

- The bond will not provide congestion relief on interstate freeways. It is certainly proper that a state proposition would fund state road improvements and many state roads are in desperate need of congestion relief. Some funds are also available for local streets. However, voters who expected congestion relief on interstates—where some of our worst bottlenecks exist—will be disappointed.
- A portion of the funds would be unavailable to the most of the state—$1 billion is devoted specifically to State Route 99. It is the only provision designated for such a specific purpose and may be little more than pork.
- An unknown portion of a $2 billion component of the bond devoted to traffic safety and congestion relief may be spent on public transit. But conventional transit is unlikely to offer much in the way of congestion relief and Proposition 1B's passage would not change that reality.

But the bond's effect on the political climate may be the most tragic outcome of all. Voters have little sense of the severity of our transportation crisis and if the bond passes, many will be satisfied

that "something" has been done about transportation. Our state sorely needs new public-private partnership legislation and the private sector has announced loud and clear that it is interested in investing billions in California's highways, if only we would invite them in. However, if the bond passes our elected officials would be secure in the knowledge that voters are at least temporarily pacified, and that would make them less inclined to pursue real reform. In short, choosing this very flawed "something" and overlooking crucial reforms could end up making our transportation troubles worse.

C. Essential Infrastructure Ought To Be a Priority for General Revenue Funding

By allowing the legislature to bond for essential infrastructure, taxpayers remove the pressure on the legislature to prioritize the general budget. Transportation infrastructure that cannot be supported by user fees should be funded out of the general budget. Instead, bonds let those responsible for California's fiscal priorities off the hook.

Since the 1960s transportation has accounted for a shrinking portion of the state budget. Increasingly, our leaders have turned to borrowing to fund infrastructure of all kinds. In 1960-1961 bonds accounted for only 16 percent of infrastructure funding, but by 2002-2003 the figure had grown to 76 percent.[15] California is rather average in terms of bond debt as a percentage of the general revenue, but among the 10 most populous states, it has the second largest long-term debt per capita.[16]

Voters have approved bond after bond, and yet here we are again. Since 1990 voters have passed five transportation-specific propositions that they hoped would quell a growing crisis and yet conditions continue to degrade. The title of 1990's Proposition 111 even included the phrase "Traffic Congestion Relief," which Californians now regard as yet another empty promise. In 2002, frustrated voters passed Proposition 42 by a huge margin and yet our leaders neglected their obligation to devote gasoline sales tax revenues to transportation purposes. Governors from both parties cited a technicality and funneled billions in transportation funds to other purposes. And funds that should go toward transportation are routinely diverted elsewhere. An expert panel assembled by USC's Keston Institute "believes that the Department of Finance is singling out transportation to pay a disproportionate share of the General Fund deficit."[17] This bond would allow our leaders to lean on the crutch of borrowing yet again and continue their habit of shortchanging transportation in the general fund.

D. Proposition 1B Allows Poor Prioritization to Continue

Proposition 1B aims to make our roads and ports safer, to improve air quality, and reduce traffic congestion, yet it allows policymakers to continue the same ineffective policies that have brought us to our current situation. Our state does not lack funding so much as it lacks leaders who will

prioritize properly. Fixing our state's problems isn't always a matter of spending more. Often it's simply a matter of spending smarter.

Consider traffic congestion. California's large and growing problem has been well-documented, yet state leaders and local MPOs have refused to make cutting congestion a priority. Officials hope to slow congestion's rate of growth, but they fully expect conditions to grow much worse in the future. Policymakers claim they simply do not have the money to actually make conditions better, but that is not the case.

The MPOs for our state's three largest regions (Los Angeles, San Francisco, San Diego) plan to spend $265 billion over the next couple of decades, but the majority will go toward transit, not toward reducing congestion on our roads. Perhaps that would represent a sensible way to set priorities if transit could lure large numbers of motorists out of their cars. But the MPOs make forecasts based on rather optimistic assumptions about what transit can accomplish in the future, and yet even they predict that transit will account for only somewhere in the neighborhood of 10 percent of commute trips by 2030. If we consider total travel, not just work commutes, transit's contribution shrinks considerably. For example, today transit carries roughly 10 percent of commuters in the San Francisco area, yet it carries only about 3 percent of total travel. Our state will likely experience tremendous growth in travel and the vast majority of it will occur on our roads. No wonder congestion is expected to reach new levels of severity.

The Hartgen-Fields analysis finds that different priorities would yield better results. Contrary to conventional wisdom, our MPOs do have the money necessary to actually reduce congestion by 2030.

- Los Angeles plans to spend 58 percent of transportation funds on transit. Devoting the same percentage to expanding capacity would eliminate gridlock by 2030.
- San Francisco plans to spend 64 percent of transportation funds on transit. Devoting just 25 percent of planned funds to expanding capacity would eliminate gridlock by 2030.
- San Diego plans to spend 49 percent of transportation funds on transit. Devoting just 24 percent of planned funds to expanding capacity would eliminate gridlock by 2030.

Of course, devoting even larger portions of planned spending to roadway needs would bring even greater congestion reduction. And a shift in priorities to emphasize congestion reduction would improve travel for transit users, since the vast majority of them are bus riders. Reducing congestion would also improve highway safety and air quality, two additional key goals outlined in Proposition 1B (see Box).

How Reducing Congestion Improves Highway Safety and Air Quality

Improving Highway Safety

Free-flowing traffic is relatively safe, but congestion increases the likelihood of danger. Researchers have confirmed what the rest of us have long known: congestion makes drivers frustrated and frustrated drivers do dangerous things.[18]

They are more likely to tailgate or force their way into a turn. Often their thoughtless maneuvering results in a collision. Accidents in congested areas are often low-impact—drivers aren't traveling fast enough to do serious damage. But even fender benders can lead to higher-impact crashes. Drivers are often distracted by the commotion an accident causes and reactions like "rubbernecking" can lead to more dangerous consequences. Definitive figures are hard to come by, but some states attribute between 10 and 30 percent of their highway fatalities to these "secondary accidents."[19]

Congestion can increase danger in another important way: it slows emergency response. Each year roughly 67,000 Americans die from a type of cardiac arrest that is very receptive to prompt treatment.[20] Recently, the Mayo Clinic placed the critical marker at six minutes. If emergency care arrives within six minutes the patient's chance of survival are great. Wait longer and the likelihood of survival drops off precipitously. In most of our nation's big cities, only between 6 and 10 percent of these people are saved.

We must remember that much emergency transport has nothing to do with the inner workings of Emergency Medical Services. Often regular people driving regular cars take their friends and loved ones to emergency rooms. And speed is not crucial just for this special kind of cardiac arrest; many other types of emergencies are time-sensitive.

Improving Air Quality

Cars traveling in stop-and-go traffic not only waste gas, they also pollute more than cars traveling at speeds that are faster and more constant. Ironically, our state's aversion to building roads has likely caused more pollution. Our policymakers may have been unwilling to expand capacity much, but that has not stopped driving from increasing dramatically. Now that California faces another huge increase in population we must accept the fact that driving will increase even more. We can either continue to refuse to expand capacity and allow the resulting gridlock to pollute our skies or we can create conditions that will allow for smoother, faster, and cleaner travel.

Still, it is important to keep in mind that the most important factor in air quality is not congestion or even how much driving occurs. The most important factor is which cars are on the road. In general, older cars pollute much more than newer models. Most pollution comes from a very small percentage of cars on the road. For example, about 50 percent of on-road carbon monoxide comes from just 5 percent of cars. The same is true for hydrocarbon emissions.[21] The best way to improve air quality improvement would be to target these "gross polluters." Inexpensive devices such as "remote sensors" use infrared beams to analyze exhaust plumes. They can quickly distinguish the clean cars from the gross polluters.

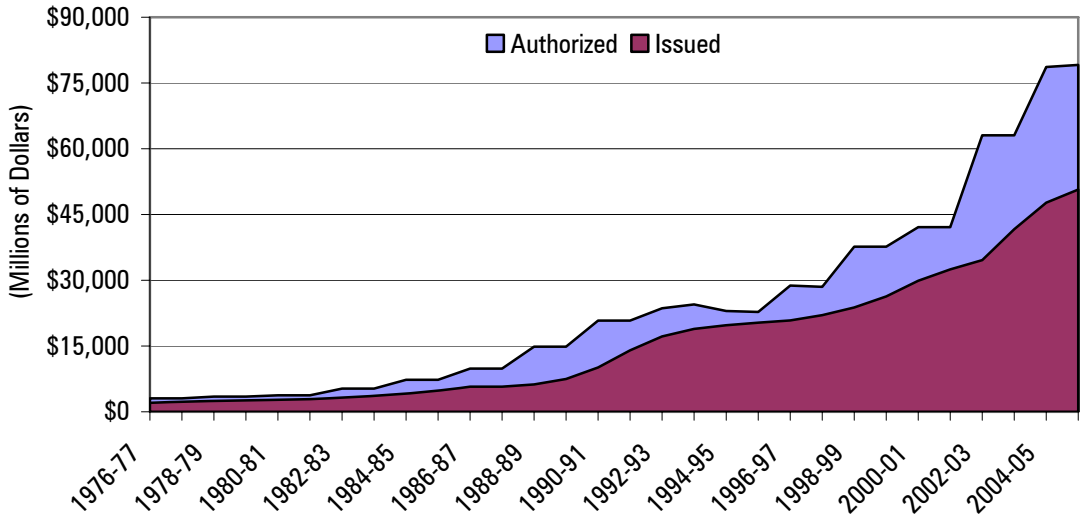
Yet targeting gross polluters is rarely a key component of air quality policy. Instead of focusing on the dirtiest cars, officials typically expand transit in an attempt to get any and all cars off the road. This is another area where we must re-think our current approach to policy.

E. Funds Will Not be Spent as Wisely as They Should Be

One reason borrowing may seem appealing is that it avoids steep and immediate tax hikes that might be used to finance big infrastructure projects. Yet oftentimes borrowing does not avoid tax hikes so much as it delays them and because interest must also be paid, borrowing causes total costs to swell greatly. Proposition 1B would nominally devote about $20 billion to infrastructure, but most of the funds are not required to be spent on new infrastructure. Instead, they can pay for ongoing expenses like maintenance and planning. The Legislative Analyst's Office estimates the total cost at about $40 billion. Californians would push this sizable burden onto future generations and the more the state relies on borrowing the more interest payments eat away at general fund revenues. As interest payments grow, the state is left with less money for other programs.

California's bonded indebtedness is already at record levels. The state issued 2.5 times as much debt in FY 2005-06 as it did in FY 1995-96, and over 10.5 times as much as in FY 1985-86. We have already authorized the state to go nearly $80 billion in debt (see Figure 1). It is fiscally risky to increase the state's level of debt by the amount proposed in this and the other bond measures on the November ballot.

Figure 1: California Historical General Obligation Bonds Debt



Source: California Department of Finance Web site, "Budget FAQs," Chart K-4: General Obligation Bonds, July 2006, http://www.dof.ca.gov/Budget/documents/CHART-K4.pdf (retrieved August 21, 2006).

Let us move beyond the general principle of whether bonding represents wise fiscal policy and examine whether the funds themselves would be spent wisely. Proposition 1B supporters argue that accountability measures will ensure that projects are completed properly. Yet it is unclear how effective these measures would be. In the first place, they are not very extensive. One provision for local roads specifies that the Controller may verify local government compliance and any city or

county that has not complied "shall reimburse the state for the funds it received during that fiscal year."[22] However, that provision accounts for a relatively small portion ($2 billion) of the bond and it is the only time specific accountability measures are mentioned.[23]

The vast majority of money would fund a system that does not inspire confidence. Recently a Public Policy Institute of California analysis uncovered troubling structural problems with CalTrans' ability to contain costs. For example, PPIC discovered that "soft" costs (cost of management and support staff) are approved via a completely different process than "hard" costs (the cost of construction):

> *The bifurcation hinders accurate cost-estimating because no records are kept on the amount of time people in districts spend on each project. Thus, CalTrans employees have no records with which to estimate the costs of engineering, environmental review, and project management, and they have little incentive to deliver preconstruction engineering or any other preconstruction task on time or within budget.*[24]

Researchers did find one CalTrans district that paid close attention to details, and there projects experienced costs escalations as much as 39 percent between the planning and final engineering stages. An internal CalTrans study notes "an apparent lack of focus and/or urgency toward cost estimating" that leads to an "It costs what it costs" mentality.[25]

However, if the state passed a sensible public-private partnership bill there would be less concern about steep costs. Later sections will explore the advantages of public-private partnerships in more detail, but here we will address the matter briefly. Research shows that PPPs can cut costs significantly. This approach would also allow the state to avoid both a tax hike and the prospect of saddling future generations with more debt. With PPPs, no taxpayers—neither today's nor tomorrow's—get stuck with debt and other hassles associated with borrowing. Instead the risk shifts to the private sector.

F. Projects Will Not Be Completed as Quickly as They Should Be

Another commonly cited advantage to borrowing over pay-as-you-go financing is speed. Funding large infrastructure projects bit-by-bit can be impractical and borrowing allows governments to generate huge sums of money up-front for faster project delivery. But there are reasons to believe that 1B would not result in prompt project delivery.

The proposition does not include provisions that would streamline the environmental permitting process, nor does it allow for "design-build" contracts which often speed up project delivery since the same contractor attends to both tasks. Those who expect the bond to deliver improvements immediately may be surprised to learn that certain congestion relief projects could wait until December 31, 2012 just to break ground.[26]

CalTrans itself is often plagued with sluggish project delivery. Adding an HOV lane to an existing highway may take anywhere from 5 to 11 years from initial planning to ribbon-cutting. Some projects have languished on "to-do" lists for 30 years. CalTrans explains the delays by citing a lack of staffing and the lengthy and complex environmental review process. Although these factors contribute to the sluggishness, the PPIC highlights other problems.

Up until the mid-1980s CalTrans had used a regimented process to study, plan, and execute projects, but by the 1990s that process was reportedly largely ignored. Instead of possessing a stock of reliable plans, "concept" studies were often now ten or more years out of date. Even though CalTrans fell behind in planning, it still resisted contracting out planning duties to other agencies or private firms. Without adequate plans, projects stalled in the state's funding process.

Once a project does move forward, its progress is often hampered by CalTrans' organizational structure. "One-hat" project management is widely regarded as the best way to ensure accountability because it tasks one person with a project's completion. That person shepherds the project through the various stages (e.g. environmental review, design, construction) and since he or she is responsible for its success, the incentive to perform well is great. Yet CalTrans is mostly organized around a different approach, one where the project is passed to a new project manager at each stage. When the buck does not stop with anyone, there is little incentive to complete projects on time and on budget.

Proper PPP legislation would also allow Californians to enjoy faster project delivery. Innovative contracting techniques have been shown to quicken project delivery by as much as 50 percent.[27] Apart from allowing Californians to use the facilities earlier, faster delivery would also decrease the traffic disruptions and safety concerns associated with work zones.

Part 4

Alternative Means to Meet California's Transportation Needs

Rather than borrowing an unprecedented amount of money to marginally increase the effort to do things the way they've always been done, Californians ought to be stepping back and thinking about new ways to approach our transportation infrastructure needs.

There are three main parts to the way California *ought* to be approaching our transportation infrastructure needs.

First, make better use of current funds. Proposition 1B is a pork-laden mess and much less than half the money will go to projects that will relieve congestion. That is typical of our transportation spending. While transit is important and needs appropriate funding, current spending plans allocate very disproportionate funds to transit. The three largest metro areas plan to spend about $154 billion on transit over the next 25 years, vs. $109 billion on roads, and most of the road money will go to maintenance and upgrades, not new capacity. If even one-third of the money going to transit was shifted to roads we could get three to five times more congestion relief than Proposition 1B will accomplish.

Second, give transportation its share of the budget. We used to devote a reasonable share of the general fund to transportation infrastructure. Now, even though the state budget has grown considerably, we don't devote the same share of general fund revenue to infrastructure that we used to. If Proposition 1B passes, we will pay $38.9 billion to get less than $20 billion in current funds for projects, and we'll be paying for that with about $1.33 billion each year out of the general fund. It make more sense to take a responsible look at our bloated budget and cut less essential spending so that we could allocate about $4-5 billion per year out of the general fund for what is surely one of the most core functions of the state. Some bonding for large infrastructure investments might still be good policy, but prioritizing spending of the revenue we have should come first. We have plenty of good examples of such an approach. Nineteen counties in California have put in place local sales taxes for local transportation funding and used them to combine pay-as-you-go financing with bonding. [28]

Third, California is falling far short of making full use of public-private partnerships for transportation projects. We are far behind states like Virginia, Massachusetts, and Florida in outsourcing highway maintenance, which would free up gas tax funds to help fund new road projects. More important, the private sector would happily invest their own capital in providing major new highway projects. If we aggressively pursued PPPs and tolled some of the new facilities and lanes added, private capital could fund at least 25 percent of what the bond could do if all the bond funds were spent on roads.

The Texas Transportation Institute estimated that in 2003, drivers in California's five largest metropolitan areas wasted over $16 billion due to traffic congestion in that one year alone. Surveys show that a large proportion of transportation customers are willing to pay for better mobility, and especially for the opportunity to bypass congestion.[29] Table 3 shows Californian's support for various transportation revenue options. Notice that the top three are all toll options.[30] The widely held belief among political leaders in California that the people don't want toll roads is simply no longer true. Indeed, the Mineta Transportation Institute study found that support for tolling options:

- was strongest among the youngest people surveyed (18-34 years);
- was expressed just as much by lower and middle income people as the wealthy;
- HOT lanes and TOT lanes found their greatest support among blacks and Hispanics; and
- HOT lanes and TOT lanes are supported by people regardless of how much or how little they drive.

Table 3: Californian's Support for Transportation Revenue Options

Revenue Option	Description of option from questionnaire	% of respondents supporting the option
Truck-only toll (TOT) lanes	There were proposals in some congested regions to build new toll lanes for trucks right next to existing freeways. Trucks would be required to use these toll lanes instead of the regular freeway. (Survey 2)	64.3%
HOT lanes	Open underused carpool lanes to solo drivers who were willing to pay a toll (Survey 1)	55.2
Toll roads	One option for building new highway projects without increasing taxes is to borrow money to build the road, charge tolls for driving on the new highway, and use the money collected to pay back the loans and maintain the highway. (Survey 2)	46.7
Variable registration fees (by emissions & fuel economy)	Increase the vehicle registration fee to an AVERAGE of $62 per year for all vehicle owners, but vary the fee according to how much pollution the vehicle emits and how much gas mileage it gets. Vehicles that emit more pollution or get lower gas mileage would pay HIGHER fees and those that emit less pollution or get better gas mileage would pay LOWER fees. (Survey 1)	44.1
Express toll lanes	Building new freeway lanes alongside existing highways and charging a toll to drivers who use those NEW lanes. (Survey 2)	43.8
Gas tax	Increase the 18-cents-a-gallon state gas tax by one cent per year for ten years. (Survey 1)	40.4

Table 3: Californian's Support for Transportation Revenue Options		
Revenue Option	**Description of option from questionnaire**	**% of respondents supporting the option**
Sales tax	Adopt a half-cent increase in the statewide sales tax. (Survey 1)	40.2
Vehicle license fee	Raise the vehicle LICENSE fee to 1%. The vehicle license fee is currently 0.65% (point six-five percent) of your vehicle's value, so the new fee would be 1%, with the additional revenue dedicated to transportation purposes. (Survey 1)	40.1
Tolls on new highway lanes	One way to pay for new highway lanes is to charge tolls for using them. (Survey 1)	39.8
Registration fees	Increase the vehicle REGISTRATION fee to $62 per year per vehicle, from its current level of $31.	31.5
General obligation bonds	One proposal is for the state to pay for new freeways and transit programs with general obligation bonds. These don't require a tax increase. But paying off the bonds from the state's general fund over 30 years would use money that otherwise might be spent for other state programs and services.	29.9
Indexed gas tax	Index the gas tax to inflation. Under this proposal, the gas tax could increase slightly each year based upon inflation. For example, in 2004, inflation in California was about 3%, so the tax would have gone up by about a half cent per gallon. (Survey 1)	26.8
Mileage fee	Eliminate the 18-cents-a-gallon gas tax altogether and replace it with a so-called "mileage fee" based on the number of miles a vehicle is driven. Each driver would pay a fee of one cent per mile for every mile driven within the state. For example, every 100 miles driven would incur a mileage fee of $1. Each vehicle would be equipped with an electronic means to keep track of miles driven and the fee would be paid at the pump when drivers buy gas. (Survey 1)	22.4
N (number of people surveyed)	Survey 1: 2705; Survey 2: 815	

Source: Dill and Weinstein, "How to Pay for Transportation? A Survey of Public Preference," paper presented at the 1st International Conference on Transport Infrastructure Funding, Banff, Canada, August 2006.

Indeed, SCAG, SANDAG, and MTC have all included toll projects in their most recent long-range plans. But because these concepts are relatively new to California, the extent to which they can play a significant role in funding major infrastructure improvements has been seriously underestimated. It is worthwhile to explore that potential, and then turn to the governance and institutional challenges facing state and local policymakers as they attempt to plan for the future transportation development.

A. An Overview of Public-Private Partnerships

Long-term public-private partnerships in transportation are becoming increasingly common. Governments are using them as the means to leverage limited public investment capabilities, to increase the efficiency of transportation projects and to provide new facilities and services. Public-private partnerships are not new in the history of transportation development. Yet there are many recent applications in the United States and overseas that can provide lessons for California; there is no need to reinvent the wheel on this subject.

1. Long-Term PPPs Abroad

Over the past two decades, the biggest innovation in overseas transportation has been the widespread reliance on the private sector to take responsibility for financing the construction and maintenance of major projects. The public sector remains heavily involved in the planning and permitting of projects, and usually sets the terms for investor involvement. It also supervises the construction and operations. But actual operations are a private-sector responsibility, and project financing— including the raising of toll revenues and controlling costs—is a private-sector risk. These public-private partnership approaches to highway construction and maintenance have been used in the countries as diverse as Canada, Britain, Ireland, France, Spain, Italy, Greece, Hungary, Poland, China, India, Pakistan, Turkey, Indonesia, Malaysia, Israel, South Africa, Australia, Philippines, Argentina, Brazil, Chile, and Jamaica. Here we provide some examples from Australia, Britain, Canada, and France, since these countries have a lot in common with the United States in terms of economic level and political and legal culture.

a). Canada

Toronto's Highway 407 ETR is the first private toll road in Canada. This highway was planned in the 1950s and construction began in the late 1980s. However, the work was halted due to budget constraints until Ontario Transportation Capital Corporation (created and fully owned by the province) started to sell toll revenue bonds to fund the design and construction of the major portions of Highway 407-ETR.

With funds raised in the capital markets, a first-stage 43-mile, 29-interchange project was built in a three-year period, opening in June 1997. The project was bold in technology, being the first major toll road system in the world without any cash collection. Those without transponders are recorded by camera ("video tolling"), and toll bills are mailed to them. Two years later the province was able to pay off its debt on the toll road entirely, and pocket over a billion dollars extra by leasing the toll road for a 99-year period after seeking competitive bids from investors. The new owners of the road agreed to add lanes, build extra intermediate interchanges, and construct extensions to the east and west. The franchise deal was criticized by the subsequent provincial government, which took 407 ETR to court in 2004. But the dispute was finally settled in March 2006, after the courts upheld key provisions of its 99-year lease agreement with the province of Ontario. With investor additions it is now 67 miles long with 43 interchanges. It is popular with motorists, carrying over

270,000 vehicles per day on average and over 300,000 on weekdays. The highway itself is showing signs of congestion, despite annual toll increases, and hence lane additions in some segments might be on the horizon. The right of way can accommodate 10 lanes, compared with the six currently in place.

Today, several new PPP transportation projects are under way in Canada. In British Columbia, a long-term concession approach is being used for the $500 million Golden Ears toll bridge project across the Fraser River. BC is also using a design-build-finance-operate PPP to modernize the (non-toll) Sea-to-Sky Highway in time for the 2010 Winter Olympics. The CDN $600-million improvement project will be completed by spring 2009 and will meet population growth and travel demands until 2020, with additional improvements phased in as required over approximately 20 years. A similar approach is being used in Alberta for a $400 million project to design, build, finance, and maintain an 11 km. section of the ring road around Edmonton.[31]

b). Great Britain

New motorways have been extremely difficult to build in Britain, in large part because of the lack of dedicated funding for major roads. The sole success story in getting a major new road built in recent years is the M6 Toll. This new toll road is a 27-mile, six-lane motorway that splits off from the established M6 motorway just south of Birmingham and rejoins it just north of Birmingham, providing a bypass of the free road which has turned into a congested inner-city expressway. Opening December 9, 2003 at a project cost of about $1 billion, it caters principally to long-distance traffic.

In 1989 the U.K. government sought bids for the design, financing, construction, and operations of the M6 Toll in return for the investors' right to toll the road for 53 years. After the concession was awarded in 1991 there were 10 years of alternatives analysis, public meetings, and refinement of the design. Opponents challenged the road in the courts, but all were eventually defeated. Once the legal way was clear, financing and construction proceeded quickly and smoothly.

The U.K. Ministry for Transport has expressed satisfaction with the performance of the M6 Toll and is considering several other projects to be funded by tolls and developed under long-term concession agreements. One is a toll road parallel to M6 from Birmingham to Manchester, about 50 km. Another would be adding tolled lanes to the M25 ring road around London and the M1 arterial route in central England. The United Kingdom also has a number of DBFO highway projects, under which private firms design, build, finance, and operate various highways, but no tolls are charged. Instead, the government makes annual payments under a long-term concession agreement.

c). France

Paris's A86 Tunnel is a landmark example of a long-term concession project. This project originated as an unsolicited proposal by private toll operator Cofiroute to build the road as a tunnel deep (up to 260 feet) beneath Versailles. This tunnel was designed to complete the missing link of the circumferential freeway A86, which was in a politically and environmentally sensitive area of Versailles, and was experiencing increasing traffic. Cofiroute finally won a 70-year concession agreement with the local government in 1994 to use $1.5 billion in private funds financed only with tolls, not tax dollars, to construct and operate A86 Tunnel. Without this private investment, there was no other financial source for the local government to construct such a costly project.

The A86 Tunnel project itself is characterized not only by public-private partnership approaches, but also by innovative physical design. The project consists of two tunnels. The 6.5-mile East tunnel was designed as a two-deck tunnel, one deck in each direction exclusively for low-height vehicles. It allowed six traffic lanes inside a 10.4-meter (34 ft.) internal diameter tunnel. The 4-mile West tunnel is a single-level, with one lane each direction. This tunnel can be used by light vehicles as well as trucks. The A86 Tunnels are still under construction and will be opened to the public in 2009. Variable toll rates—between E2.00 and E5.00 ($2.50 to $6.00)—will be used to ensure free-flow traffic conditions in the tunnelway. Travel times are expected to be about 10 minutes for the full 6.5 miles compared to about 30 to 40 minutes presently on local surface roads. No tollbooths will be used, since the tolling will be full highway-speed, open-road design with transponders plus video enforcement.

In early 2005, infrastructure giant Vinci finalized a 65-year concession to develop and operate the $800 million A-19 in central France. Also in 2005, the world's highest bridge, the Millau Viaduct, opened to traffic. The $536 million project was developed under a 75-year concession agreement between the government and Compagnie Eiffage.

d). Australia

Melbourne Toll Roads

Over the past decade and a half, nearly all the new motorways in Sydney and Melbourne have been developed as toll roads by the private sector, operating under competitively awarded long-term concessions.

One of them is the CityLink in Melbourne. This project is a Victoria state government-initiated project. It involves 13.7 miles of six-lane motorway in an L-plan wrapping around the south and west sides of the central business district, providing new access/egress, and linking three disconnected and truncated freeways. The project also makes extensive use of tunnels under residential areas and city parks and elevated structures through commercial/industrial areas.

The state believed motorists should pay for the facility and that construction would be most efficiently managed by a company answerable to shareholders, supervised by a special-purpose Melbourne CityLink Authority. The toll concession was won by Transurban, with funding provided by a participating construction company, investment bank funds, and publicly subscribed equity (i.e., shares purchased on the stock exchange). Construction proceeded between May 1996 and December 2000, when all stages were open. Like Toronto's 407ETR, the CityLink has no cash toll collection. Motorists acquire transponders or get billed after usage. Enforcement cameras handle passes and violations.

The CityLink project is approximately a quarter of the scope of work of the Big Dig in Boston, but built at about a tenth the cost: $1.5 billion versus $15 billion. CityLink did not cost taxpayers any major expense—just supervisory costs. The toll concession is 35 years, after which the facilities become the property of the state.

CityLink's success had led to a second major toll concession project in Melbourne, the A$3 billion Mitcham-Frankston Expressway in the eastern suburbs. This 24-mile, six-lane tollway will include 17 interchanges, numerous bridges, and a mile-long tunnel. It will use the same electronic toll system (no toll booths) as CityLink. Once the concession was awarded to a Macquarie-led consortium called ConnectEast, the consortium offered shares to the public via an initial public offering that raised A$860 million. The company itself is investing A$460 million, which means that 44 percent of the total cost is in the form of equity, leaving only 56 percent to be funded with debt.

Sydney's Toll Roads and Tunnels

Australia's biggest city, Sydney, also arrived at 1980 without a connected network of freeways. Though the traffic management in Sydney's local surface arterials was once effective, they no longer facilitated the increasing travel demand.

Using tax money, freeway construction was restarted on the outskirts. Then to fund the more expensive projects within the suburbs, the state of New South Wales franchised investors to build three major radial expressways as toll roads: the M4 Western Motorway (1983 onward by stages), the M5 Southwestern Motorway (1993), and the M2 Hills Motorway going east-west through the northern suburbs (1997). But all these ended short of the inner suburbs and lacked interconnection.

The New South Wales state government then developed a series of tunneled projects to develop routes under dense urban areas where gaining surface right of way was liable to be financially ruinous, if not politically impossible anyway. These tunnel projects include Eastern Distributor, Cross City Tunnel, the Lane Cove Tunnel, M4 East and F3 Newcastle Freeway to M2 Orbital Link. They are either completed, under construction, or in the approval process. All used long-term concession approaches to finance the projects through private investment.

e). Findings

Australia, Britain, Canada, and France have shown that projects conceived and developed to preliminary design stage by the public sector can be successfully put to public bid, and that investor groups will compete for the right to finance, design, construct, operate, and maintain those projects in return for a right to toll. Major metro areas there have managed to deliver mega-projects on budget and on time with private sector toll concessions. With investment money involved, local groups seem more accepting of tolls, and there seems to be more discipline to resist "requirements creep" (the tendency of projects to become more and more complex and costly) than when they are engaged with a public entity.

2. Domestic PPP Projects

In the United States, long-term public-private partnerships are playing a larger and more meaningful role in addressing the nation's transportation needs. The modern use of PPP's in transportation started 15 years ago with California's enactment of AB 680 and approval of an initial private toll road in Virginia. Since then, states have been broadening the scope for PPP approaches, which include contract operations and maintenance, program management fee service contracting, Design-Build contracting, Build-Operate-Transfer (BOT), Design-Build-Finance-Operate (DBFO), or Build-Own-Operate (BOO), etc. The number of States with PPP legislation is growing too. Indiana has just passed a new law to authorize the use of PPP to finance, build and operate the I-69 extension from Indianapolis to Evansville. In May 2006, Alaska passed a bill to authorize the PPP approach to finance Knik Arm Bridge near Anchorage[32]. A total of 23 states have adopted legislation enabling public-private partnerships to design, build, finance and operate the transportation facilities.

Much of the recent interest in PPPs has revolved around new toll facilities. A survey done by PB Consult for the Federal Highway Administration (FHWA) finds a total of 147 new toll projects in 22 states in the last 15 years, that would provide 13,800 new lane-miles of capacity at a total cost of $76.7 billion investment, if all are completed. Even though toll roads only make up 2.8 percent of the 162,000-mile National Highway System, they have contributed an average of 50 to 75 miles of new expressway out of an overall average of less than 150 miles of urban expressways opened annually in the last decade. The report concludes that, "Toll roads…have been responsible for 30 to 40 percent of new upper level road mileage over the past decade."[33]

a) Texas

Texas has gone further than any other state in embracing public-private partnerships for transportation projects. The state's PPP programs have been implemented by Texas Department of Transportation (TxDOT), Texas Turnpike Authority (TTA), and Regional Mobility Authorities. In 2003, the Texas State Legislature passed a series of bills which are generally referred to as HB 3588, to make tolling the first option for financing new limited-access capacity, to enable the Trans-Texas Corridors plan, and to authorize the TxDOT, TTA and Regional Mobility Authorities

to accept solicited and unsolicited PPP proposals. It is this legislative and regulatory environment that helped to generate strong incentives to the public and private stakeholders to use PPPs in developing transportation facilities in Texas. According to the PB Consult survey, Texas has planned 38 toll projects, of which 13 are complete, with the rest under development. The planned TTC 35, a 600-mile corridor which is designed to include roadways, rail and a dedicated utility zone[34], became one of the largest transportation projects in the U.S. In March 2005, the Comprehensive Development Agreement signed between TxDOT and Cintra-Zachry would give the full rights to Cintra-Zachry to design, construct and operate a four-lane 316-mile toll road between Dallas and San Antonio for up to 50 years as the initial segment of TTC-35[35]. For this, Cintra-Zachry would make a $6 billion private investment for project costs and provide an upfront concession fee of $1.2 billion payable to TxDOT. The mid-term (2010-2025), and long-term (after 2025) plans would expect Cintra-Zachry to develop entire TTC-35 from Laredo to the border of Oklahoma primarily by using private funds.

Another major PPP project, The Central Texas Turnpike is under construction. This toll facility is a 122-mile turnpike near Austin - a $4.3 billion investment. Meanwhile, several other PPP projects have been proposed or are under development, including:[36]

- Drawing private-sector proposals for the TTC-69 project;
- Adding managed lanes, some of them in tunnels, to the LBJ Freeway (I-635) as part of a $3 billion reconstruction of that major corridor in Dallas;
- Adding 42 miles of toll lanes on Loop 1604 and US 281 on the north side of San Antonio;
- Developing SH 121 as a new 24-mile toll road on the north side of Dallas;
- Developing the proposed $500 million SH 161 in Ft. Worth as a toll road.

b) Virginia

Virginia was one of the first states to enact a comprehensive public-private partnership law.[37] In 1995, the Virginia legislature enacted the Public-Private Transportation Act which encourages public-private partnerships in developing transportation facilities. The revised version of this act expanded the scope of public sector involvement in PPPs. Under the revised PPTA, any "responsible public entity" may authorize PPTA projects, not just the Virginia DOT. And it permits both requests for proposals (RFPs) and unsolicited proposals to be used by these entities. In addition, if permitted by other federal and state laws, a private partner may toll existing free lanes.

Virginia's first modern-day private toll road, the Dulles Greenway, is a 14-mile, limited-access highway extending from the state-owned Dulles Toll Road (which connects Washington's Capital Beltway and Dulles Airport) to Leesburg. The Greenway is a build/operate/transfer facility and the concession term was initially 42.5 years. The project was entirely financed through tolls. The Greenway opened to traffic in September 1995. Though plagued by low traffic in the first few years after it opened, the road is now so popular that it faces some degree of congestion. In

February 2005, after winning approval of a toll rate increase, the company issued new toll revenue bonds to pay for a $72 million expansion, to widen the entire 14 miles from two lanes to three lanes. The concession term was extended to 60 years.

In April 2005, a comprehensive agreement was signed under the PPTA to allow Virginia to partner with two private companies to add HOT lanes to the Capital Beltway (I-495) in Northern Virginia. The proposed Capital Beltway HOT project will add two HOT lanes in each direction on a 14-mile segment of the Capital Beltway. The electronically tolled HOT lanes will be free to three or more-person carpool vehicles, buses and emergency vehicles. All other vehicles will pay a variable toll that would be adjusted with the traffic volume. The construction cost of the four HOT lanes, when fully built, is estimated to be $900 million. If Virginia DOT accepts the Fluor/Transurban concession proposal, no state funding will be required.

In June 2006, Transurban Group, Australia's second-biggest private toll road operator, agreed to bail out the floundering Pocahontas Parkway in Richmond, a recently built toll road whose traffic and revenue were far below initial projections. Transurban acquired a 99-year concession to operate and maintain the nine-mile long toll road.[38] Although this PPP deal doesn't include an upfront concession fee, Transurban has agreed to share profits with the state. The state will receive 40 percent of gross revenues once net cash flow yields an internal rate of return of 6.5 percent. Revenue sharing increases to 80 percent once that rate of return hits 8.0 percent.[39] Besides this innovative revenue sharing, Transurban Group agreed to pay off all existing debt of the Pocahontas Parkway Association; to finance and build the airport connector subject to obtaining federal government loans;[40] and to accept capped toll levels to limit the degree of toll increases.

c) Florida

Florida has one of the largest tolled highway and bridge systems in the United States. This tolled system benefited from Florida's legislative and institutional support. Through legislative authorization, FDOT, Florida's Turnpike Enterprise, and local expressway authorities may use PPPs in a wide range of transportation projects. In addition, legislation (H.B. 0261) passed in 2002 exempted FDOT's Turnpike Enterprise from FDOT policies, procedures and standards, and authorized it to develop its own governance rules and use best business practices in delivering cost-effective transportation projects. And in 2004, the legislature revised Florida's PPP law to remove a previous requirement for legislative approval of individual tolled PPP projects. That provision was widely seen as having prevented any such projects from having been developed, due to the risk that the private sector's extensive investment in developing project proposals would be for naught, if political factors led to a subsequent legislative veto. Thanks to the new legislation, the expressway authorities and the Turnpike Enterprise are eagerly soliciting PPP proposals for needed additions to the state's limited-access highway system.

Recently, the Florida Turnpike Enterprise and Miami-Dade Expressway Authority did feasibility studies on HOT/managed lane projects. These projects would add express toll lanes to the medians of the Homestead Extension of Florida's Turnpike and the Dolphin Expressway. Meanwhile, under

a federal Value Pricing grant, FDOT is doing an investment-grade traffic and revenue study of alternatives for converting the HOV lanes on congested I-95 into elevated HOT lanes. FDOT is also researching tolled express lanes for Orlando (I-4) and Fort Lauderdale (I-595).

d) Georgia

Under Georgia's Public Private Initiatives law, as amended, the Georgia DOT can accept both solicited and unsolicited proposals for toll-financed projects. During 2005-06, it has received proposals for four such projects, all in the greater Atlanta metro area. The first called for widening and modernization of the state highway between Athens and Atlanta by converting it into a toll road. Conversion of existing free highway capacity into tolled capacity proved controversial, and GDOT subsequently made a policy decision not to allow such conversions, leading to this proposal's withdrawal.

The three subsequent proposals all call for the addition of tolled lanes to portions of the Atlanta freeway system. One would do this on major sections of Georgia 400, part of which is already a toll road. Another would add tolled HOT and truck-only lanes on the northern portion of I-75 and I-575. These two proposals have been accepted by GDOT, and the projects are now in preliminary design. A more recent proposal would add truck toll lanes to the western portion of I-285, the Atlanta beltway; these truck toll lanes would mesh with those proposed for I-75.

e) California

In 1989, the California legislature enacted AB 680—one of the first legislative initiatives for transportation PPPs, to authorize four pilot PPP projects. Unlike most subsequent PPP laws in other states, this measure did not allow state or federal funds to be used to supplement private capital. Only two of the four proposed projects survived the lengthy political and environmental review process. One project added HOT lanes to SR 91 in Orange County, opening in December 1995. The other led to the new South Bay Expressway (SR 125) in San Diego, now under construction and expected to open in 2007.

In 2002, as part of a measure to permit the Orange County Transportation Authority to purchase the 91 Express lanes from its private developer, AB 680 was repealed. Currently California does not have clear statutory authority for PPP programs. The 2006 legislature passed a statute allowing four pilot PPP projects, which can toll only commercial vehicles, and requiring legislative approval on each individual project. This measure is viewed as unworkable by PPP firms, because it creates too great a risk that the legislature might veto a project into which extensive development time and money had been put.

Despite the lack of a workable PPP framework in California today, the gap between available transportation resources and investment needs makes long-term PPPs an essential part of the solution. Indeed, a number of the Metropolitan Planning Organizations (MPOs) in the state have

demonstrated strong support for the use of PPPs for transportation projects, particularly in Southern California.

Lessons Learned: 91 Express Lanes.

California's first experiment with long-term PPP toll roads was the 91 Express Lanes project in Orange County. It consists of four new toll lanes added to the median of SR 91 by a private consortium, operating under a 35-year franchise, awarded competitively by CalTrans under AB 680. It was the first privately financed toll road in America in the 20th century, the first with no toll booths, and the first toll road in the world to use "value pricing" to manage traffic flow. We can draw several useful lessons from this important pilot project.

First, private capital is available to build innovative new projects. These 40 lane-miles of sorely needed new highway were built at no cost to taxpayers. Secondly, we learned that commuters appreciate the choice: revenues are high on the express lanes, and they have received high satisfaction ratings since opening. Third, the 91 Express Lanes have proven that variable pricing can maintain free-flow traffic conditions: the express lanes have a higher throughput than the congested general purpose lanes because they are able to maintain high speeds at rush hour.

Perhaps the most important lesson learned from the 91 Express Lanes is the reason some regard them as a failure. *Rigid non-compete provisions are not necessary for new toll projects in built-up, congested urban areas.* In 1990 when the franchise agreement was negotiated, nobody had ever financed toll lanes with large-scale free competition right beside them. Even conventional toll roads often worked out non-compete agreements with highway agencies, since unlimited amounts of competition from free roads could siphon off so much traffic that bond-buyers would never be repaid and the bonds would default. So the financiers advised CalTrans that strong protections would be needed in order to obtain financing for this revolutionary type of project.

Toward the end of the 1990s, continued growth in Riverside County led to such strong traffic demand on SR 91 that CalTrans wanted to add more regular lanes to SR 91 to relieve renewed congestion, but the non-compete provision prevented them from doing so. The Express Lanes company won a legal battle with CalTrans, but lost in the court of public opinion. And that led to the legislation authorizing OCTA to buy out the franchise.

Today, more than 15 years after the Express Lanes were financed, the financial markets have some experience with what we now call "HOT lanes" (premium-toll lanes built alongside regular lanes on a freeway). Rigid non-compete clauses are no longer demanded. Most toll road and toll lanes projects being financed these days build in the assumption that every project in a region's 25-year long-range transportation plan will eventually get built, and may divert some traffic from the toll lanes. Only additional (not currently in the long-range plan) projects are deemed potentially competitive, and in those cases, the remedy is compensation to make up for lost revenues. These kinds of provisions balance investor protection and the public interest.

Lessons Learned: The TCA Toll Roads.

Special legislation in 1986 allowed for creation of Orange County's Transportation Corridor Agencies (TCAs). They were permitted to use tolls (as well as developer fees) to finance the construction of 67 miles of new toll road, in fast-growing eastern and southern Orange County. So far, 51 miles of the planned system have been financed, built, and opened to traffic. Investors have provided $3.9 billion in bonds to build the toll roads, backed by future toll revenues, not by Orange County taxpayers. The three toll roads take nearly 300,000 cars per day off Orange County's freeways. According to a newly released study, "Orange County's 51-mile toll road system operated by the Transportation Corridor Agencies (TCA) saves motorists more than six million hours and $182 million annually because of reduced congestion."[41]

Of the three toll roads, the San Joaquin Hills Toll Road (SR 73) has gotten the most attention. Although it is operating in the black, it has not attracted as much traffic as projected and therefore does not have the planned level of reserve funds and could theoretically default on its bonds in 2014 if things don't improve. The Foothill (SR 241) and Eastern (SR 241, 262, and 133) Toll Roads are doing better than forecast, in both traffic and revenue.

Start-up toll roads are inherently risky propositions, financially, especially in an area with no previous familiarity or experience with toll paying. Toll projects where more is known about people's willingness to pay tolls in the area are easier to finance. Because of the difficulty in predicting toll revenue the track record of stand-alone, start-up toll projects is not wonderful. Seen in this context, the fact that two of the three TCA toll roads are exceeding their projections is actually very good. And the fact that they were built with the burden of risk on investors rather than taxpayers is important to emphasize.

For the 73 Toll Road, alternatives to default include extending the term of the debt and refinancing all three toll roads as a system. But even if default were to occur in 2014, it must be remembered that taxpayers will not be at risk. It is only the bond-buyers—sophisticated investors who knew what they were getting into—who stand to lose some of their investment. The toll road will still be there, after a financial restructuring, and with lower debt service requirements after the restructuring, it should be well-positioned to continue meeting Orange County's need for good transportation.

An important lesson from Orange County's experience with toll roads is the value of employing both debt and equity in financing such projects. Debt (bonds) requires payments on a fixed schedule, regardless of temporary ups and downs in the business. It is considered much wiser for a business to employ a mixed capital structure, consisting of both debt and equity. This becomes possible when a toll road is developed and operated by the private sector under a long-term public-private partnership. The equity can be seen as "patient capital," willing to wait beyond the early years of tolling for a longer-term return on its investment

Lessons Learned: SR 125 Toll Road.

The South Bay Expressway is a new four-lane, 11-mile toll road (now under construction) which directly connects Otay Mesa, at the border, with Eastern Chula Vista in San Diego County.[42] The southern 9.5 mile section of SR 125 is being developed under AB 680 with a 35-year concession term. The northern 1.5 miles, including the interchange with SR 54, is publicly financed, and will be opened as a freeway. Both sections are being built by the same private partners under two design-build contracts with the limited partnership. The major private investor partner involved in the project is California Transportation Venture, Inc., a wholly owned subsidiary of Maquarie Infrastructure Group (MIG), the largest developer of toll roads in the world. This is also MIG's first "greenfield" toll road project in the United States.

The innovation that SR 125 brings to PPP projects comes from its financing structure. The total cost of this project is about $650 million, of which, MIG will invest $160 million as equity. As pointed out above, equity tends to be "patient capital" which provides leverage for the return on investment over a longer time period. As a result, this type of capital structure could help to reduce the risk of default in a stand-alone, start-up project if the early years traffic and revenue are below projections.

The SR 125 concession agreement includes "second-generation competition provisions", which permit some degree of compensation only for loss of traffic from further additions of capacity, beyond what is in the approved SANDAG long-range transportation plan.[43]

B. Potential Toll Projects in California

The purpose of this section is to illustrate how large-scale, toll-funded projects could be developed to address specific needs in California's three major metro areas. We define and analyze three types of such projects: toll tunnels, HOT networks, and toll truckways. To assess the feasibility of funding these projects via tolls, we have adopted a simplified model. Specifically, our feasibility models take the estimated capital costs of a project converted to base-year dollars using a standard discount rate. Toll rates are adjusted for inflation (to keep them constant in real terms) over an assumed 40-year term. After producing a spreadsheet of gross and net toll revenues over this planning period, we then compute the net present value (NPV) of the stream of net toll revenues, as of the base year, and compare this with the base-year capital costs. If the NPV of revenues exceeds the NPV of costs, the project is considered potentially self-supporting via toll revenue financing alone. If this kind of calculation yields a lesser result—e.g., that toll finance can cover only 70 percent of capital costs—most state PPP laws, as well as federal law, provide for blended funding. In effect, the state or other government agencies may choose to "buy down" the capital cost by providing the 30 percent as a kind of state equity investment. In effect, the state provides the down payment and the PPP developer finances the balance, as a homeowner does in purchasing a new house.

1. Toll Tunnels

a) Palmdale-Glendale Tunnel

One of the most serious transportation problems facing the SCAG region is inadequate airport capacity. With the decisions to cap the growth of LAX, to not build an airport at El Toro in Orange County, and to keep severe limits on the capacity of Burbank, Long Beach, and John Wayne Airports, the only remaining options are Ontario and Palmdale. Especially for Palmdale, the potential air transportation market is supported by dramatic population growth between now and 2030 in the local area as predicted by SCAG, and the significant demand from south county users.[44] However, the great driving distance and the limited amount of highway capacity from most population centers in south county to Palmdale is putting severe strains on the ability of Palmdale Airport to meet future aviation needs. The North County Combined Highway Corridors Study[45] found that not only is "substantially increased vehicle capacity needed in each of the major highway corridors [I-5, SR 14, SR 138]" but also that "new north-south route options should be studied for possible feasibility."

One such possibility is a toll tunnel linking Palmdale with Glendale, deep-bored beneath the Angeles National Forest. This option was defined and evaluated, briefly, in a corridor alternatives study of SR 14 in 2000.[46] That study compared the cost and feasibility of both surface and tunnel alternatives and found that the tunnel option would cost less ($1.8 billion tunnel vs. $2.3 billion surface), have shallower grades thereby permitting higher speeds, and would pose significantly less land-use and environmental impacts than a surface route. Either alternative would produce significant time savings for many trips now made between north county and the L.A. Basin, the San Fernando Valley, and the San Gabriel Valley. Building on this SR 14 study, the city of Palmdale pursued a further analysis of the tunnel option to assess its feasibility as a tolled route. That brief 2001 report concluded that toll revenue could pay for half the cost of the tunnel project, with the balance having to come from other sources.[47]

However, Palmdale's 2001 tolling study omitted two important developments. First, it treated the proposed tunnel like a conventional toll road, rather than conceiving of it as a premium congestion-relief facility similar to HOT lanes. Second, since it was conducted prior to the regional decisions to limit the capacity of LAX and to turn down the proposed El Toro airport, it neglected to consider the potential additional north-south traffic generated by serious development of Palmdale International Airport. Thus, a fresh assessment of the toll tunnel concept seems appropriate at this juncture.

Our analysis began with the route proposed in the 2000 SCAG study. The tunnel would extend from the SR 2/I-210 interchange northward, with interchanges at Big Tujunga Canyon and Aliso Canyon Road before terminating at an interchange with SR 14 just south of Palmdale (see Figure 2). Heading northbound, most of it would be at a grade of 3 to 4 percent. The two primary segments would be tunnels 4.7 miles and 10.8 miles long, with another five miles at-grade, for a

total length of a bit less than 21 miles. The tunnel segments would consist of twin tubes with an inside diameter of 47 feet.

Because of the high cost of such a tunnel, it is essential that its capacity be used to the maximum degree. Tunnel designs for the A86 Tunnels in Paris can be adapted for this purpose. Twin tubes that would provide space for only four (total) conventional full-size traffic lanes could be reconfigured to provide eight lanes, six in one tube for light vehicles (cars and light trucks) in a double-deck configuration and two in the other tube for heavy trucks and buses. Figure 3 compares the conventional approach, from the 2000 study, with an adaptation of the French concept to the same 47-foot inside diameter tubes.

Figure 2: Proposed Palmdale Tunnel

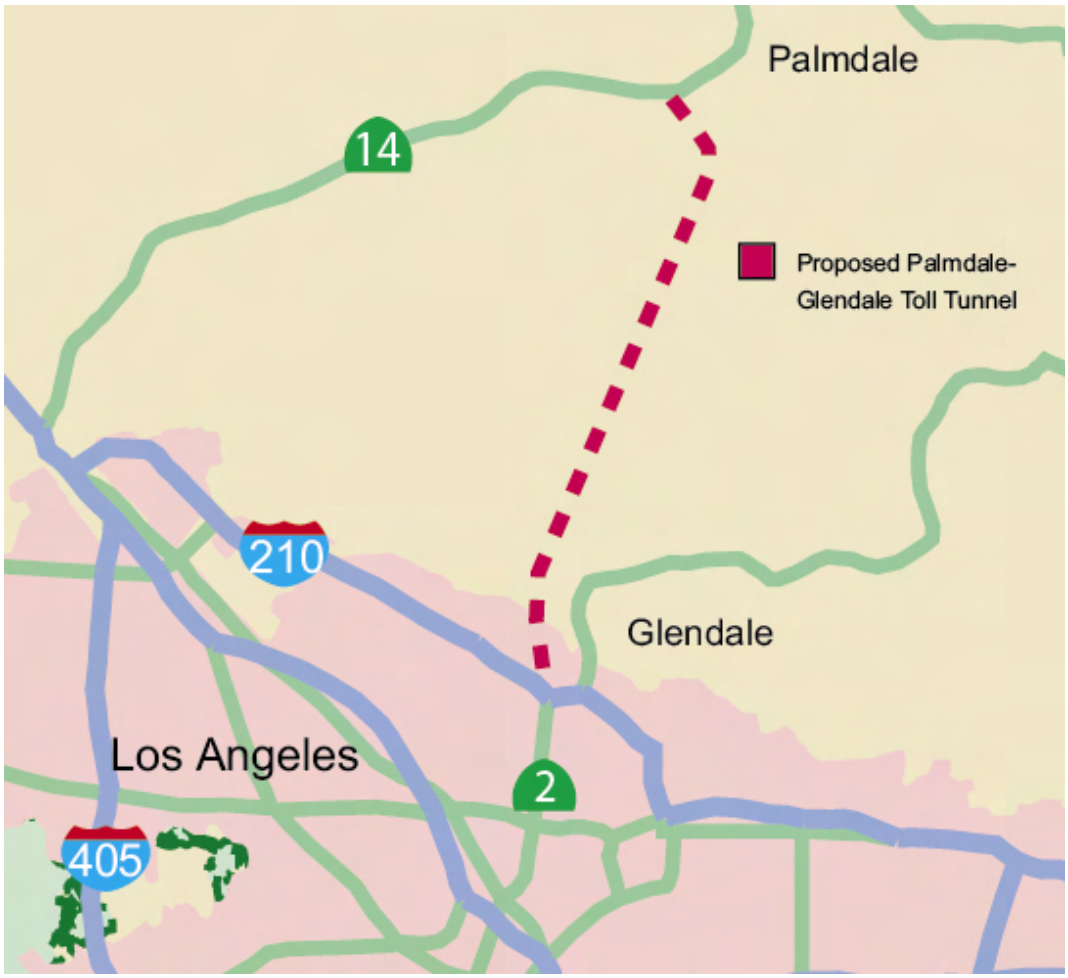
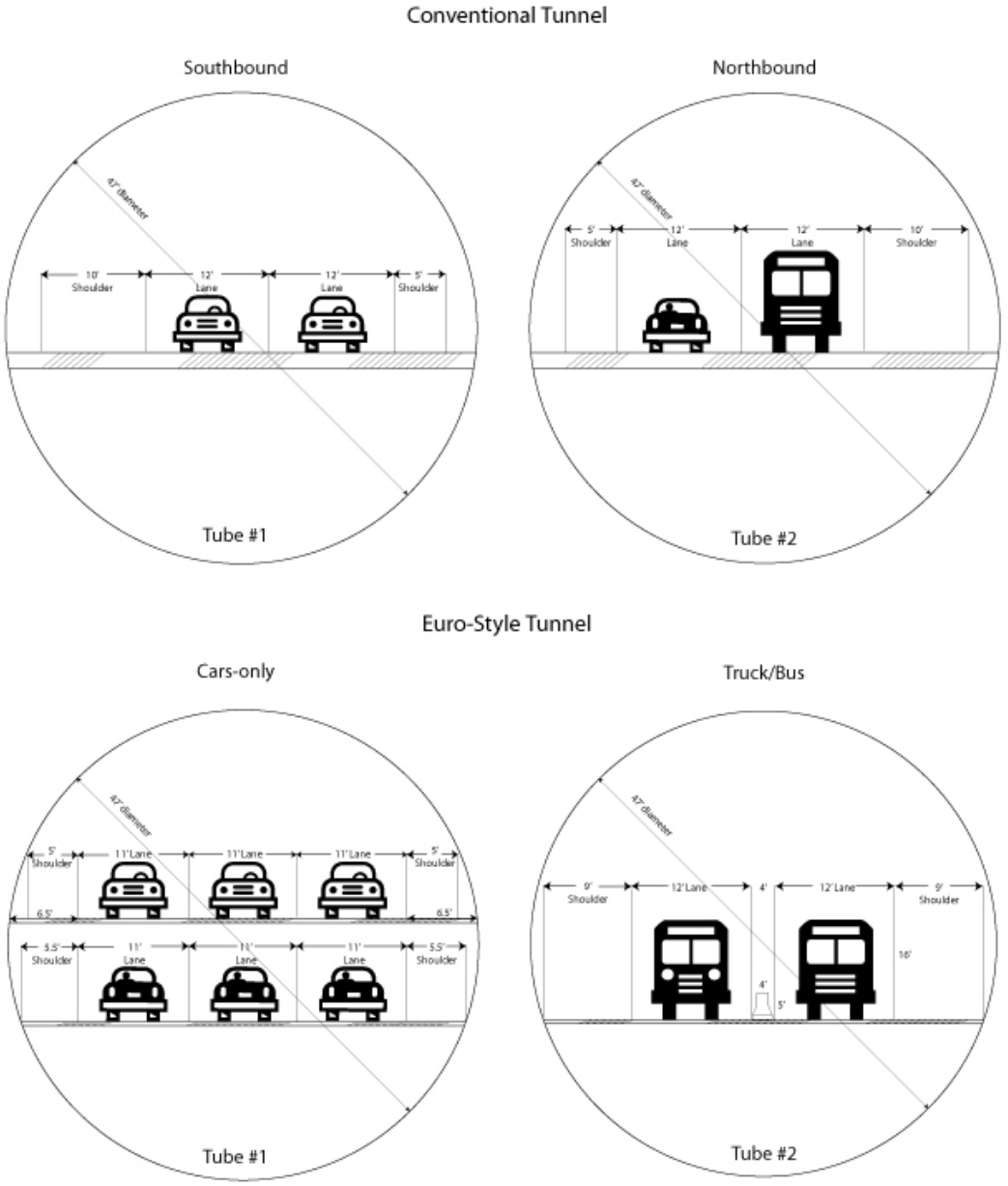


Figure 3: Alternate Tunnel Concepts



Our feasibility assessment was based on the tunnel's ability to provide dramatic reductions in distance from many L.A. Basin locations to the Palmdale area, and even more dramatic time savings during morning and afternoon peak periods. We assumed the tunnel to be value-priced, like the HOT lanes in Orange and San Diego Counties, to keep traffic moving at the speed limit even during peak periods. Our first analysis assumed that both tunnels are built at the outset, at a 2012 capital cost of $3.07 billion. Done that way, the net present value of the toll revenues generated over the first 40 years of operation is $2.6 billion (2012 dollars), which means that toll revenues could cover 83 percent of the cost of the entire project. But if the project were done in the

two-phase approach, building the double-deck tunnel first, only 60 percent as much capital cost would have to be covered from the same toll revenues in the initial years. Under that approach, the project could be fully supported by toll revenues.

b) U.S. 101 Tunnel in San Francisco

Downtown San Francisco is seriously impacted by through traffic on U.S. 101. Between Golden Gate Avenue and the Presidio, 101 becomes simply a designation for the surface streets Van Ness Avenue, Lombard Street, and Richardson Avenue. Approximately 70,000 through vehicles per day must crowd onto these congested surface streets due to this missing link in the 101 freeway.

Completing U.S. 101 as an elevated freeway through San Francisco would be politically impossible. However, the prospect of removing up to 70,000 vehicles from the city's surface streets each day, at no cost to the taxpayers, might make a bypass tunnel politically and financially feasible. A hypothetical route for such a bypass is depicted in Figure 4.

From the south, it begins at or near Haight and Octavia, where the current 101 freeway terminates. The proposed tunnel consists of three lanes northbound (lower level) and three lanes southbound (upper level), making a straight-line path to the northwest, to link up with the resumption of the 101 freeway at the eastern border of the Presidio. This routing would not only complete the 101 through the city on a limited-access basis, but it would also provide a limited-access route for traffic from the Bay Bridge (I-80) to reach the Golden Gate Bridge without impacting the city's surface streets.

It is assumed that following the opening of this bypass route, CalTrans and the city would designate the bypass as U.S.101, with the present surface-street route becoming Alternate-101, for those vehicles either unwilling to pay the toll on the bypass or too large for the tunnel dimensions (e.g., trucks). Since there would be no freeway alternative through the city, it is assumed that the bypass would attract 90 percent of the auto-size through traffic. Assuming that large truck vehicles are 10 percent of the total, the bypass is therefore assumed to attract 81 percent of the 70,000 daily through vehicles. Congestion pricing and electronic toll collection are assumed to be used in this project.

This six-lane, double-deck design would be very similar to the double-deck tunnel used as one of the two tubes for the Palmdale tunnel. With the same diameter but only 12 percent of the length (1.85 miles instead of 15.5 miles), it could cost as little as 12 percent of a single Palmdale tube’s $1.55 billion (in 2012 dollars), i.e. $186 million. Because of the added complexities of tunneling beneath city streets and utilities, we will boost this estimate to at least $250 million for purposes of this initial feasibility estimate. For revenue estimation, we assumed a toll of $2.25 in 1997 dollars and escalated for 3 percent annual inflation through 2051. We assumed traffic would increase at 2 percent per year. And we assumed that operating and maintenance costs would be 15 percent of gross revenue. On this basis, the NPV of net toll revenue in 2012 was $1.87 billion. This is more than seven times the NPV cost in 2012 of $250 million; hence the project appears to be highly feasible.

Figure 4: Downtown San Francisco Bypass

c) South Pasadena (I-710) Tunnel[48]

In South Pasadena, there is 4.5 mile gap where freeways I-710 and I-210 were intended to connect. Filling in this missing link would significantly reduce congestion on the freeways in that part of the metro area as well as on the surface streets of Alhambra and nearby cities. However, all of the proposals to continue the I-710 freeway through South Pasadena over the past 40 years have raised controversies and objections. As these proposals emphasized traditional surface routes, they have brought up enormous community and environmental concerns. A new feasibility study released this June and funded by the Los Angeles County Metropolitan Transportation Authority (MTA) proposed a tunnel to close this 4.5 mile gap. This tunnel project would not split South Pasadena nor create the environmental impacts of a surface project. As confirmed by the MTA study, "a tunnel beneath South Pasadena would be a physically, financially and environmentally feasible way to fill the controversial missing link on the 710" and to improve the travel conditions in Los Angeles Metropolitan Area.[49]

Figure 5 Proposed Pasadena Tunnel

Source: MTA Study, Figure 6-2, page 6-76

The MTA study estimated the cost of three alternative tunnel alignments based on a series of assumptions as well as the "knowledge of similar constructed projects in terms of construction equipment, approach to excavation and disposal of spoil material and number of working faces", etc. The estimated construction cost ranged from approximately $2.3 billion to $3.6 billion, for four lanes in each direction. These tunnels assumed that all eight lanes would be sized to accommodate large trucks, which results in much larger cross-sections than the design we have proposed for the Palmdale tunnel. Two 47-foot diameter tubes would provide six lanes for cars and light trucks (pickups, SUVs, etc.) plus two full-size lanes, plus breakdown lanes, for large trucks. Since the South Pasadena tunnel requirement is only 4.5 miles, compared with the 15.5 miles of tunnel needed for Palmdale, the basic tunnel cost would be about one-third that of the latter. Thus, not counting design, access ramps, and other ancillary costs, the basic tunnel cost using the Palmdale design approach should be in the $1 billion range. Adding other factors might bring the total to $1.2 billion. Escalating that at 3 percent per year to the 2017 base year gives us $1.39 billion.

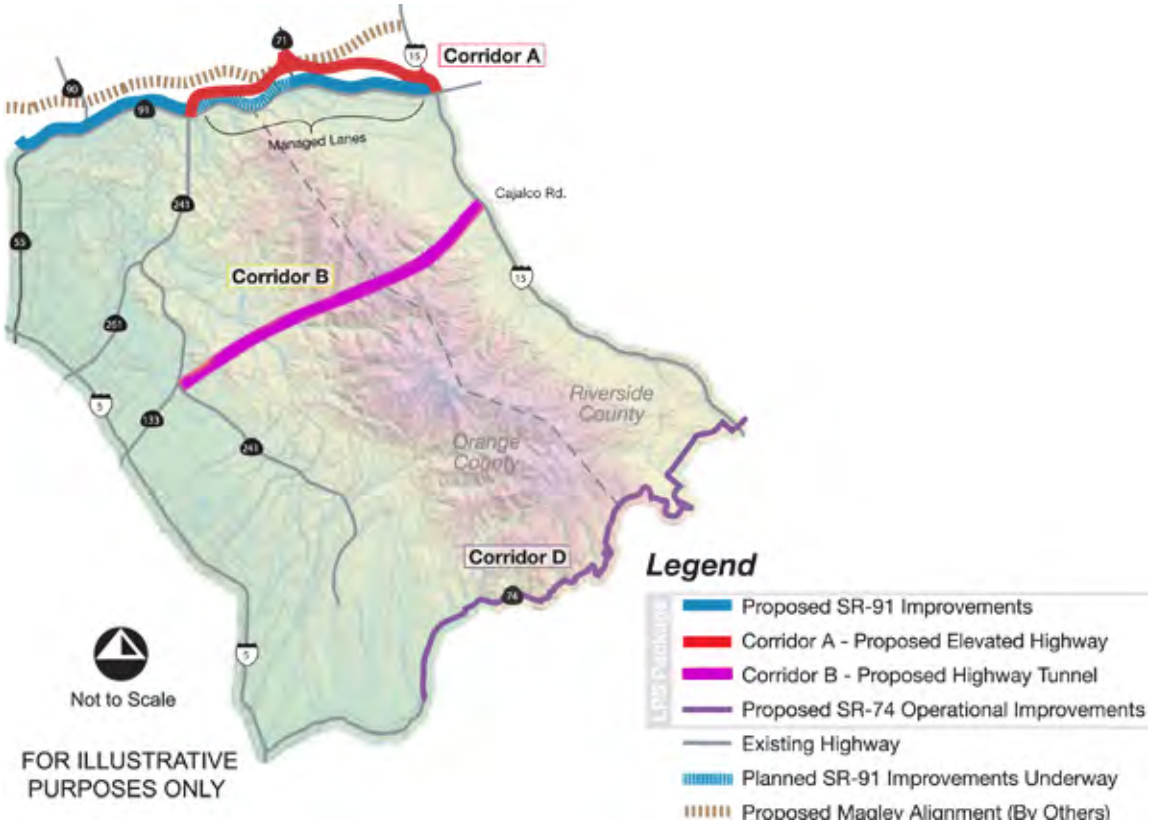
Our revenue scenarios used (2006) toll rates of $3, $4, $5, and $6 for cars and $4 to $7 for trucks. The NPV of net revenue in the 2017 base year ranged from $3.4 billion to $6.0 billion. Even the lowest of these considerably exceeds the estimated construction cost.

d) Riverside/Orange County Tunnel

Commuting from the bedroom communities of Riverside County to the job markets in Orange County is projected to continue increasing far beyond the capacity of existing roadways. According to RCTC, there are only two roadways—SR 91 in the north and narrow, two-lane Ortega Highway (SR 74) in the south—to accommodate more than 292,000 vehicles commuting between Orange County and Riverside County each day. And in terms of the highway capacity, "SR 91 is the only significant highway corridor that provides the home-to-work connection for Riverside County residents working in Orange County."[50] It carries over 95 percent of the daily traffic volume each day at the Orange/Riverside county line and has been one of the longest rush-hours in the nation and one of the most heavily congested freeway corridors of California.[51] As "the number of trips forecast over the next 20 years is expected to double to nearly one-half million,"[52] there is need to find a way to add significant capacity for trips between these two counties.

Currently, The Riverside County Transportation Commission (RCTC), the Orange County Transportation Authority (OCTA), and the Transportation Corridor Agencies (TCAs) are working together to investigate several corridor options to improve accessibility between Orange County and Riverside County, as shown in the following figure.

Figure 6: Proposed Tunnel between SR-241 and SR-15



Source: http://www.rcocconnection.info/map.html

Of all of the proposed corridors, Corridor B has been seriously considered owing to its potential to sufficiently divert traffic to serve travel demand, manageable cost and the fact that it would be more environmentally friendly as it would primarily depend on the tunnel design. The alignment of Corridor B was proposed to start from the I-15 near Cajalco Road to the junction of the SR-241 and SR-133. Although freeway, toll road, and toll tunnel options are being considered, we consider only the toll tunnel to have serious potential for being judged financially and environmentally feasible.

A 2004 study by Cofiroute took a fairly detailed look at the feasibility of the tunnel alternative.[53] One of its several alternatives was for two 48-foot diameter tubes, each 12 miles long as part of a 14-mile total project length. This configuration is very close to the previously discussed Palmdale tunnel configuration, which would provide six lanes for cars in one double-deck tube and two lanes for trucks in the parallel tube. Including interchange work at each end and miscellaneous costs, Cofiroute estimated the total cost in 2004 dollars to be $4.72 billion. Their report also proposed a design and construction schedule under which the tunnel could open in 2018. Escalating the cost to that year as the base year for NPV calculations gives us $7.14 billion.

The Cofiroute study also cites base case average daily traffic estimates (from OCTA and TCA) of 90,000 cars and 10,000 trucks as of 2025. Assuming that traffic between the two counties grows at two percent per year, we constructed a traffic projection covering the years 2018 through 2057, a 40-year planning period. For a first-cut revenue analysis, we used the average daily toll on the 91 Express Lanes in 2006 of $2.48. Since the 14-mile route for the tunnel is 40 percent longer than the 10-mile Express Lanes, we upped this by 40 percent and then escalated it by our annual 3 percent inflation factor from 2006 through 2057. (This analysis did not take into account that trucks would pay a higher rate than cars, so to some extent it underestimates the total revenue.) Following the same NPV procedure used for the other tunnel projects, we find that the NPV of net revenue in the base year of 2018 is $4.2 billion, which is 59 percent of the project cost in 2018. Thus, the project could cover the majority of its costs, but would not be self-supporting unless demand became strong enough to support higher toll rates than those we have assumed. With the toll level assumed, the balance of the project funding would need to come from traditional highway funding sources.

e) Seismic Issues for Toll Tunnels

Understandably, proposals for large, long vehicular tunnels in California are greeted with skepticism in some quarters over the issue of seismic safety. This is not a new issue to civil engineers or to experts in seismic safety.

This issue arose during the 1960s in the San Francisco Bay Area when the BART heavy rail system was being designed, much of it in tunnels (including the nearly four-mile long tunnel beneath the Bay). It was considered again in the 1970s when Los Angeles first began studying what became the Red Line subway system. On January 9, 1978, the earthquake sciences and engineering firm Lindvall, Richter & Associates sent a letter to the chief engineer of the Southern California Rapid Transit District (predecessor of the LACMTA) on possible earthquake hazards to the then-proposed 15-mile starter line subway. The section of this five-page letter dealing with tunnels is worth quoting in detail:

> *We can state at the outset that deep tunnels are safer from damage during an earthquake than structures at or near the surface of the ground. Elevated transit structures could be the most hazardous because of the possibility of the trains falling off a column-supported guideway subjected to strong shaking.*
>
> *The reason a deep tunnel is safer during earthquake shaking is that the tunnel is surrounded by a medium that is moving and moves along with it. At the ground surface, a ground/air interface exists and the shaking is more violent. Also, seismic surface waves are active, but they attenuate and deamplify with depth.*
>
> *In a recent study of "Damage to Rock Tunnels from Earthquake Shaking" by Dowding and Rozen (1978, in press, ASCE Geotechnical Division Journal), the authors studied 41 tunnels where damage occurred and concluded that "tunnels are less susceptible to damage from shaking than aboveground structures at the same intensity level." Kanai and others in Japan*

came to a similar conclusion in their paper "Comparative Studies of Earthquake Motions on the Ground and Underground" (Bulletin, Earthquake Research Institute [Tokyo], 1966).

In Richter's book, Elementary Seismology, *a similar phenomenon is reported from people in a deep cave when an earthquake struck; those in the cave were not aware of the quake while others at the ground surface were concerned for their safety.*

Another example is found in the 1973 NOAA report on the San Fernando earthquake of 1971 (Vol. III, p.214). At the time of the earthquake, the San Fernando Tunnel of the Metropolitan Water District was being excavated. The earthquake caused the ground to warp up seven feet in a region including the tunnel. However, the rails in the tunnel were not sufficiently distorted to cause a derailment, and the miners drove the locomotive out from the tunnel working area, a distance of three miles. Three other tunnels in the epicentral region did not suffer damage: the SP Railroad Tunnel (built in 1876), the L.A. City Aqueduct Tunnel (built in 1913), and the MWD Newhall Tunnel (built in 1968).[54]

We also note that neither the BART tunnel beneath San Francisco Bay nor the Los Angeles Red Line tunnel suffered any significant damage in, respectively, the Loma Prieta Quake of 1987 or the Northridge quake of 1994.

Thus, California's experience with bored tunnels of the kind proposed in this study has been positive with respect to seismic safety.

2. HOT Networks

High Occupancy Toll (HOT) lanes are limited-access "managed" lanes reserved for vehicles paying a toll and those meeting certain high-occupancy criteria. The HOT lanes are "managed" by using variable toll rates to maintain free-flowing traffic at all times, even during peak hours. Since variable pricing can produce greater vehicle throughput than on congested general-purpose lanes during rush hours, HOT lane projects are now operating or in the planning stages in about a dozen metro areas, including Atlanta, Denver, Dallas, Houston, Miami, Minneapolis/St. Paul, Orlando, Salt Lake City, San Antonio, San Francisco Bay Area, and Washington, DC.

A HOT Network is developed by connecting a set of HOT lanes encompassing all or a major portion of a metro area's freeway system. It would begin with the conversion of existing HOV lanes to HOT lanes and be expanded by building additional lanes and adding flyover connectors at freeway interchanges. Emergency vehicles, buses, and pre-authorized vanpools would use the lanes at no charge; in the version of the concept recommended by Reason, all other vehicles would pay the market-based toll. Prices would vary so as to limit the number of vehicles per lane per hour to the maximum consistent with free flow. Tolling would be all-electronic, with every vehicle required to have a transponder and a toll account. Enforcement would be via video imaging of license plates of vehicles either lacking a transponder, having an insufficient account balance, or whose accounts had expired.

From the financial viability perspective, a series of past Reason studies found that HOT Networks can come close to being self-supporting, especially in cases where the system can make use of a large base of already built HOV lanes. Compared with other large-scale urban transportation improvement projects, the cost of HOT Network development tends to be lower because it can partially use existing highway HOV lanes. And most of the funding for HOT Networks would come from voluntary payments by HOT lanes customers, supplemented by conventional highway and transit funds, as needed.

A previous Reason study identified and analyzed costs and benefits for the potential HOT Networks in the 19 most congested metro areas in US by using current engineering cost data and the demand data from California's two operational HOT lanes.[55] Those calculations suggest that 72 percent of the $98 billion total cost to construct 19 HOT networks in the nation could be recovered from toll-paying customers. The 28 percent balance could come from the federal and state transportation programs. In comparison with traditional highway and mass transit programs, for which the federal government picks up 50 to 80 percent of the capital costs, this proposed HOT Networks program could be seen as quite a bargain for federal government support.

The concept of HOT Networks is gaining popularity because they would be valuable to many groups of travelers. Transit riders would benefit because many cities that could not afford to build a large-scale rail system would be able to implement effective region-wide express bus service, using the Network as the virtual equivalent of an exclusive busway.[56] Individual motorists would benefit by having the option of faster and more reliable travel on a network of congestion-free lanes when saving time is really of importance to them. Users of regular lanes would gain because regular lanes would become less congested as some motorists switched to the toll lanes. And, importantly, HOT Networks could be built without the need for major new public funds by utilizing the revenue stream from toll charges paid by individual motorists.

In California, there are two successful HOT lane projects, the I-15 corridor in San Diego, and the 91 Express Lanes in Orange County. Both have been in operation for many years and have demonstrated the success of the HOT lane concept. Surveys in California also show widespread public acceptance of the HOT lane concept. The merit embedded in the HOT Network strategy itself along with the general public support has encouraged local government agencies in California to consider implementing this idea on a larger scale on their freeway systems. In San Diego, SANDAG and CalTrans plan to expand the I-15 HOT lane project, quintupling its size from two lanes and eight miles (16 lane-miles) to four lanes and 20 miles (80 lane-miles). SANDAG also plans to add HOT lanes to three other freeways: I-5 and I-805 and SR 52. Approved in February 2005, the San Francisco Bay Area's MPO included a $3 billion HOT Network in its long-range transportation plan. In the following, we will build on the 2003 and 2005 Reason studies and use the same basic methodology to analyze the feasibility of the HOT Networks in California's three major metropolitan areas: Los Angeles, San Diego and San Francisco.

a) Greater Los Angeles HOT Network

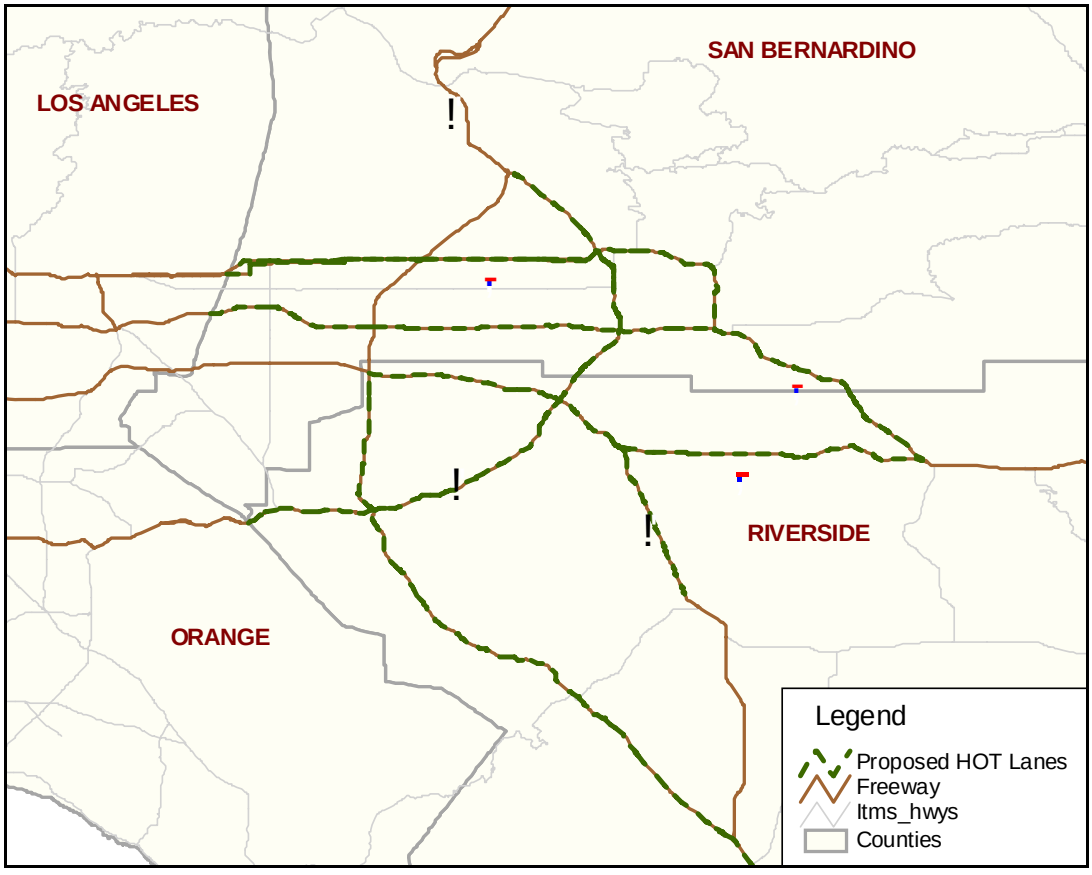
Los Angeles/Orange County has the greatest intensity of traffic congestion and the most extensive set of HOV facilities in the nation. These existing HOV facilities and the pioneer 91 Express Lanes project suggest that a HOT network in greater Los Angeles could be a socially acceptable and economically efficient way to reduce congestion. In the current long-range transportation plan, the constrained version proposes to fill in a small portion of the HOV system's missing links, focusing primarily on the addition of interchange connectors in Orange County. The unconstrained LRTP adds many more missing links and connectors, but even that plan still leaves a number of freeways without HOV lanes and over a dozen connectors unbuilt. Reason's proposed HOT Network would include all planned (constrained plus unconstrained) additions, as well as the additional links needed to complete the system as a seamless network on all but a few outlying freeways. This network would build on the extensive (624 lane-mile) system of HOV lanes already in place, and add new lanes on key links that today lack such lanes, in particular all of US 101 and SR 60 and SR 22, much of I-10 and I-605, and portions of I-5 and I-405. We also propose to add HOT lanes on the Orange County toll roads (SR 73, SR 241, and SR 261). We estimate that 231 of the new lane-miles would have to be built as elevated sections, due to land-use constraints. Another major expense would be adding 93 flyover connectors. The completed system would include 1,009 lane-miles and 93 interchange connector quadrants. Figure 7 shows the HOT network suggested by this study for Los Angeles/Orange County area.

Figure 7: Los Angeles HOT Network

b) Riverside/San Bernardino HOT Network

This fast-growing region, called the Inland Empire, is just to the east of Los Angeles and Orange Counties. It is linked to them by I-10, SR 30 (an extension of I-210), SR 60, and SR 91, all east-west freeways. Like the rest of this region, it already has extensive HOV facilities totaling 90 lane-miles. Because two key freeways in this region (SR 60 as far as I-15 and I-15 from there northward) are planned by the MPO to have toll truck lanes, and it would be difficult to include both HOT lanes and truck lanes on the same freeway, we have excluded those two segments from the planned network. It therefore includes I-10 from the Los Angeles County line to Calimesa on the east, SR 30 from the county line to its termination at I-10, SR 60 from I-15 eastward to Gilmore Springs, I-15 from Temecula to I-10, SR 91 from the Orange County line to SR 60, and I-215 from I-15 on the north to Perris on the south. The network totals 410 lane-miles, of which 69 would be elevated. The HOT network plan is shown in the following map.

Figure 8: HOT Network in Riverside / San Bernardino



c) San Francisco Bay Area HOT Network

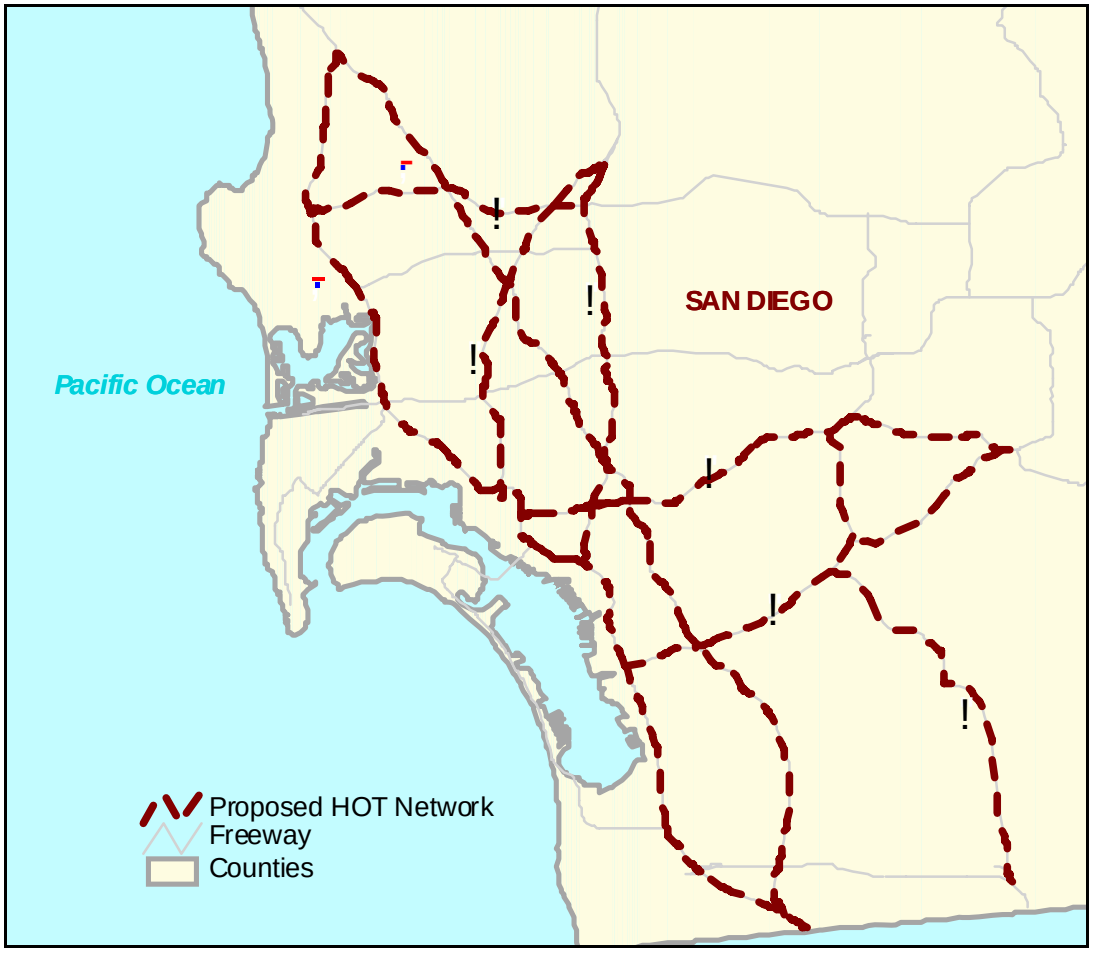
The Bay Area has the country's second-largest HOV system, with 285 lane-miles in service as of 2003. Based on the Regional Transportation Plans for Bay Area, Reason has suggested adding HOT lanes on the freeways including major portions of US 101, SR 24, I-880 and I-580, and portions of I-680. Elevated lanes would be needed for 58 lane-miles, primarily on US 101 and I-880. As noted previously, the Metropolitan Transportation Commission's 2030 plan, adopted in February 2005, calls for a $3 billion HOT Network that encompasses some but not all of what is proposed here. Figure 9 depicts the completed 630 lane-miles HOT network in Bay Area.

Figure 9: HOT Network in San Francisco

d) San Diego HOT Network

Although it has only 26 lane-miles of existing HOV, San Diego's MPO is already committed to the managed lanes concept, with one eight-mile stretch of 2-lane HOV on I-15 converted to a HOT lane and plans to expand that facility as well as create larger ones on three other freeways. Our proposed network builds on those plans to create a network of 447 lane-miles, of which 21 would be elevated. The principal north-south corridors would be I-15, I-5, I-805, SR 163, and SR 125, with east-west links on SR 52, SR 54, and SR 94.

Figure 10: HOT Network in San Diego



e) HOT Network Cost and Revenue Analysis

HOT Network Cost Estimation

We used Reason's most recent study to get cost figures for the four main components of a HOT network in California, which are the costs of:

- Constructing new lanes at grade, per lane-mile
- Constructing new elevated lanes, per lane-mile
- Constructing flyover connectors, per interchange quadrant
- Conversion of the system to electronic tolling (gantries, transponders, video equipment, etc.)

To estimate these four cost numbers, Reason's study first used the Engineering News Record Construction Cost Index to adjust the urban freeway lane addition cost figure of 8.256 million (1997) per lane-mile (at grade) provided by the most recent FHWA Highway Economic Requirements System (HERS)[57] to $9.265 million (2002), which is national level average urban freeway construction cost. Reason's study then used data from R. S. Means Company[58] to develop a construction cost index for each state, and used this index value to derive construction costs for each state. Drawing from Reason's work,[59] unit costs for three main components of a HOT network in California are $11.32 million per lane-mile for at-grade lanes, $30.6 million per lane-mile for elevated lanes, and $48.9 million for flyover connectors, respectively. For the cost of electronic tolling equipment, Reason's study used national cost figure $0.12 million per lane-mile.

Using the unit-cost figures for California HOT network construction and the design features of each proposed network from the previous section, we estimate the capital cost for each HOT network in major metropolitan areas, as shown in Table 4.

Table 4: HOT Network Capital Costs

HOT Network Component	Greater Los Angeles	San Bernardino / Riverside	San Francisco / San Jose	San Diego
Existing HOV Lane-Miles	624	90	285	26
New Lane-Miles, At-Grade	154	251	240	400
New Lane-Miles, Elevated	231	69	58	21
Total Lane-Miles	1,009	410	583	447
New Connector Quadrants	93	17	32	21
HOV-HOT Conversion (million)	$121	$49	$70	$54
At-Grade Construction (million)	$1,740	$2,836	$2,712	$4,520
Elevated Construction (million)	$7,069	$2,111	$1,775	$643
Connector Construction (million)	$4,548	$831	$1,565	$1,027
Total Cost (million)	$13,478	$5,828	$6,122	$6,243
Grand Total Cost in California (million)	$31,670			

Source: Ted Balaker and Robert Poole Jr., *Design and Evaluation of Nationwide Deployment of Urban Area HOT Networks* (Los Angeles: Reason Foundation, March 2005), p 10.

HOT Network Revenue Estimation

Estimating the revenues from a HOT Network requires three important pieces of information: peak-period toll rate, peak-period hours and the number of HOT lane users. Actual data from the I-15 and SR-91 HOT lanes turned out to be the best sources to derive the toll rate and peak-period hours in the four major metropolitan areas. For the 91 Express Lanes, the peak-period, peak-direction toll averages 40 cents per mile; for the I-15 Express Lanes, it averages 30 cents per mile. The number of peak hours per weekday was drawn from the MPOs' latest long-range transportation plan or estimated where not available. These figures represent the HOT lane service conditions in Greater Los Angeles area and San Diego Metropolitan Area. Congestion intensity from Texas Transportation Institute data is then used to estimate the average toll rates and peak-period hours in Riverside / San Bernardino area and San Francisco area.

To estimate the number of vehicles in HOT lanes, we took free-flow capacity of a single freeway lane (1,700 vehicles/lane/hour), and assumed that HOT lanes would accommodate 100 transit or van-pool vehicles per lane per hour. Taking out these 100 super-high-occupancy vehicles which have free access to HOT lanes, would leave 1,600 paying vehicles per lane per hour, during peak hours, in the peak direction. For two-way HOT-lane facilities, we assumed lower tolls (one-half the peak-direction level) and an average of 1,100 paying vehicles per lane per hour. Thus, on a two-way facility, during peak hours the average flow over the two lanes will be 1,350 vehicles/lane/hour in non-peak direction.

An estimated $25.8 billion (81.4 percent) of the four HOT networks' cost could be financed based on expected toll revenues.

Peak-hour toll rate, the number of peak hours, and the number of paying vehicles during peak-period can give us daily peak-period revenue. We then converted this daily peak revenue to an annual figure by multiplying it by 250 weekdays. But the total toll revenue estimation also needs off-peak revenue since HOT toll lanes would operate all day long and there is demand to use them at all times. The information from the 91 Express Lanes indicates that about 20 to 25 percent of annual HOT revenue comes from off-peak operations. We then used the average percent (22.5) to estimate off-peak revenue. Peak plus off-peak gives us total annual revenue. Taking out the maintenance and operation cost which is estimated to be 10 percent of the annual gross revenue, we can derive annual net revenue produced by each network. This is the amount available to pay for the capital costs via toll revenue financing.

A 2005 Reason study on these HOT networks estimated the bonding capacity of each project. It concluded that these HOT Networks could support bond issues equal to 15 times the year-10 revenue produced by such a network. Table 5 summarizes all of the information above.

Table 5: Estimated HOT Network Revenues and Bonding Capacity				
HOT Network Component	**Greater Los Angeles**	**San Bernardino / Riverside**	**San Francisco / San Jose**	**San Diego**
Vehicles/lane/hour	1,350	1,350	1,350	1,350
Average peak toll ($)	0.30	0.25	0.27	0.23
Peak hours/day	7	7	6	6
Lane miles	1,009	410	583	447
Peak revenue/day ($)	$2,860,515	$968,625	$1,275,021	$814,658
Peak revenue/year ($)	$715,128,750	$242,156,250	$318,755,250	$203,664,375
Off-peak revenue ($)	$207,387,338	$70,225,313	$92,439,023	$59,062,669
Total revenue/year ($)	$922,516,088	$312,381,563	$411,194,273	$262,727,044
Net revenue/year ($)	$830,264,479	$281,143,406	$370,074,845	$236,454,339
Size of bond issue ($)	$12,453,967,181	$4,217,151,094	$5,551,122,679	$3,546,815,091
Cost of Network ($)	$13,478,000,000	$5,828,000,000	$6,122,000,000	$6,243,000,000
Percent Covered by Revenue Bonds	92%	72%	91%	57%

Source: Ted Balaker and Robert Poole Jr., *Design and Evaluation of Nationwide Deployment of Urban Area HOT Networks* (Los Angeles: Reason Foundation, March 2005),

On an aggregate basis, these four HOT networks would cost $31.7 billion to construct. Reason's estimation is that $25.8 billion (81.4 percent) of this cost could be financed based on expected toll revenues.

3. Toll Truckways

a) Toll Truckways and Freight Productivity

The Toll Truckway is a relatively new transportation management idea. There are currently no dedicated truck toll lanes in operation in the United States or Europe.[60] However, several studies, including past studies done by the Reason Foundation, have concluded that toll truckways can greatly improve freight productivity.

The first major source of productivity increase comes from enhanced accessibility that can be provided to double- and triple-trailer rigs (known as longer combination vehicles or LCVs) by toll truckways. LCVs are important devices to improve commercial transportation productivity due to the increase of cargo-carrying capacity of 30 to 100 percent per driver, fewer truck trips and lower costs per ton compared with a regular tractor-semitrailer (18-wheeler). However, under a 1991 federal freeze, LCVs are not allowed to operate on interstate or state routes in most states, including California. The LCV routes existing in the United States today are disconnected and fragmented. Toll truckways proposed by previous studies could be a way to add specialized heavy-duty truck lanes and connect LCV routes into a national network.

The second major source of improved productivity can arise from the management of traffic flow in the truckway. Trucks are the most important freight carrier and one of the major highway

customers in the United States. Nationally, trucks carried 74 percent or $6.2 trillion of the total value of freight shipments according to 2002 Commodity Freight Survey data.[61] In terms of utilizing the highway system by freight flows, the volume of freight moved on the U.S. transportation system has grown dramatically over the past few decades. And vehicle miles traveled (VMT) by truck grew by 80 percent over the 20 years from 1980 to 2000, while roadway construction increased lane-miles by only 4 percent. Truck VMT has grown even faster than automobile VMT since 1994, and has been projected to grow faster than total VMT through 2020, with 3 percent vs. 2.5 percent annual growth rates respectively.[62]

Due to growing truck traffic on the highway system, congestion has become a serious problem for freight transportation. In 2001, the Interstate highway system had over 5,400 route-miles in urban areas, and 1,800 route-miles in rural areas operating at severely congested or moderately congested conditions.[63] About 46 percent of the National Highway System routes are projected to be at or over capacity by 2020.[64] By charging variable tolls on the designated truck lanes, some truckers will be discouraged from traveling at the busiest times, which in turn promotes highway travel conditions with more free flow and fewer accidents. A toll truckway can have an hourly capacity of about 800 trucks/lane/hour as long as free flow is maintained. And with a speed up to 75 mph for long doubles, trucking productivity per tractor-driver could be increased as much as threefold, compared with regular tractor-semitrailers in unmanaged mixed lanes at average speeds in the 35 to 40 mph range.

By charging variable tolls on the designated truck lanes, some truckers will be discouraged from traveling at the busiest times, which in turn promotes highway travel conditions with more free flow and fewer accidents.

The following table from a previous Reason study illustrates basic productivity-gain information for an urban toll truckway. The study used current Los Angeles data sources and a series of assumptions to estimate trucking revenue and distribution of the net profit, etc. Several assumptions listed in the table are necessary for estimation, they are:

1. 100-mile delivery freight rates;
2. Average speed on the road (38 mph on mixed freeway, and 60 mph on toll truckway), and driving hours (6 hours);
3. Variable costs per shift;
4. A three-way split of the surplus from truckway operations

From Reason's estimation, we can see that freight transportation productivity could be dramatically increased by using LCVs on urban toll truckway, with $1,237 and $1,979 extra earnings for triple-short and double-long trucks respectively.

Table 6: Toll Truckway Productivity						
	Mixed freeway	**Mixed freeway**	**Truckway**	**Truckway**	**Truckway**	**Truckway**
	Semi-trailer	double-shorts	Semi trailer	double-short	triple-short	double-long
Payload	45,000 lbs	45,000 lbs	45,000 lbs	45,000 lbs	67,500 lbs	90,000 lbs
metric tons	20t	20t	20t	20t	30t	40t
100 mile delivery - 2004 freight rates	$500	$500	$500	$500	$750	$1,000
Average speed on the road	38mph	38mph	60mph	60mph	60mph	60mph
Miles driven in 8-hr shift (6 hrs driving)	228 miles	228 miles	360 miles	360 miles	360 miles	360 miles
Revenue from 6 hrs payload at 2004 rates	$1,140	$1,140	$1,800	$1,800	$2,700	$3,600
Variable costs	$684	$684	$684	$684	$1,007	$1,165
Available for overhead, profits, tolls	$456	$456	$1,116	$1,116	$1,693	$2,435
Extra earnings from using truckway/shift/day			$660	$660	$1,237	$1,979
Drop assumption of no change in freight rates						
Assume the extra productivity split 3 ways			3x$220	3x$220	3x$412	3x$660
Shipper's savings on 100 mile delivery, %			$61 12.2%	$61 12.2%	$76 15.2%	$91 18.3%
Additional for trucker overhead & profit/day			$220 43%	$220 43%	$412 90%	$660 145%
Truck tollway - possible toll per mile			61c/mile	61c/mile	$1.15/mile	$1.83/mile

Source: Robert Poole Jr., et al., *Easing California's Transportation Crisis with Tolls and Public Private Partnerships,* Policy Study no 324, (Los Angeles: Reason Foundation, January 2005), p22.

b) Basic Characteristics of Toll Truckway Facility Operations

The truckway would have the following features:

1. Two lanes each way (2x2) of 14 ft. each;
2. Fully separated from regular lanes with concrete barriers (minimum 42" high) to contain accidents;[65]
3. Its own access/egress ramps (no trucks crossing regular lanes) at selected interchanges;
4. Dedicated spur connections to major facilities such as ports and airports;
5. Wired for ITS services including in-cab signs, automatic lane-keeping, intelligent cruise control, dynamic dispatching, in-vehicle navigation, etc.
6. Tolls to be collected by transponder only (no on-site cash transactions);

7. Variable toll rates for management of traffic;
8. Guaranteed free-flow conditions or "your money back";
9. Adjacent make-up/break-down yards and truck parking at key interchanges;
10. Engineered for heavier axle weights;
11. Generally located inside the existing Interstate right of way, either elevated, depressed, or with widening as determined best segment by segment or on separate alignment;
12. Walls to contain sound and provide wind protection for trucks;
13. Truck tow services provided;
14. Full monitoring by sensors and pan/tilt/zoom cameras and full-time dispatching of help.

c) Potential Toll Truckway Projects in California

California has been the largest origination as well as destination state in terms of truck freight shipments by value. In year 2002, it generated or attracted $626 billion outbound and $618 billion inbound truck freight flows. And the percentage of total freight value handled by truck in California is about 73 percent.[66] According to CalTrans' most recent forecast, truck VMT in California is expected to increase 71.1 percent between 2005 and 2030, which is more than 10 percent higher than the overall VMT increase rate (62 percent).[67]

California already has several major metropolitan areas ranked among the nation's ten most congested places, including Los Angeles, San Francisco, San Diego, and Sacramento. Urban freeway systems in California have been operating at or beyond capacity, and growing truck traffic would make the congested travel conditions even worse and would seriously affect the state economy that is critically dependent on efficient goods movement.

Trucking companies would be willing to pay tolls to gain access to these truckways because the new truck lanes would provide them with large gains in productivity. A nationwide survey done by Reason Foundation in 2002 confirmed that major truck companies were aware of the potential for this infrastructure and even suggested 17 potential truckway corridors based on their knowledge of the most productive routes. Among these 17 routes, four of them cross California. These four potential corridors are the I-5, I-40, I-15 and I-10 freeways. Reason's research team used a series of data screens to derive revenue-potential scores and cost scores, which were then used to rank the most promising toll truckway corridors nationwide. For California, I-5 and I-15 have higher potential revenue/cost ratios and tend to be more attractive corridors than other candidates.

In a 2005 study, Reason Foundation proposed that the following toll truckway corridors be considered in California:

- Los Angeles Ports-to-San Bernardino Truckway;
- San Bernardino to Nevada border Truckway;
- Oakland-Valleys Truckway, from I-880 to I-5;

- I-5 (urban) Truckway from I-710 to the Kern County line;
- I-5 (rural) Truckway from L.A./Kern County line to I-80 at Sacramento;
- I-680/SR 84 Truckway branch to I-580;
- SR 125/I-15 Truckway from Mexican border to Inland Empire, taking Otay Mesa border truck traffic; and
- I-80 Truckway from Sacramento to Nevada line.

In California, Southern California Associations of Governments (SCAG) has also realized that the development of a regional system of user-supported, dedicated truckways would offer a viable and self-financing way to reduce congestion as well as emissions in Southern California. Since 2001, SCAG has studied potential user-supported regional truckways and proposed a 142-center-lane-mile dedicated truck lane which would extend from the San Pedro Bay ports eastward to Barstow and cover a proportion of I-710, SR-60 and I-15.[68] Figures 11 and 12 illustrate the proposed truckways in California.

Figure 11: Proposed Truckways in Southern California

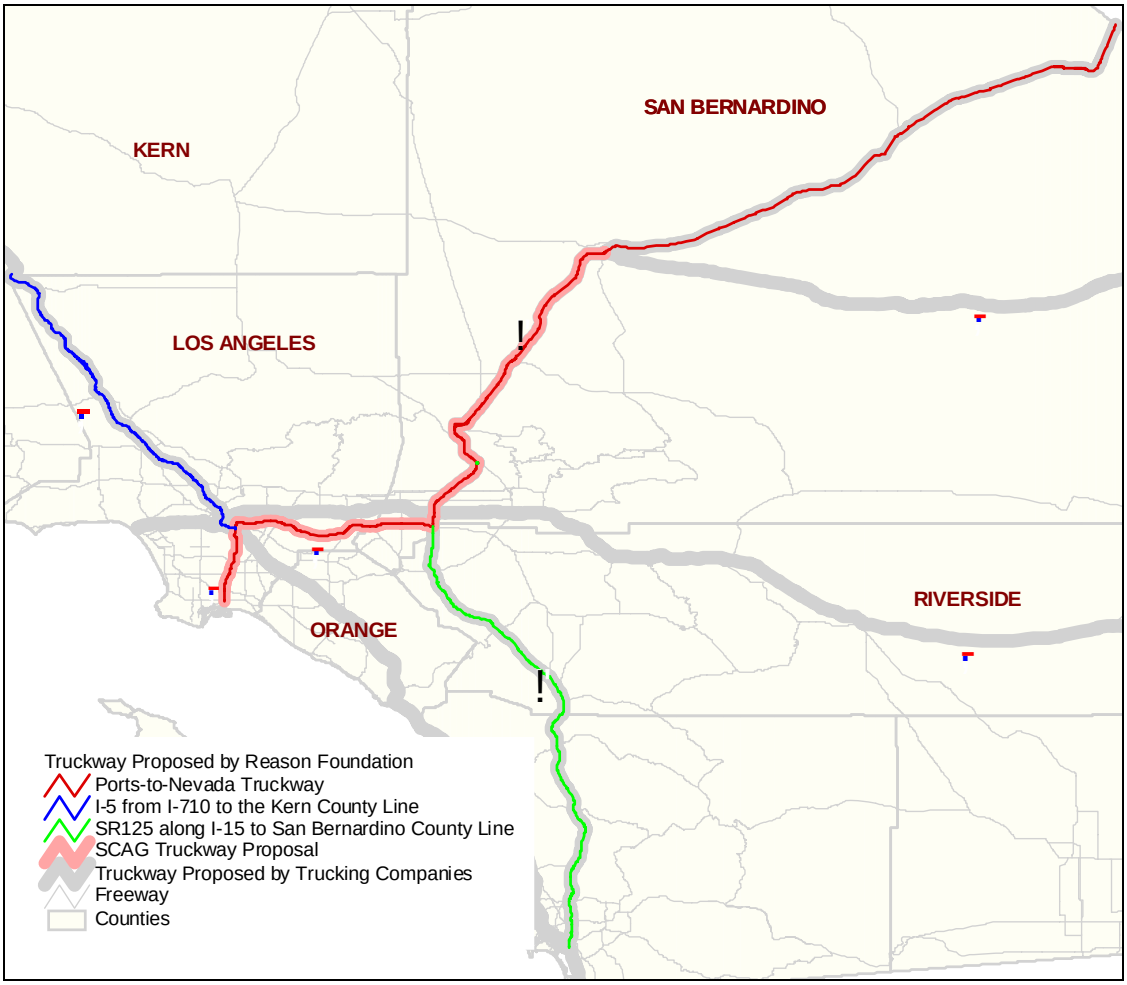
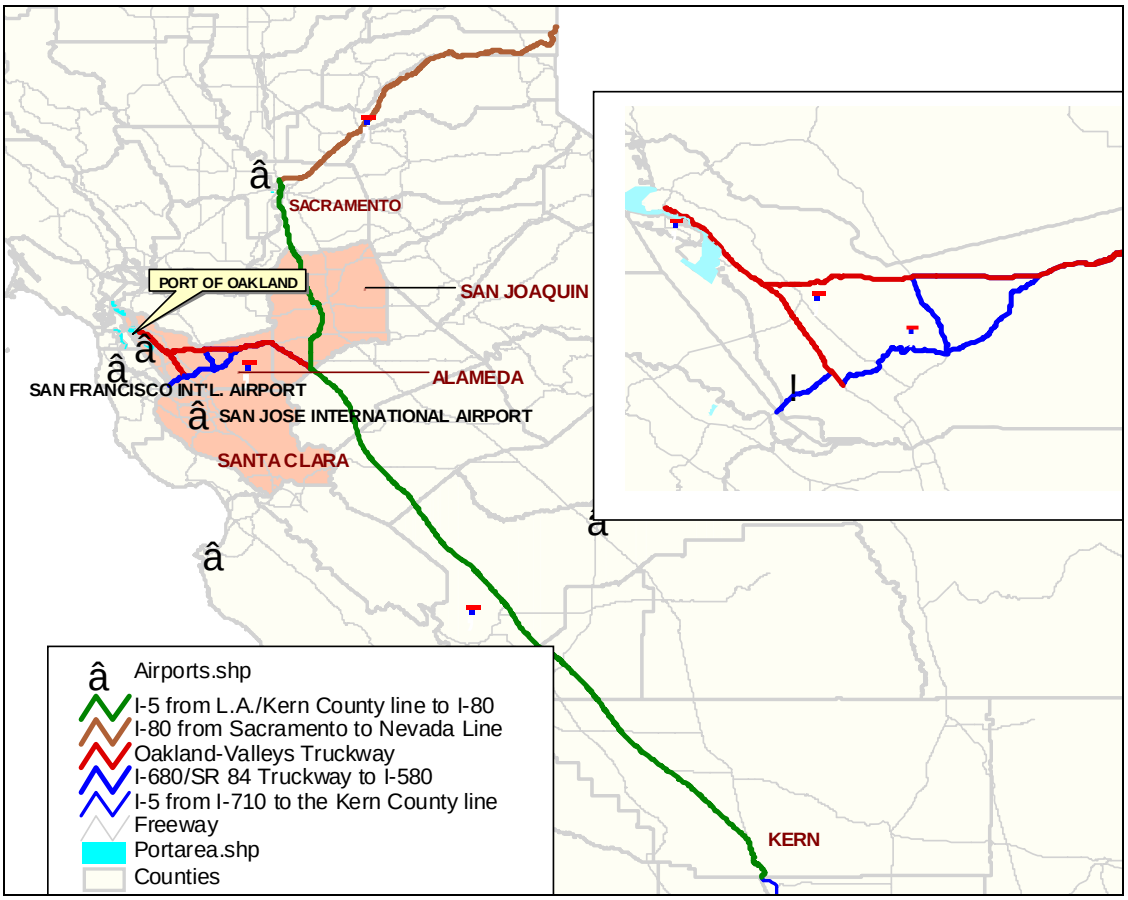


Figure 12: Proposed Truckways in Northern California



d) Financial Feasibility Analysis for Toll Truckways

In previous studies, Reason conducted financial feasibility studies for two truckways: Twin Ports-to-Nevada Truckway (combining the urban and rural truckways) and Oakland-Valleys Truckway. These initial analyses found that both projects could be self-supporting based on their projected toll revenues, and could be financed on that basis.

Twin Ports to Nevada Truckway

To meet future transportation demand, SCAG has been studying truck lanes and full truckways along I-710, SR-60 and I-15. It found that a toll of 56 cents per mile on trucks could "totally fund the development and operation" of a $16.5 billion system extending 142 miles between the seaports and Barstow on I-15. SCAG modeling is based on an average of 2,466 million truck-miles traveled annually, which generates toll revenues of $1,250 million per year averaged over 30 years.[69]

Like SCAG's truckway, our proposal would involve similar 2x2 lanes within the greater Los Angeles urban area, but this configuration would end on I-15 near the I-215 interchange north of San Bernardino. This urban truckway segment would be 73 miles long and include 292 lane-miles. By using SCAG's cost estimation of $27.5 million per lane-mile[70] (2004 dollars) and 3 percent inflation adjustment, it would have a capital cost of $8.52 billion in 2006 dollars.

We propose that the truckway be extended (in a reduced form) all the way to the Nevada state line (see Figure 11), so that LCVs could run continuously between the Los Angeles ports and Salt Lake City and beyond in the Rocky Mountain states (LCVs can operate legally on interstate routes in Nevada, Utah and 11 other western states). From I-215 in San Bernardino north and east to the Nevada border is a rural segment of I-15 with much lower truck volumes. We propose that the rural truckway could be one lane per direction with periodic passing sections. As the truckway from San Bernardino to the Nevada line is about 172.5 miles long with an average of 2.2 lanes (the 0.2 there accounting for the passing sections of 2-lanes per direction), it would have 380 lane-miles in total. The cost of this rural segment of the truckway would be much lower than urban segment, at approximately $5 million/lane-mile (2004 dollars), and the total cost for the rural truckway would be around $2.0 billion.

We also considered make-up/break-up facilities for LCVs, which are essential to facilitate efficient operations by long doubles and triples without encroaching on other roads. Make-up/break-up facilities are located at "nodes" to provide services for truck parking and related truck-stop activities. Over time, they could become profit centers in their own right. In the urban segment, we propose that the initial nodes would be located at East Los Angeles (I-5), El Monte (I-605), Ontario, and San Bernardino (I-15). At a nominal $100 million each (2004 dollars), this would increase the capital cost of the urban segment to $8.94 billion in 2006 dollars. The rural segment would need only two initial nodes, at Barstow (I-40, SR 58) and Victorville (US 395, SR 18). Being in smaller towns, they were costed at $50 million each (2004 dollars), which increases the capital cost of the rural segment to $2.1 billion in 2006 dollars.

To estimate the toll revenue generated by using truckway services, several assumptions are needed. It is assumed that truck traffic in the corridors would increase at 3 percent per year. The urban portion of the truckway (ports to San Bernardino) would initially capture 10 percent of truck traffic on the adjacent freeways, growing to 50 percent by the end of a 10-year ramp-up period during which a growing fraction of trucking companies would equip for LCV operations. An average toll rate (averaged over all types of trucks) was assumed to be $1.00/mile (2004 dollars), escalated at our assumed inflation rate of 3 percent per year to the starting year of 2012 and adjusted annually thereafter to keep pace with the inflation rate. The urban segment of a Twin Ports-Nevada Truckway was estimated to generate net present toll revenue of $16.7 billion (2010 dollars) over the 40-year period. Compared with an adjusted (2010) capital cost of $10.1 billion, toll revenue would have enough capacity to support urban segment of this truckway.

For the rural segment, it was assumed that truckway would again attract 10 percent of the much smaller truck traffic in the I-15 long-haul corridor, growing to 60 percent after 10 years and

beyond. The toll rate was set up lower than the urban segment toll rate, at $0.40/mile (2004 dollars) due to the economy of the scale from long-haul trucking transportation. The net present value of its net toll revenues is $5.5 billion (2010 dollars), compared with an adjusted (2010) capital cost of $2.4 billion. Like the urban segment truckway, this rural part of truckway could also be self-supporting.

Oakland-Valleys Truckway

The Oakland-Valleys Truckway would link three key freight areas, namely, the West Bay area, Silicon Valley, and the Central Valley, through a truck-only toll facility. The West Bay area hosts one major port, the Port of Oakland, and two international airports, which are San Francisco Airport and Portland International Airport. As the third largest seaport in California, the Port of Oakland handled more outbound freight than inbound freight, thanks to the largest originator of outbound freight in Santa Clara County—a prominent high technology center, and a growing warehouse and freight distribution center in the San Joaquin Valley, along with the largest inter-county and intra-county freight corridor in Alameda County (see Figure 12).

Because of this spatial distribution of the industrial activities in the Bay Area, I-880 and I-580 become the major freight corridors to connect the ports, Alameda County and Santa Clara County, and connect the Central Valley to the Bay Area respectively. We specify a T-shaped truckway alignment. It would extend the length of I-880 in Alameda County from near its northern end at the Port of Oakland, terminating near the SR 237 interchange in Milpitas, just a couple of miles inside Santa Clara County. It would also have a spur from I-880 at San Lorenzo in the West Bay eastward into the Central Valley terminating at I-5 near Tracy (see Figure 12). The eastern spur would follow a short stretch of SR 238, then I-580, and I-205 to I-5. The I-880 segment is 35.4 miles long and the SR 238/I-580/I-205 spur is 45.8 miles, for a total of 81.2 miles. Common trips would be Port of Oakland to Tracy near I-5 (58 miles), Port of Oakland to Milpitas (35 miles), and Milpitas to I-5 at Tracy (69 miles).[71] The route was chosen by examining stretches of highway with present truck traffic consistently over 10,000 trucks per day based on CalTrans data for 2002.[72]

Like its southern California counterpart, this truckway would permit the use of double and triple-trailer (or container) LCVs. Hence, a crucial aspect of the truckway concept is the provision of nodes along it. Access and egress would be limited to nodes, which would consist of access and egress ramps, truck yards for parking, and make-up/breakdown space for the LCVs that would not be permitted to operate off the truckway. Nodes in the truckway would be at about six points initially along I-880 and at four points on the I-580 spur. Make-up/break-down yards at these nodes would be simple parking lots where longer combination vehicle (LCV) rigs would add a second long trailer on entering the facility, or drop off the second trailer on leaving.

The Oakland-Valleys truckway would consist of 325 lane-miles. If we take SCAG's truckway construction cost of $27.5 million per lane-mile (2004 dollars), total capital investment in the truckway would be $9.48 billion (in 2006 dollars). And if we assume the toll truckway allows $20 million for its investment in each node (in 2004 dollars), the 10 nodes would add $212 million for a total capital cost of $9.7 billion.

To estimate the toll revenue, we assumed the combined usage by short, medium, and long-haul trucking could grow to two-thirds of truck traffic in these corridors after a 10-year ramp-up period based on the characteristics of its potential traffic which is primarily medium-distance flow, and the absence of plans to add significant free capacity to these corridors. Like its southern California counterpart, an initial average toll across all types of trucks was set up at $1.00 per mile, adjusted for annual 3 percent inflation to $1.38 by the assumed starting year of 2015. On this basis, the analysis found that the net present value of toll revenues would be $12.4 billion, compared with capital costs of $11.9 billion (both in 2013 dollars, the assumed mid-year of construction). Thus, the project appears to be a break-even proposition if financed solely based on toll revenues. In reality, some degree of financial support from state or federal funding sources would probably be required to make this project financeable.

C. Potential Legal and Policy Changes

Given California's projected growth to 48 million people by 2030, it is becoming increasingly difficult for state and local governmental agencies to maintain—let alone improve—the state's aging infrastructure, including its highways and bridges. Periodically, the legislature focuses on this problem and attempts to identify new funding sources by, for example, encouraging the private sector to shoulder some of the responsibility. In addition, it considers expanding the use of innovative project delivery tools such as design-build. Some of these previous efforts are examined below. In sum, it is fair to say that California took an ambitious (if flawed) first step with AB 680 back in 1989 but then fell well behind other fast-growing states, such as Texas and Virginia, in subsequent years. Its recent attempt at PPP enabling legislation did little to improve the situation.

In 2004, Governor Schwarzenegger reenergized interest in discussing transportation issues through his California Performance Review. California also is having its own Big Dig scandal involving CalTrans' rebuilding of the San Francisco-Oakland Bay Bridge. The multi-billion dollar cost overruns associated with this project are likely to further increase calls for the state to reform its transportation project delivery system and increase the number of financing tools that are available to fund these efforts.

1. The Pioneering but Flawed First Step: AB 680 Private Toll Roads

In 1989, Assembly Bill 680 authorized CalTrans to enter into agreements with private entities for the development, construction and operation of four demonstration transportation projects at private sector expense and without the use of state or federal funds. Four projects were selected from among a number of proposals submitted to CalTrans. Only two of the four projects ultimately went forward; the other two failed due to a lack of financial and community support.

Of the two that went forward under this legislation, the 91 Express Lanes project in Orange County is the only one in operation; the San Diego SR 125 South toll road is now under construction and is expected to open to traffic in 2007.

Because of the negative reaction to the controversy over non-compete clauses, the legislation authorizing OCTA to purchase the Express Lanes also repealed (rather than reforming) AB 680. Hence, California has been left with no enabling legislation for creating new toll roads or toll lanes, converting HOV lanes to HOT lanes, or making use of other forms of public-private partnerships for toll projects.

2. Incomplete Second Step: Fee-Generating Infrastructure under AB 2660

In the mid-1990s, the legislature acknowledged that local governmental agencies such as cities and counties were unable to make necessary improvements to their "deteriorating" infrastructure facilities due to a lack of public funding.[73] It also acknowledged that they must identify new funding sources such as private sector investment capital to make these improvements, and that the failure to do so would reduce the increasing population's "quality of life."[74]

In 1996, the legislature's response to dealing with this funding problem was AB 2660. This legislation gave local governmental agencies the authority to allow private contractors and developers to finance, design, construct, lease, operate, and maintain fee-generating infrastructure facilities. These facilities include, for example, water supply, treatment and distribution, airports, commuter and light rail, and highways and bridges.[75] In addition to leasing these facilities, the governmental agency in its discretion may also decide to transfer ownership of them to the private sector for up to 35 years.[76]

A second innovative aspect of AB 2660 is that it gives the governmental agency the ability to impose user fees and service charges on those persons benefiting from or using such infrastructure facilities. The revenues from these user fees are then dedicated exclusively to payment of the private entity's direct and indirect capital and operating costs associated with the project and a "negotiated reasonable return on investment to the private entity."[77] The statute is silent on what is reasonable, leaving that financing issue for individual public-private partnership agreements to address.

Lastly, rather than waiting for the public sector to act, AB 2660 enables the private sector to submit unsolicited proposals for individual projects or those that are part of a larger project.[78] The responsible governmental authority then decides whether or not it is interested in further discussing the private sector's proposal. If it is, then it may avoid the typical public procurement process—which relies on competitive bidding—and instead use a special bidding process that focuses on "demonstrated competence and qualifications" and that ensures the facility will be operated at "fair and reasonable prices" to the users of the infrastructure facility.[79]

Despite the foregoing, there has been only mixed interest in and use of AB 2660 for eligible fee-generating infrastructure projects in California. The statute to date has been used most successfully to develop water and wastewater facilities, including projects in Arvin, Fillmore, Lathrop, Palm Springs, and Rialto.

In the transportation sector, however, AB 2660 has not been a useful tool because one of its provisions prohibits its use on projects involving toll roads on state highways which are otherwise state-financed.[80] If a road or bridge is not part of the state highway system, it is unlikely to have traffic high enough that it would lend itself to toll finance. Recall, for example, that both of the AB 680 privately financed toll road projects (SR 91 and SR 125) are part of the state highway system. To make AB 2660 a truly effective tool, the legislature would therefore have to eliminate these prohibitions.

3. A Timid Third Try: AB 1467

In the spring of 2006, in response to years of pressure from transportation experts, the California legislature passed AB 1467, a third shot at enabling public-private partnerships in transportation in the state. Although this latest legislation corrects several of the flaws from the first pilot program, it fails to take advantage of the experience of states like Texas, Virginia, and Florida, all of which have successfully revised their statutes to encourage private investment.

The improvements in this legislation map well with the recommendations transportation experts have been making in recent years:

- Both CalTrans and local/regional transportation agencies are permitted to initiate projects;
- Unsolicited proposals are permitted;
- There is no limit to the number of years in a long-term concession agreement;
- It provides a realistic approach to the non-compete problem, which permits compensation for demonstrable toll revenue reductions due to projects that were not in the LRTP; and
- Tolling is permitted to continue beyond the end of the lease term.

Unfortunately these improvements are unlikely to have much impact because of the serious flaws included in this legislation.

First, the measure authorizes only four pilot projects (two in the north, two in the south). Pilot programs can be useful, and AB 680 was essential as the first program of its kind in the United States. But today over 20 states have public-private partnership legislation, and many are actively developing projects under that legislation. California is home to the earliest pilot projects of this kind. Public-private partnerships, correctly designed, have been proven across the globe to be an excellent delivery method for transportation infrastructure. While we are still learning, the time for pilot programs has passed.

Second, section one of the legislation prohibits tolls to be charged to non-commercial vehicles with three or fewer axles. This clearly limits the application of this legislation to goods-movement projects such as toll truckways. But since the legislation is silent on the issue of access by all other vehicles (which cannot be tolled), prospective developers can only assume that cars would have unlimited free access to these facilities. Given the extent of congestion on most existing freeways and major highways, cars would surely take advantage of such new capacity, making these new roadways congested, as well. Hence, one of the main advantages of toll truckways—time savings thanks to no congestion—would be wiped out.

Third is the option for legislative veto of individual projects. Within 60 days of the submittal of the negotiated lease agreement, the legislature can veto the project with a majority vote. This essentially means that a private investor who commits millions of dollars and thousands of hours to the development of a proposal for a major transportation facility can lose that investment to a political vote. Other states that are successful in attracting private investment allow the DOT or other responsible agency to make the final project-approval decisions.

4. The Keston Report on Transportation Funding and Finance

In early 2004, the new Secretary of the Business, Transportation and Housing Agency, Sunne Wright McPeak, encouraged local transportation experts to help her brainstorm what steps should be taken to improve the delivery and financing of public infrastructure projects in California. The University of Southern California's Keston Infrastructure Institute responded to this request by convening a panel of transportation finance experts, who came up with a series of specific recommendations in a March 17, 2004 report entitled "Initiatives in Transportation Funding & Finance."

In particular, the Keston report cited Texas as a good example of how one state has created a comprehensive set of new tools to fund major mobility improvements and improve the efficiency of the delivery of such projects. Some highlights of the Texas model singled out by the Keston report include:

- Tolling, to accelerate and help finance a significant portion of new construction;
- Bonding authority, now available to the Texas Transportation Commission;
- The Texas Mobility Fund, a revolving loan fund for transportation; and
- Regional Mobility Authorities, enabling local governments to engage in large-scale transportation projects, using tolling and toll revenue bonds as well as long-term PPPs.

As the Keston report makes clear, transportation reform should be one of California's top priorities given the gap between its limited funding sources and huge investment needs and the negative impact of congestion on the state's economy. The Schwarzenegger administration seemed to agree with this conclusion, as evidenced by its establishment of the California Performance Review, whose final report endorsed wider use of tolling and PPPs.

5. Recommended Legislative Approach

As this study has attempted to demonstrate, California does not currently have the policy tools necessary to finance and develop large-scale improvements to its highway system, on which we will continue to rely for more than 90 percent of passenger transportation and the large majority of all goods movement over the next 30 years. A growing number of other fast-growing states (as well as urban areas in Australia, Britain, Canada, France, and others) have developed effective means of tapping the private capital markets and drawing on the project-delivery skills of the private sector, to make major improvements to their transportation systems. California needs to do likewise.

Most recent legislative efforts to authorize public-private partnerships in California (including AB 1467) focus on modifying California Streets & Highways Code Section 143, the statute established by Assembly Bill 680 in 1989. While it is reasonable to create statutory authorization in this code section, as written, the statute fails to draw upon the best practices developed over the past 17 years in other states. If California is to authorize a true 21st Century authorizing statute in this code section, a complete rewrite will be required.

Moreover, while the authority created in AB 1467 may be severely limited, it seems reasonable to at least offer the opportunity for this statute to be used before it is completely overwritten.

Fortunately, another statute was approved in 1996 through Assembly Bill 2660, Government Code 5956, which may provide an easier avenue to improve access to public-private partnerships without overwriting AB 1467 and not requiring a complete rewrite of law.

AB 2660 authorized the broad use of public-private partnerships in varying local infrastructure, with two notable limitations. First, it did not allow state entities such as CalTrans to utilize this approach to infrastructure. Second, it excluded toll-based transportation projects within the State Highway system from consideration. If a road is not within the State Highway system, it is unlikely to have sufficient traffic levels to be financially feasible as a public-private partnership. In other words, while AB 2660 opened the door to public-private partnerships in other areas of infrastructure such as the development of water and waste-water facilities, it has provided no benefit in tackling the transportation crisis.

Despite its limitations, the law is generally well constructed and can become a potentially valuable tool in addressing California's transportation infrastructure crisis if two minor changes are made to the law:

- Government Code 5956 should be amended to remove the exclusion for toll-funded projects within the State Highway System.
- The authority to enter into public-private partnerships through this statute should be extended to state entities as well (most notably CalTrans).

The amendments to achieve these two needed changes are provided in the Appendix in standard legislative format.

A Cautionary Note

While there may be other areas of the statute that lawmakers may wish to expand upon or clarify, making these two minor changes, as outlined above, will dramatically enhance California's ability to bring privately funded transportation projects to fruition.

Nonetheless, it is important that the final statute, *as approved,* be as permissive and flexible as possible. Lawmakers must resist the urge to offer such level of detail in the statute that project innovation is stifled.

For instance, when AB 680 was crafted, the statute required that qualifying projects be entirely privately financed and that the public sector could not be a financial partner in the projects. While this may have been a well-intended effort to conserve taxpayer resources, it helped create the adversarial relationship that resulted in the 91 Express Lanes controversy. When the public and private sector both hold financial interests in a joint venture, a spirit of collaboration and goals-oriented thinking is far more likely to be achieved.

In summary, California has a tremendous need to tap into private capital to help improve its transportation infrastructure but lacks the necessary tools to do it, even with the recent passage of AB 1467.

The simplest approach to authorizing public-private partnerships would be to amend Government Code 5956 as described above. A second, and more ambitious effort would require the creation of a model 21st Century authorizing statute that overwrites AB 1467 and draws heavily upon the experience of other states. Given the political realities of California and the likely difficulty in extending such broad authority, the most appropriate step would be to simply expand upon what the state already has at its disposal.

Regardless of the option pursued, however, lawmakers must be mindful to not stifle innovation by passing an overly restrictive measure.

California remains in a pitched battle for economic competitiveness with a number of fast-growing states like Texas, Florida and Virginia. To truly succeed in this competition, California lawmakers must be willing to allow the market and existing safeguards to protect the public good and not attempt to do so with well-intended but misguided statutory restrictions.

Part 5

Public Transportation and Proposition 1B

A. Introduction

Many regard mounting congestion as evidence that we cannot continue to drive as much as we do. As Californians spend more time stranded in their cars, it is quite understandable that they would turn to public transit, and by extension to the public transportation funds offered in Proposition 1B, to offer at least some relief. But conventional transit is unlikely to offer much help and Proposition 1B's passage would not change that reality.

Yet public transit does serve an important societal function, especially to the millions of poor and handicapped Californians who rely on it as their sole means of transportation. If Californians were to turn away from Proposition 1B and embrace the proposed reforms listed below, the transit dependent could enjoy vastly improved mobility. A faster, more convenient and more reliable transit system would also likely win over some motorists to unconventional forms of transit. Instead of saddling it with expectations it cannot meet, Californians should adopt a realistic view of what transit can accomplish. Even though public transit may not be equipped to do as much as we might hope for, it can still do more than it does now.

B. Understanding the Transit Component of Proposition 1B

If California voters were to pass Proposition 1B, where would the $4 billion devoted to transit go? First, $400 million would go to improve intercity rail by, for example, purchasing more railcars. The remaining $3.6 billion would be devoted to local transit services. Half would be distributed on the basis of transit revenues (mostly fares and advertising) and half would be distributed on the basis of population. So we can expect that funding will be heavily skewed toward our state's most highly populated areas, especially those where transit use is already highest. Indeed just two regions—San Francisco and Los Angeles—account for more than 80 percent of statewide transit ridership.[81]

To better understand how Proposition 1B might affect transit it may be helpful to give a brief overview of how transit is funded.[82] Transit agencies generate some revenues themselves, mostly through passenger fares. However, the revenue transit agencies generate on their own only covers a small portion of transit's cost. The percentage of total costs covered by the agency itself is called a

"recovery ratio" and the recovery ratios show the extent to which transit is subsidized. For example, a recovery ratio of 30 means that a transit agency covers 30 percent of its costs and subsidies make up the remaining 70 percent. As Table 7 shows, transit agencies typically rely on public subsidies for most of their funding.

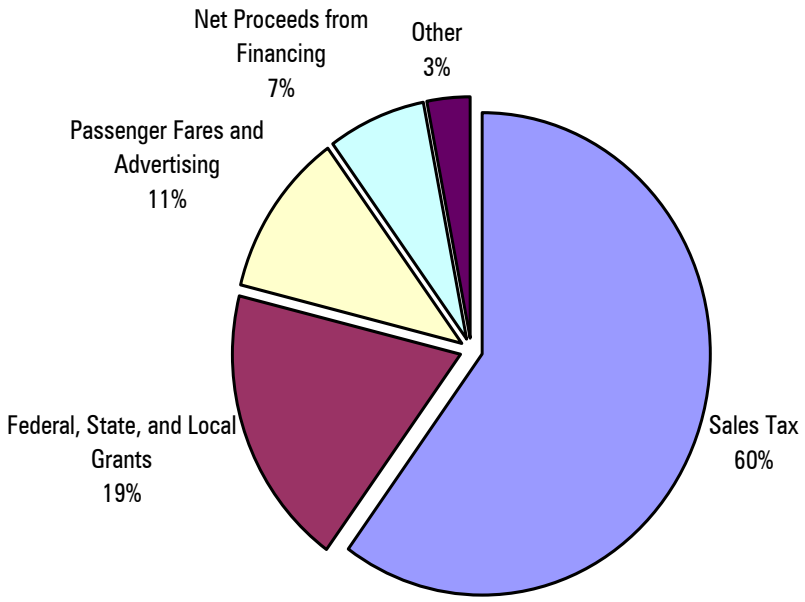
Table 7: How Big is the Subsidy? (Recovery Ratios for Selected Transit Agencies by Mode)

Transit Agency	Mode	Recovery Ratio
Alameda-Contra Costa Transit District (AC Transit)	Bus	20
City of Los Angeles Department of Transportation (LADOT)	Bus	19
City of San Louis Obispo (SLO Transit)	Bus	17
Foothill Transit	Bus	27
Fresno Area Express (FAX)	Bus	27
Long Beach Transit (LBT)	Bus	24
Los Angeles Metropolitan Transportation Authority (LACMTA)	Light Rail	17
Los Angeles Metropolitan Transportation Authority (LACMTA)	Bus	26
Modesto Area Express (MAX)	Bus	26
North San Diego County Transit District (NCTD)	Commuter Rail	38
North San Diego County Transit District (NCTD)	Bus	22
Orange County Transportation Authority	Bus	24
Riverside Transit Agency (RTA)	Bus	18
Sacramento Regional Transit District (Sacramento RT)	Light Rail	22
Sacramento Regional Transit District (Sacramento RT)	Bus	19
San Diego Association of Governments (SANDAG)	Vanpool	71
San Diego Trolley, Inc.	Light Rail	59
San Francisco Bay Area Rapid Transit District (BART)	Heavy Rail	59
San Francisco Municipal Railway (Muni)	Light Rail	20
San Francisco Municipal Railway (Muni)	Bus	25
Santa Clara Valley Transportation Authority (VTA)	Light Rail	10
Santa Clara Valley Transportation Authority (VTA)	Bus	14
Southern California Regional Rail Authority (Metrolink)	Commuter Rail	45
Santa Monica's Big Blue Bus (Big Blue Bus)	Bus	26
Sonoma County Transit	Bus	17

Source: 2004 National Transit Database

Transit subsidies come from a variety of federal, state, and local sources. For example, motorists help pay for transit when they fill up their cars. For each gallon of gas they buy, Californians pay 36.4 cents in fuel tax (18.4 from the federal fuel tax and 18 cents from the state tax). Roughly 16 percent of the federal fuel tax and 7 percent of the state fuel tax go to fund transit.[83] Local funding sources, such as special sales taxes, often comprise a large portion of transit funding. For example, Los Angeles County spent $2.6 billion on transit in 2005. Figure 13 shows where the money came from.

Figure 13: Where L.A.'s Transit Funding Comes From (LACMTA FY 2005)



Source: LACMTA Adopted Budget FY 2007

C. Problems with the Bond's Approach

1. The Funds Offer Extremely Small Gains.

The $4 billion that would go to transit may seem like a huge funding stream, but it offers only a trickle of gains. After the $4 billion is spread across the entire state, the funding any particular city, county, or metropolitan area receives is unlikely to purchase much transportation improvement. Imagine if one lucky transit agency received $1 billion. Even though it represents a huge portion of the available funding, that amount of money actually does not go very far in most transit agencies. For example, $1 billion would purchase only two-thirds of San Francisco's recently completed 9-mile BART extension.

The planning agencies for the state's three largest regions (Los Angeles, San Francisco, and San Diego) develop long-range plans and list projects that they hope to complete with funds they hope will materialize. Table 8 lists some of these projects, further demonstrating the relatively small impact Proposition 1B funding would have. Note that San Francisco plans to devote huge amounts

of money simply to maintaining the transit system it already has. The projects listed in Table 8 are only a small portion of the many billions that each region plans to spend on maintaining its current transit system. Moreover, transportation projects, especially rail transit projects, have a well-documented habit of costing considerably more than initially projected. One extensive analysis pegged the magnitude of rail transit cost escalation at more than 40 percent.[84] So there is good reason to believe that actual project costs will be much more than these initial estimates predict.

The long-range plans for the state's three most populous regions devote about $159 billion to transit over the next couple of decades. In other words, Proposition 1B funds would represent less than 3 percent of that total and if we were to include the billions more that other areas plan to spend, the impact of an extra $4 billion shrinks even more.

Table 8: A Sample of Proposed Transit Projects

Region	Project	Estimated Cost
San Diego	Mission Valley East Light Rail Extension	$450M
	Sorrento Mesa Transitway	$500M
	Oceanside-Escondido Rail	$520M
	MidCoast Light Rail Transit Line	$590M
	Various direct access ramps	$1.1B
Los Angeles-Orange County-Inland Empire	Metrolink Commuter Rail Service Expansion	$464M
	Gold Line Extension (Light Rail)	$595M
	Red Line Extension	$710M
	County-wide Fixed Route, Rail feeder	$1.9B
	County-wide bus system improvement	$2.2B
San Francisco Bay Area	CalTrain downtown extension	$1.5B
	Maintenance for various small transit operators	$2.5B
	AC Transit (Alameda County) maintenance and replacement	$6.8B
	BART (Alameda County) maintenance and replacement	$6.9B
	San Francisco Municipal Railway (Muni) maintenance and replacement	$16.4B

Sources: SANDAG, SCAG, MTC

If passed, Proposition 1B would sink our state deeper in debt and still have very little transit improvement to show for it. Some may regard this as an argument for devoting vastly more money to transit. Yet transit is not being held back by insufficient funding as much as it is by powerful social trends that make it an increasingly unrealistic alternative to auto travel (see Box).

Why Transit Struggles

We should avoid chalking up transit's struggles to the peculiarities of Californians. It is often said that Americans, particularly Californians, have a "love affair" with their cars. Some pundits and journalists go further and suggest that we are "addicted" to the four-wheeled contraptions. Yet Californians are no more addicted to cars than they are to high speed internet access. Both cars and broadband offer better, faster, and more convenient performance than the alternatives. We are not surprised that broadband is gaining ground at the expense of dial-up modems and we should be similarly unsurprised that auto travel has become more prevalent. After all, even with mounting congestion, average highway speeds far surpass average transit speeds and the typical transit commute takes twice as long as the typical car commute.[85] Indeed, driving tends to increase wherever wealth increases. Compared to Americans, Europeans enjoy much greater transit service and endure much higher gas prices, yet their steady increase in wealth is why transit is slipping even there. In Europe transit accounted for 25 percent of travel in 1970 and only 16 percent in 2000.[86] From 1980 to 1995, transit fell by 14 percent in London, 24 percent in Paris, 19 percent in Stockholm, and 60 percent in Frankfurt.[87]

Transit's influence continues to wane mostly because it was designed for a type of society that is increasingly rare, not just in California but in most of the developed world. Transit works best in areas with high population density, where it is easy for travelers to walk to transit stops and make transfers. High concentrations of employment in Central Business Districts also greatly improve transit's chance for success. It was much easier to design transit systems when many workers headed to one centralized location, but today the term "CBD" grows ever more misleading. Centralized employment has given way to multiple employment clusters and housing is also increasingly characterized by such decentralization. Since 1950 more than 90 percent of our nation's population growth has occurred in suburbia.[88]

Policymakers often fail to appreciate just how powerful the trend toward decentralization is.[89] It is not merely a fixture of upstart metropolitan areas like San Jose and Riverside; from Los Angeles to New York it is occurring even in the largest and most densely populated areas. Nor is decentralization uniquely American. It is happening worldwide, in Paris, London, and Tokyo—nearly every major metro in the developed world is decentralizing. It is unrealistic to assume that transit can thrive in the face of such strong societal trends.

2. Public Transit's Impact Is Waning and The Bond Cannot Change That.

The potential impact of the bond decreases more when we consider that it would add a relatively small amount of money to something (transit) that contributes relatively little to transportation. For comparison's sake, consider that nearly the same portion of California workers (4.4 percent) telecommutes as commutes by transit and, unlike transit, telecommuting receives no public subsidy.[90] Moreover, statewide figures can be misleading because transit commuting varies tremendously from one area to the next (see Table 9). For example, 30 percent of workers in San Francisco County commute by transit, far and away the state's top county. Only one other county (Alameda) breaks double-digits and outside the Bay Area only one county (Los Angeles) has a transit commute share greater than 5 percent.

Table 9: Transit Commuting in California
(selected counties ranked by transit commute share)

County	Transit Commute Share	Rank
San Francisco County, CA	29.6	1
Alameda County, CA	12.2	2
Contra Costa County, CA	9.1	3
San Mateo County, CA	8.3	4
Los Angeles County, CA	6.4	5
Monterey County, CA	4.4	6
Orange County, CA	3.4	7
Santa Cruz County, CA	3.3	8
Santa Barbara County, CA	3.1	9
Sacramento County, CA	2.8	10
San Diego County, CA	2.8	10
Santa Clara County, CA	2.6	12
Solano County, CA	2.6	12
Fresno County, CA	1.9	13
Sonoma County, CA	1.9	13
Riverside County, CA	1.5	15
San Bernardino County, CA	1.4	16
Stanislaus County, CA	1.2	17
San Joaquin County, CA	1.1	18
Placer County, CA	1.1	18
Ventura County, CA	1.0	20

Source: 2004 American Community Survey (U.S. Census Bureau)

Yet residents travel without paying much attention to county boundaries and Table 10 reflects this by examining larger metropolitan areas, rather than just individual counties as Table 9 does.

Whether one examines commuting or total travel, Table 10 reveals that automobile travel dwarfs transit, even in areas where transit use is relatively high.

Table 10: How Californians Travel (the state's most populous areas)

Metropolitan Area (2001)	Transit Commute Share (2000)	Personal Vehicle Share of Commute Trips (2000)	Transit's share of Total Travel (2001)	Personal Vehicle Share of Total Travel
San Diego	3.4%	86.9%	1.4%	98.7%
Sacramento	2.7%	88.8%	0.9%	99.2%
Los Angeles	4.7%	87.6%	1.4%	98.7%
San Francisco	9.5%	81%	3.3%	96.8%

U.S. Census, Federal Transit Administration, and Federal Highway Administration data compiled by Wendell Cox Consultancy.

Transit's impact is not just small, it is also decreasing. From 2000 to 2004, the percentage of Californians who commute by transit dropped by 9 percent. Indeed transit commuting has been declining for a very long time and even metropolitan areas with traditionally high transit use have been affected. From 1980 to 2000, transit's commute share shrunk by 8 percent in Los Angeles and by 17 percent in San Francisco.[91] Proposition 1B funding is unlikely to reverse—or even slow—that slide. Consider that, even with planned spending increases that would dwarf 1B, officials still expected transit to make only a relatively small contribution to travel into the foreseeable future.

Let us examine transit's best-case scenario—its contribution to rush hour travel in big cities. It is this combination of time and place where transit's contribution to travel is largest and the reasons are threefold:

1. Compared to rural and suburban areas, big cities have relatively high population densities, which are more supportive of transit since it is easier for travelers to walk to and from transit stops.
2. Compared to rural and suburban areas where employment is dispersed, big cities are more likely to have relatively high concentrations of employment in central business districts. It is easier to design successful transit systems when many people need to travel to the same general destination.
3. Traffic (whether on roads or on rail transit) is greatest during rush hour (weekday mornings and afternoons) because this is when most people travel to work. When we expand our focus beyond the work commute, it is clear that transit's impact decreases considerably. Consider the San Francisco metropolitan area. Although nearly 10 percent of residents get to work by transit, transit accounts for only about 3 percent of overall travel.

Over the next couple decades the MPOs for the state's three largest regions (San Diego, Los Angeles, and San Francisco) plan to make massive investments in transit, investments that would

dwarf what they might receive from Proposition 1B. (Note that these three regions encompass more than a dozen counties.) Even if the MPOs' optimistic assumptions materialize (e.g. funding is actually generated to pay for their proposed projects), in 2030 rush-hour transit commuting would still account for only 10 percent of commuting in San Diego, 7.4 percent in Los Angeles, and 7.3 percent in San Francisco.[92] If transit cannot attract a significant portion of riders in big cities at rush hour, it is highly unlikely that it will have a perceptible impact in far less transit-friendly scenarios, such as during non-peak travel times or in the suburbs where most Californians live.

D. Rethinking Transit in California

If Proposition 1B were passed, the transit component would likely fund more business-as-usual transit projects. Its passage would likely pacify voters and lawmakers as both sides would note approvingly that "something had been done" about transit. Pressure to re-examine how transit should function would wane and that would be one of Proposition 1B's most unfortunate outcomes.

Although transit serves a small and declining share of Californians, it still has an important role to play. For the transit dependent poor and handicapped, it offers the only way to get around. When mobility for the transit dependent is improved their worlds expand. They have more access to jobs, education, child care, and so on. They have more opportunity to pull themselves up the economic ladder. Yet California is also home to many millions of comparatively well-off motorists who suffer in some of our nation's worst traffic congestion. They too demand improved mobility.

Often the transportation funding process seems to pit transit patrons against motorists, but there are ways to please both groups. First, making good on the important goal of improving mobility by cutting traffic congestion would help transit patrons and motorists alike. It is clear to see how motorists would benefit from congestion relief, but transit patrons also have much to gain since buses carry the vast majority of them. For example, between 1997 and 1998, busses accounted for 82 percent of the state's transit trips.[93] Second, lawmakers should pass legislation that allows for greater use of public-private partnerships in highway finance. Doing so would allow a new kind of innovation to emerge, one that allows transit patrons and motorists to travel at the speed limit any time of day or night. That innovation is called VEB.

A VEB (Virtual Exclusive Busway) simply extends the concept of HOT lanes to mass transit.[94] One important reason why bus service is often slow and unreliable is because buses usually have to slog through surface traffic like all the other cars and trucks on the road. This problem disappears when buses are given an exclusive busway. Now they do not have to worry about traffic congestion, and transit agencies can deliver high quality service. But while the congestion problem is fixed with exclusive busways, new problems emerge.

Take cost. It takes a great deal of money to build a separate bus-only facility. Los Angeles's new 14-mile Orange Line cost $330 million and since there is quite a long time between buses, the

pavement goes unused most of the time. Letting perfectly good pavement go to waste is the second problem that arises with exclusive busways. Nowhere outside of New York do more than 60 buses run on a facility in an hour. Sixty buses may seem like a lot, but that is just one bus per minute. If you stood on the side of such a facility and a bus passed by, you would start to get an idea of how much capacity goes to waste. Why not fill up the empty spaces with gridlock-weary motorists? Of course then we would have the same problem we began with—buses would get stuck in traffic. Service would again be slow and unpredictable. That's where pricing comes in.

A VEB sets aside a certain percentage of the roadway capacity for buses and vanpools. Houston is creating the first VEB on the rebuilt Katy Freeway, and officials have devoted up to 25 percent of the space to this purpose. Roughly 1,700 vehicles can pass through a lane each hour at free flow conditions. Even with 60 buses per hour, there is still enough space for 1,600 paying motorists. And because motorists pay a variable toll that goes up and down with the flow of traffic buses are not slowed by congestion. Bus riders and vanpoolers enjoy a fast, predictable trip because they get the virtual equivalent of an exclusive busway.

VEB networks would be a boon to transit users (as well as paying motorists) because they would not have to merge into and out of regular traffic.

Imagine if we were to take the concept a step farther. Instead of having stretches of congestion-free lanes here and there, imagine if the HOT networks we described earlier were VEB networks as well. Such a network would be a boon to transit users (as well as paying motorists) because they would not have to merge into and out of regular traffic. They could travel far and wide and do so quickly and predictably. Moreover, that improvement would come at a relatively modest cost. A 500 lane-mile VEB network in California would cost around $6 billion, much less expensive than a rail network of that size (250 miles each way) which, based on recent experience, would cost more than $30 billion (see Table 11). A VEB network would be even more affordable in practice since most of the capital costs would be covered by drivers who voluntarily pay to avoid congestion.

A VEB network would likely breathe new life into vanpooling, which is perhaps the most cost-effective and energy-efficient transit mode. Operating transit vehicles that are nearly empty wastes money and energy and much of the key to vanpooling's financial and environmental success has to do with its relatively high load factors. In other words, vanpools are much more likely than buses or rail cars to operate at or near capacity.

Table 11: What a Rail Network Might Cost (Current FTA-Supported Light and Heavy Rail Projects)						
Metro Area	**Project**	**Type**	**Route miles**	**Capital Cost ($M)**	**Cost/Mile ($M)**	**250-mi. system cost ($B)**
---Light Rail ---						
Los Angeles	Gold Line	Light	5.9	$899	$152.4	$38.1
San Diego	Mission Valley	Light	5.9	$431	$73.0	$18.3
Denver	T-REX	Light	19.1	$879	$46.0	$11.5
New Jersey	Hudson-Bergen	Light	5.1	$1210	$237.2	$59.3
Portland	MAX	Light	5.8	$350	$60.3	$15.1
Seattle	Sound Transit	Light	13.9	$2440	$175.5	$43.9
Phoenix	East Valley	Light	19.6	$1400	$71.4	$17.9
Charlotte	South Corridor	Light	9.6	$427	$44.5	$11.1
Pittsburgh	North Shore	Light	1.5	$381	$254.0	$63.5
Average		Light			$123.8	$30.95
---Heavy Rail ---						
San Francisco	BART-SFO	Heavy	8.7	$1550	$178.2	$44.5
Chicago	Douglas Branch	Heavy	6.6	$483	$73.2	$18.3
San Juan	Tren Urbano	Heavy	10.7	$2250	$210.3	$52.6
Average		Heavy			$153.9	$38.5

Source: Federal Transit Administration

As Table 7 revealed, revenues generated by transit agencies typically cover perhaps 30 percent of operating costs, but vanpool services frequently cover more than 70 percent of costs. Table 12 shows that some vanpool services in Washington State—a leader in vanpooling—do what is unthinkable in public transit, they break even or turn a profit. Energy efficiency accompanies strong financial performance. According to the 2006 Transportation Energy Data Book list energy intensities (Btu per passenger mile) by mode were as follows: bus transit 4,160; rail transit (light & heavy) 3,228; vanpool 1,401.

Table 12: Vanpooling—Cost-effective Transit (vanpool recovery ratios in Washington State)	
Agency	**Recovery Ratio**
Ben Franklin Transit	89%
C-Tran	94%
Intercity Transit	111%
King County Metro	70%
Kitsap Transit	30%
Pierce Transit	64%
Community Transit	69%
Spokane Transit Authority	77%
Yakima Transit	117%
AVERAGE	80%

Source: National Transit Database 2002

Instead of supporting more business-as-usual transit with Proposition 1B, Californians ought to insist that public officials pursue the next generation of transit, one that offers a good deal for transit users and motorists alike.

E. Alternatives to Proposition 1B for Improving Transit

1. Set a Congestion Reduction Goal

Since the vast majority of transit users are bus riders, reducing congestion would be a boon to public transit. Patrons would enjoy faster, more predictable service and other forms of rubber tire transit, such as vanpooling, would likely grow in popularity. Even as researchers develop a greater appreciation for its many harmful effects, few state and local governments even attempt to reduce traffic congestion. In California, like most of the rest of the nation, most leaders fully expect congestion to get worse in the future. All they hope to do is reduce the rate of congestion's growth.

Texas is probably the most notable exception to the general surrender. Leaders there have agreed upon a timeframe to reduce congestion by half and California should follow their lead. Once a specific congestion reduction goal is set, officials will have a better idea of how to make good on it.

2. Expand Capacity With Innovative Financing And Design.

Californians must discard the misleading "we can't build our way out" mantra. Activists and officials have long argued that our traffic congestion woes are the result of a futile attempt to build our way out of congestion. However, the past few decades cannot be regarded as a refutation of road building because during that time growth in highway capacity came nowhere near matching the growth in driving. From 1970 to 2000, lane miles increased by about 20 percent and driving (vehicle miles traveled) increased by 175 percent.[95] Many assume that building roads only encourages more people to drive, but recent decades have shown that driving increases with or without an increase in capacity.

With the widespread aversion to road building and a swelling population it is hardly surprising that traffic congestion has grown so severe. Many regard LA as the land of endless freeways and roads, but LA actually has the least amount of pavement per person of any comparable urban area.[96] San Diego has the second least and San Francisco the third least.[97] We should not *just* build, but it is clear that building roads does help reduce congestion. Each year the Texas Transportation Institute releases data that shows that the areas that come closest to adding capacity in proportion to population growth do the best job of keeping congestion under control.[98]

3. Manage the Transportation Network More Efficiently.

Building and expanding roads is not the only way to increase capacity. Improving road management can expand capacity without pouring asphalt. Public officials have a host of traffic management tools at their disposal—for example, traffic light synchronization, freeway ramp metering, incident management (i.e. clearing accidents and other traffic disruptions quickly). Even converting busy stretches from two-way to one-way streets can increase capacity rather significantly.

These tools tend to be very cost-effective and most or all are well-known to transportation engineers. Yet they are rarely used as much as they should be and California has plenty of room for improvement:

- In the San Francisco area, only 50 percent of the highway system is equipped with ramp metering and traffic signals are coordinated in only 65 percent of the arterial roadway.
- In Sacramento, only 58 percent of the freeway system is equipped with incident-spotting cameras.
- In San Diego, only 10 percent of the freeway system is equipped with cameras; traffic signals are coordinated in only 66 percent of the arterial system.
- In Los Angeles, 63 percent of the freeway is equipped with cameras.
- In the Riverside-San Bernardino area, traffic signals are coordinated in only 24 percent of the arterial roadway.[99]

4. Shift Funding To Serve The Most Transit Users.

State and local leaders continue to allow spending priorities to be guided by wishful thinking. Although roads will continue to carry the vast majority of travelers, over the next couple decades our state's three largest MPOs have decided to spend most of the $265 billion in expected funding on transit. Meanwhile traffic congestions will grow even more unbearable.

Since the vast majority of transit users are directly affected by it, reducing congestion would improve mobility for bus riders, vanpoolers, as well as motorists.

Policymakers should also focus transit resources on improving bus service, by, for example, increasing service frequency. California has been beset by controversies in which funding priorities favor rail transit at the expense of bus transit, which serves the vast majority of transit users. Although rail transit is politically popular, there is widespread agreement among those who have expertise in cost-benefit analysis that rail transit's costs generally exceed benefits.[100] A recent study by researchers from the Brookings Institution and U.C. Berkeley found that "with the exception of BART in the San Francisco Bay, *every* [U.S. rail] system actually reduces welfare and is unable to become socially desirable even with optimal pricing or physical restructuring of its

network."[101] Instead of devoting so much funding to a mode that carries comparably few transit users, policymakers should focus on the mode that serves the most people.

5. Create Virtual Exclusive Busways.

The VEB concept is not a pie-in-the-sky proposition. It represents a slight tweaking of the HOT lane concept that has shown strong success in Orange County and San Diego and the first VEB project is under construction in Houston. Most HOV facilities have not proven effective at reducing congestion and California's extensive HOV networks offer a great opportunity for transit users and motorists. By converting underperforming HOV lanes to VEBs and by adding the necessary connectors, California's major metropolitan areas could offer transit users and paying motorists a seamless network of congestion-free lanes. VEBs and VEB networks would likely also breathe new life into vanpooling, which is probably our most cost-effective and energy-efficient form of transit.

F. Conclusion

If passed, Proposition 1B would do little more than contribute to our state's indebtedness. The funding would do very little to improve public transit, and—to the extent that it helps perpetuate business-as-usual transit—it would actually make matters worse. If voters and elected officials are left satisfied that "something has been done" about transit, they will be unlikely to support the kind of reforms needed to improve public transit in California.

Although public transit is unlikely to offer the level of impact that many expect of it, its performance can indeed be greatly improved. Developing a transit system that suits today's society would help the transit dependent populations improve their lives and gain new levels of independence. We may also be pleasantly surprised at how underappreciated forms of transit, such as vanpooling, take root. Instead of pitting gridlock weary motorists against transit users, we must realize that each group has much to gain from adopting sensible reform.

Part 6

Conclusions and Recommendations

California is at a crossroads regarding the future of its highway system. The massive growth projected between now and 2030 in both driving and truck movements threatens to paralyze our highways, especially in the major urban regions. Yet the current highway funding system is under such severe stress that it can barely maintain the existing highway assets, let alone develop the kinds of major new projects needed to cope with the growth that is on the way.

The solutions offered by California's leaders are insufficient at best, and would likely foster considerable waste. By issuing general-obligation bonds for highway infrastructure, they discard the sound principle of user-pays and irresponsibly increase the state's indebtedness. Paying almost $40 billion to get at best $10 billion in new infrastructure is absurd policy. Instead, California needs to:

1. **Make better use of existing funds**. Proposition 1B is a pork-laden mess and much less than half the money will go to projects that will relieve congestion. That is typical of the state's transportation spending. With roads carrying most travelers and goods and services, most of transportation funding needs to go to roads. Appropriate investments in transit projects should demand performance, not promises, and shift to systems that suit today's society to help the transit-dependent populations improve their lives and gain new levels of independence.

2. **Give transportation its share of the budget**. Take a responsible look at our bloated budget and make some sensible cuts so that we can allocate a steady amount—about $4-5 billion per year—of the general fund for what is surely one of the most core functions of the state. Some bonding for large infrastructure investments might still be good policy, but we have to have our finances in order first.

3. **Make full use of public-private partnerships for transportation projects**. Allow the many private firms who are eager to invest their own capital to build new toll roads and lanes to do so, so that existing transportation funds can focus on projects the market cannot deliver. Take a lesson from states like Virginia, Massachusetts, and Florida in outsourcing highway maintenance and freeing up gas tax funds to help fund new road projects.

We have seen that other fast-growing states, and world-class urban regions such as Paris, Sydney, and Toronto, have addressed the urban highway infrastructure challenge in creative new ways. They have found that the global capital markets are ready, willing, and able to invest billions of dollars into urban toll roads and tunnels so as to relieve congestion, improve connectivity, and make trips more reliable. They have also found that carefully designed long-term public-private partnerships can get such projects built sooner, and with less of a tendency toward cost overruns, than conventional highway procurement methods. Such mechanisms actually shift many of the risks of mega-projects from taxpayers to investors, who elect to take such risks and are rewarded for doing so.

California was an early pioneer in public-private partnerships for toll roads, with its innovative 1989 pilot program, AB 680. Although that measure made possible two important additions to our urban highway system, its flaws led to its repeal by the legislature in 2002. Unfortunately, it has not been replaced with a more modern measure, leaving California without the tools to attract global capital and world-class project delivery expertise to our highway system. Consequently, that capital and expertise are going to states like Texas and Virginia (as well as other countries) whose laws welcome the role the private sector can play in addressing the need for major highway investments.

California has a lot going for it, if it can just get the policy climate right. It already has an interoperable statewide electronic tolling system, FasTrak. The state is home to many of the leading global companies that design and develop large-scale infrastructure (including AECOM, Bechtel, Fluor, Granite Construction, Jacobs Engineering, etc.). International toll owner-operators such as Cofiroute (91 Express Lanes) and Macquarie (SR 125 South) are already active in the state. The $16 billion annual cost of congestion in its five largest urban areas is a powerful signal of the potential economic gains to be had from meaningful congestion relief. And although tolling is still of modest dimensions in California, agencies such as Alameda Corridor Transportation Agency, Bay Area Toll Authority, Orange County Transportation Authority, and the Transportation Corridor Agencies have a proven track record with billion-dollar revenue bond deals. Moreover, the federal government has provided credit support for ACTA, TCA, and the SR 125 South project and stands willing to offer support for future projects.

Given both the ongoing transportation finance crisis and the need to cope with major growth over the next 25 years, California urgently needs state-of-the-art enabling legislation to mobilize private capital and private sector project delivery expertise. This need has been acknowledged by the Governor's California Performance Review, USC's Keston Institute, and others. Such a measure should permit the use of tolling wherever it is needed to finance major highway improvements in California. And it should empower both CalTrans and other levels of government to carry out such projects on their own authority, without threat of legislative veto, either by themselves or in partnerships with the private sector. The changes to Govt. Code Section 5956 we have suggested will get us most of the way there.

California has the opportunity to reclaim its position as a leader in innovative provision of transportation infrastructure. The bond proposal on the November ballot is meant to look like an ambitious step forward, but in reality it does little to create the fundamental changes that are necessary to keep California growing and prosperous. The projects presented in this paper aren't a comprehensive solution to congestion in California, but combined with institutional change they can have a real impact on mobility.

About the Authors

Ted Balaker is the Jacobs Fellow at Reason Foundation. His research focuses on urban policy, globalization, and workplace issues. He is co-author (with Samuel R. Staley) of *The Road More Traveled,* a book about mobility and congestion, published in September 2006 by Rowman & Littlefield. His recent policy studies include *The Quiet Success: Telecommuting's Impact on Transportation and Beyond, Virtual Exclusive Busways: Improving Urban Transit While Relieving Congestion* (co-author Robert W. Poole, Jr.), and *Offshoring and Public Fear: Assessing the Real Threat to Jobs* (co-author Adrian T. Moore).

Adrian Moore is vice president of research at Reason Foundation. He oversees all of Reason's policy research and conducts his own research on topics including transportation, privatization, and government finance. Mr. Moore is co-author of the book *Curb Rights: A Foundation for Free Enterprise in Urban Transit*, published in 1997 by the Brookings Institution Press, as well as dozens of policy studies. He earned a Ph.D. in Economics from the University of California, Irvine. He holds a Master's in Economics from the University of California, Irvine and a Master's in History from California State University, Chico.

George Passantino is a senior fellow at Reason Foundation. In 2004, Passantino served as a full-time director on Gov. Arnold Schwarzenegger's California Performance Review. Passantino helped lead a thorough, top-to-bottom review of state government that the nonpartisan Legislative Analyst's Office concluded could save California $15 billion over five years.

Passantino has authored frequent studies, white papers, and commentaries on California's need for fundamental economic, legislative, and regulatory reform. His views have appeared in numerous publications, including the *Los Angeles Times*, *Los Angeles Daily News*, *Orange County Register*, *San Diego Union-Tribune*, *San Jose Mercury News*, *San Francisco Chronicle*, and *Investor's Business Daily*. Passantino graduated cum laude with a B.A. in Applied Economics from California State University, Bakersfield.

Robert Poole is director of transportation studies at Reason Foundation. An MIT-trained engineer, he has advised the last four presidential administrations on transportation and policy issues. Poole's 1988 policy paper proposing privately financed toll lanes to relieve congestion directly inspired California's landmark private tollway law (AB 680), which authorized four pilot toll projects including the successful 91 Express Lanes in Orange County. More than 20 other states and the federal government have since enacted similar public-private partnership legislation.

In 1993, Poole oversaw a study that introduced the term HOT (high-occupancy toll) Lanes, a term which has become widely accepted since. California Gov. Pete Wilson appointed Poole to the California's Commission on Transportation Investment and he also served on the CalTrans Privatization Advisory Steering Committee, where he helped oversee the implementation of AB 680. Poole has also served on transportation advisory bodies to the California Air Resources Board and the Southern California Association of Governments, including SCAG's REACH task force on highway pricing measures. He is a member of the Los Angeles Economic Development Corporation's Critical Infrastructure Council, an advisor to the American Legislative Exchange Council's Trade & Transportation Task Force, and a member of the board of the Public-Private Ventures division of American Road and Transportation Builders Association. From 2003 to 2005, he was a member of the Transportation Research Board's special committee on the long-term viability of the fuel tax for highway finance.

Adam Summers is a policy analyst at Reason Foundation. He has written extensively on policy and economic topics. His articles have been published by the *Los Angeles Times*, *San Diego Union-Tribune*, *Orange County Register*, *Los Angeles Daily News*, *Baltimore Sun*, and numerous others. Summers earned an M.A. in Economics from George Mason University and Bachelor of Arts degrees in Economics and Political Science from the University of California, Los Angeles.

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Appendix

Appendix: Recommended Amendments to Government Code 5956

Underlined text is added. ~~Strikethrough text~~ is being deleted.

Amend Govt. Code Section 5956 to read:

5956. State and ~~L~~local governmental agencies have experienced a significant decrease in available tax revenues to fund necessary infrastructure improvements. If ~~local~~ governmental agencies are going to maintain the quality of life that this infrastructure provides, they must find new funding sources. One source of new money is private sector investment capital utilized to design, construct, maintain, rebuild, repair, and operate infrastructure facilities. Unless private sector investment capital becomes available to study, plan, design, construct, develop, finance, maintain, rebuild, improve, repair, or operate, or any combination thereof, fee-producing infrastructure facilities, some ~~local~~ governmental agencies will be unable to replace deteriorating infrastructure. Further, some ~~local~~ governmental agencies will be unable to expand and build new infrastructure facilities to serve the increasing population.

5956.1. It is the intent of the Legislature that ~~local~~ governmental agencies have the necessary authority and flexibility to utilize private investment capital to study, plan, design, construct, develop, finance, maintain, rebuild, improve, repair, or operate, or any combination thereof, fee-producing infrastructure facilities. Without the ability to utilize private sector investment capital to study, plan, design, construct, develop, finance, maintain, rebuild, improve, repair, or operate, or any combination thereof, fee-producing infrastructure facilities, the Legislature finds that some ~~local~~ governmental agencies will not be able to adequately, competently, or satisfactorily retrofit, reconstruct, repair, or replace existing infrastructure and will not be able to adequately, competently, or satisfactorily design and construct new infrastructure.

5956.2. It is the intent of the Legislature that this chapter be construed as creating a new and independent authority for state and local governmental agencies to utilize private sector investment capital to study, plan, design, construct, develop, finance, maintain, rebuild, improve, repair, or operate, or any combination thereof, fee-producing infrastructure facilities. To that end, this authority is intended to supplement and be independent of any existing authority and does not limit, replace, or detract from existing authority. This chapter may be used by state and local governmental entities when they deem it appropriate in the exercise of their discretion. It is the intent of the Legislature that this act create no new governmental entities.

5956.3. (a) For purposes of this chapter, "governmental agency" includes a state agency, state department, or state commission, city, county, city and county, including a chartered city or county, school district, community college district, public district, county board of education, joint powers authority, transportation commission or authority, or any other public or municipal corporation.

(b) For purposes of this chapter, "private entity" includes a person, business entity, combination of persons and business entities, or a combination of business entities.

(c) For purposes of this chapter, "fee-producing infrastructure project" or "fee-producing infrastructure facility" means the operation of the infrastructure project or facility will be paid for by the persons or entities benefited by or utilizing the project or facility.

5956.9. In order to use the authority conferred by this chapter to the maximum extent, a governmental agency may use private infrastructure financing pursuant to this chapter as the exclusive revenue source or as a supplemental revenue source with federal, state, or local funds. The governmental agency involved may be a state, local governmental agency or a combination of governmental agencies. The governmental agency may work cooperatively with the California Infrastructure and Economic Development Board with regard to the design, construction, operation, and financing of privately financed facilities, but the projects will not be subject to the review or approval of that board.

5956.10. Notwithstanding any provision of this chapter, ~~neither the state or any state agency may directly or indirectly use the authority in this chapter,~~ no governmental agency as defined in Section 5956.3, may use the authority in this chapter, to design, construct, finance, or operate a project which ~~a state project. For purposes of this section, a state project~~ includes any of the following:

~~(a)~~ ~~MIXED USE~~ ~~Toll roads on state highways.~~

~~(b)~~ (a)State water projects.

~~(c)~~ (b)State park and recreation projects.

~~(d)~~ (c)State financed projects.

These limitations shall not prohibit ~~the state, any state agency, or~~ any governmental agency as defined in Section 5956.3, from utilizing the authority contained in this chapter to design, construct, finance, or operate a tolled transportation facility that may be outside of, adjacent to or within existing state-highway rights of way. Furthermore, these limitations shall not prohibit ~~the state, any state agency, or~~ any governmental agency as defined in Section 5956.3, from utilizing authorizations contained in other provisions of law.

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