California Statewide Transit Strategic Plan

Draft Recommendations

by

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Preface: About the Statewide Transit Strategic Plan

The Caltrans Division of Mass Transportation engaged researchers at the University of California to assist with research and analysis in support of Caltrans's efforts to develop a Statewide Transit Strategic Plan. This research project (#64A0228) has resulted in four primary deliverables. The first report, released in summer of 2011, "Baselines: Current and Future Transit and Demographic Trends," highlights past, current, and future demographic factors which affect transit service consumption in California. The second report, "One State, Many Visions: Transit Stakeholder Views on Planning for the Future of California's Mobility," provides an assessment of the goals and objectives held by various California transit stakeholders, which we synthesized from a number of in-depth interviews and surveys. In the report, UCLA researchers also identified the breadth and depth of support for various strategies to improve transit in California. The third deliverable, to be completed in June 2012, is a web resource that will help transit planners and other stakeholders identify and pursue cost-effective strategies to improve transit service. This document, a draft of a final executive summary deliverable, is an overview of findings and recommendations for Caltrans based on research and analysis conducted during the multi-year project.

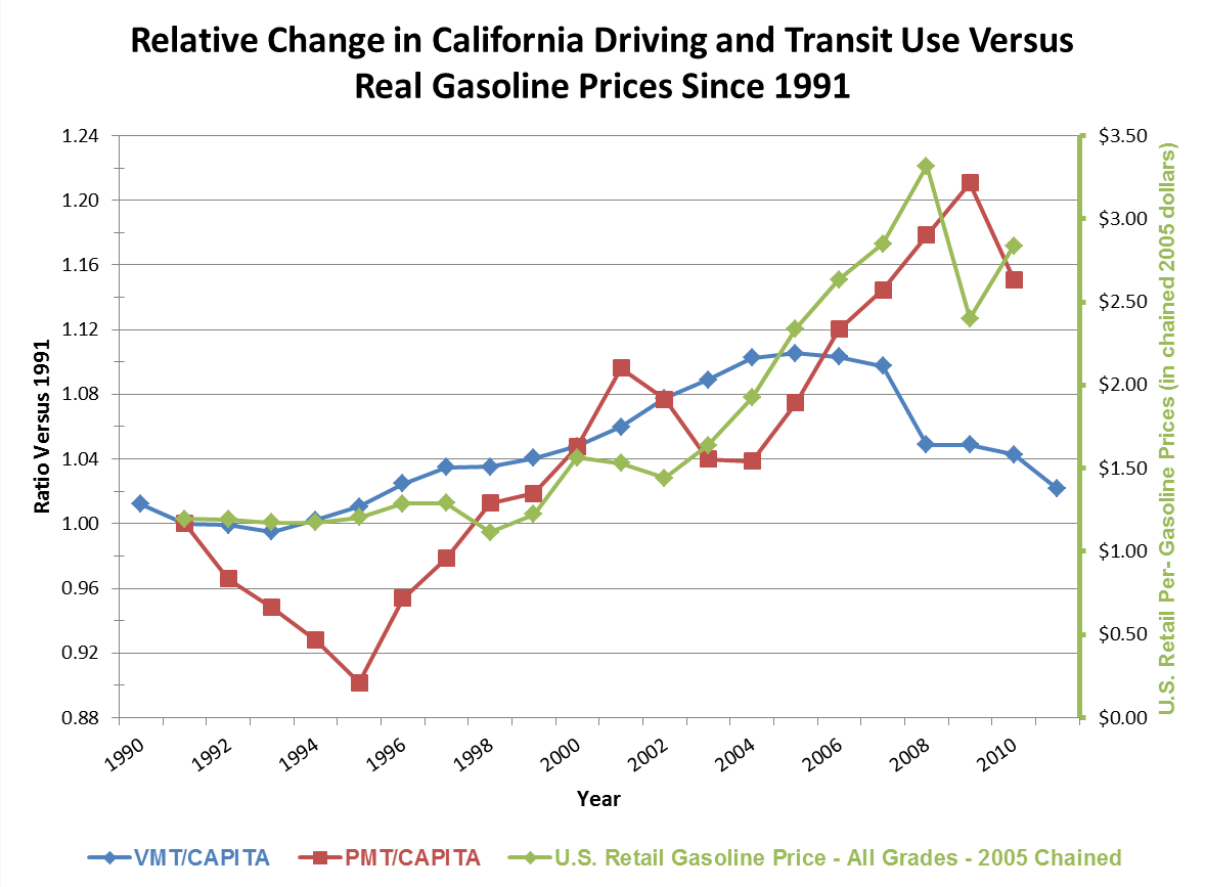
Introduction

In SB 391 (Liu, 2009), the California Legislature found that "[t]he state lacks a comprehensive, statewide, multimodal planning process that details the transportation system needed in the state to meet objectives of mobility and congestion management consistent with the state's greenhouse gas emission limits and air pollution standards." Although SB 391 is the impetus for the California Transportation Plan, it followed other bills that seek greenhouse gas emissions reductions from mode shift to transit. California's Climate Change Scoping Plan pursuant to AB 32 (Pavley, 2006) and the Sustainable Communities Planning Act SB 375 (Steinberg, 2008) identify the critical role transit will play in reducing the state's greenhouse gas emissions. As part of its Sustainable Communities Strategy, the SCAG region expects a 36% increase in total transit and rail boardings by 2035.[1] This is nearly double the 18.5% increase in transit trips the state experienced between 1991 and 2010.

While the need to reduce GHG emissions 25% from 2009 levels by 2020 may have been the impetus for SB 391, the State must grow transit ridership in order to achieve a variety of statewide economic, environmental, and social goals. In SB 391, the Legislature found that "[r]ecent increases in gasoline prices resulted in historic increases in ridership on public transportation, including transit, commuter rail, and intercity rail, and in historic reductions in vehicle miles traveled by private vehicles." Increasing transit use is vital to maintaining a vibrant state economy in the face of volatile fuel prices, while reducing transportation greenhouse gas emissions. Figure [1] below notes the relative change in driving and transit use versus gasoline prices since 1991.

[1] Southern California Association of Governments. *Proposed Final 2012-2035 RTP/SCS*: *Transit Appendix*. 2012

Figure 1: California Trends in Driving and Transit Use



The state is now at a critical juncture in which it must continue transit ridership growth to meet policy mandates and provide Californians with affordable mobility options amidst increasing gasoline prices. At the same time, growing transit ridership in California faces considerable challenges.

While Caltrans Division of Mass Transportation is involved in statewide planning and funding distribution, it has limited influence over the many and various, autonomous transit operators, which are charged with providing cost-effective services to meet both local needs as well as state objectives. Nevertheless, Caltrans DMT is in a unique position to focus on external factors like creating a transit-supportive environment in the state, encouraging collaborative planning, and disseminating best practices throughout the state. This document summarizes the key findings of our research project, with particular attention to the need for transit services in California, the challenges that face both local operators and state planning agencies like Caltrans, and the various operational, programmatic, and business opportunities available to the many stakeholders necessary for addressing the urgency of transportation reform. Our findings are intended to enable Caltrans to better understand the financial challenges of expanding transit service in California; to demonstrate transit's value to California; to identify strategies and

tactics for cost-effective transit investment in California, and to leverage local successes around the state.

The Price of Expanding Transit Service in California

While transit operators across the state have succeeded in growing transit use over the last twenty years, much of those gains have come at increasing costs. In particular, growth has come in large part through expensive capital investments in public transportation infrastructure. The resulting trend has been one in which attracting additional "choice" riders has become increasingly expensive and financially unsustainable. While investments in subways, light rail, and other capital-intensive projects will continue to play an important role, the state will need to deploy additional cost-effective means to increase transit ridership in support of the state's goal of boosting ridership and reducing carbon emissions from the transportation sector. Fortunately, California's transit operators have served as a veritable proving ground for many cost-effective transit enhancements.

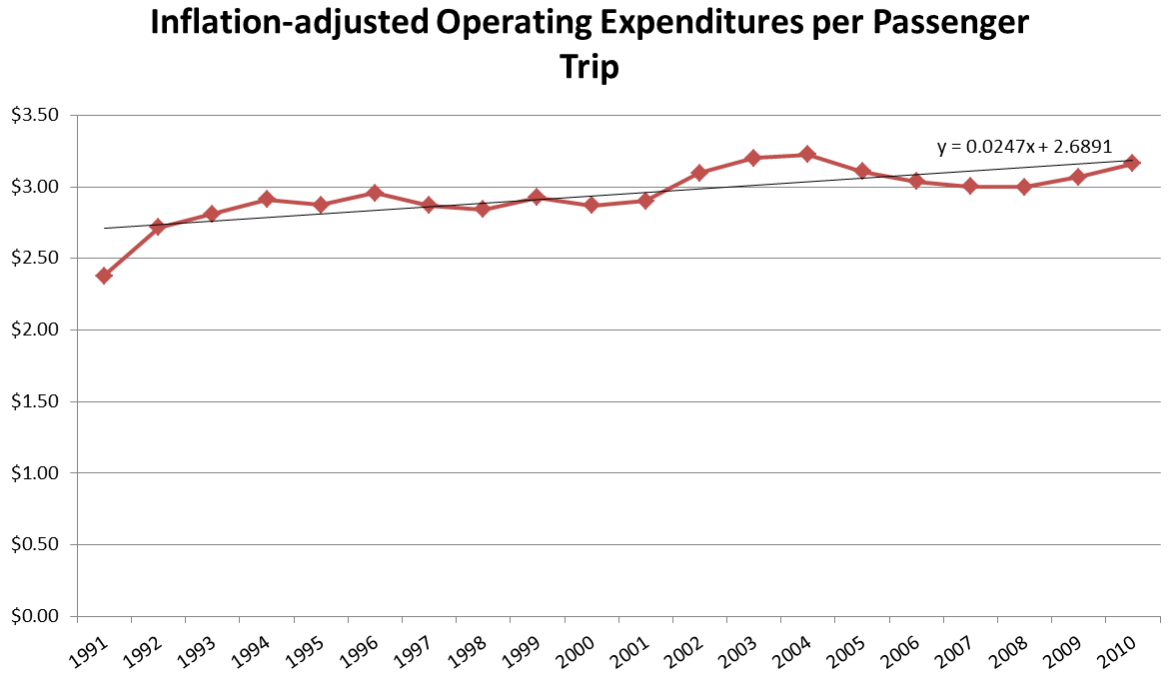
Despite various attempts to alleviate their financial problems, transit operators have experienced a repeated history of fiscal instability since the early 1900s. In the early 20th century, private companies throughout the country provided most transit services. In the proceeding fifty years, private transit operators experienced a series of financial setbacks that undermined their ability to cover costs and make capital improvements. Ridership dwindled as housing and employment suburbanized and auto ownership proliferated, leaving private transit operators with less revenue to spend on years of neglected repairs. Suburbanization did not just affect private transit providers; despite years of investment, entire downtown business districts suffered as jobs and housing shifted out of urban areas. Efforts to attract new riders were stymied by contentious labor disputes, which limited transit systems' ability to raise fares to compensate for ridership losses and to replace outdated and failing equipment. To reduce costs, private transit operators transitioned from streetcars to buses, whose lower capital costs created immediate financial benefit but long term operating and maintenance expenses. In the longer run, transit operators were left in no better financial condition.

Facing bankruptcy and years of neglected capital investments, a coalition of downtown business and advocates and private transit systems from across the country turned to the federal government for financial relief. A series of federal legislative efforts, including the Urban Mass Transit Act of 1964 and National Mass Transit Act of 1974 provided funding to update fleets, modernize facilities, and subsidize operations. Despite the influx of federal funding, ridership continued to drop - reaching an all-time low in 1972 (Hess). Federal subsidy favored capital-intensive projects, often to suburban destinations that lacked the ridership base to support the high cost of operating service. In a trend that continued into the early 1990s, rapidly increasing operating costs and continued ridership losses created more financial problems for transit systems.

Throughout the past 20 years, California transit agencies' inflation-adjusted operating costs per trip have steadily increased. This has primarily been due to an increase in trip lengths, as passenger miles traveled per unlinked passenger trip have steadily increased while inflation-

adjusted operating expenses per passenger mile have decreased slightly as fuel prices have increased.

Figure 2: Cost per trip in California



Note: Inflation adjustment using BEA Table 1.5.4 - Price Indexes for GDP (State & Local Consumption Expenditure)

Figure 3: Distance per Transit Trip in California

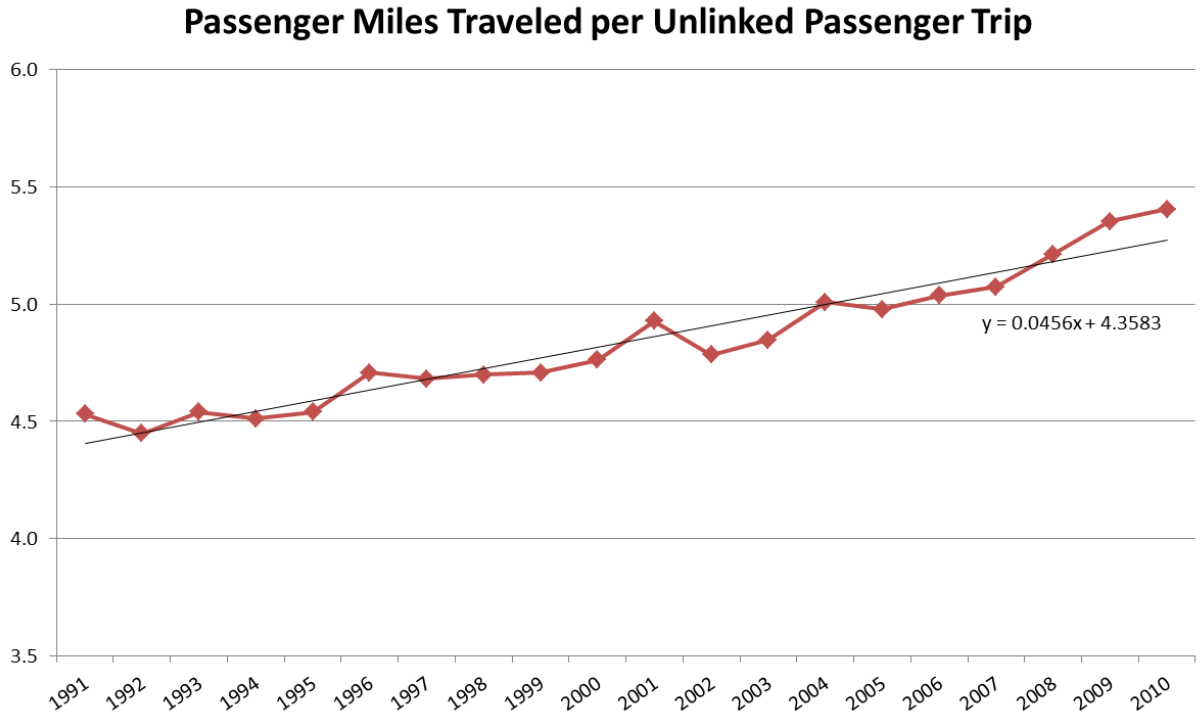
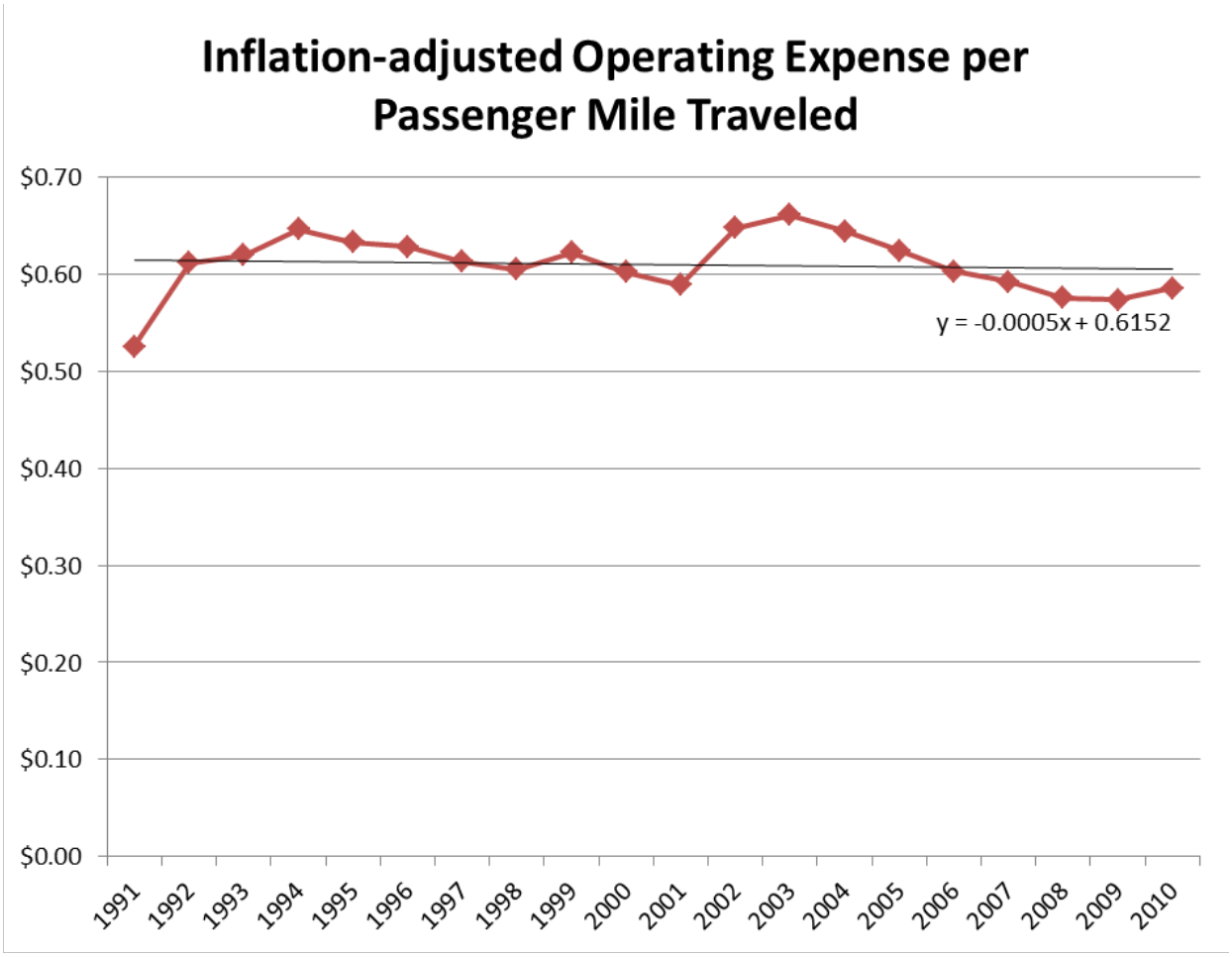


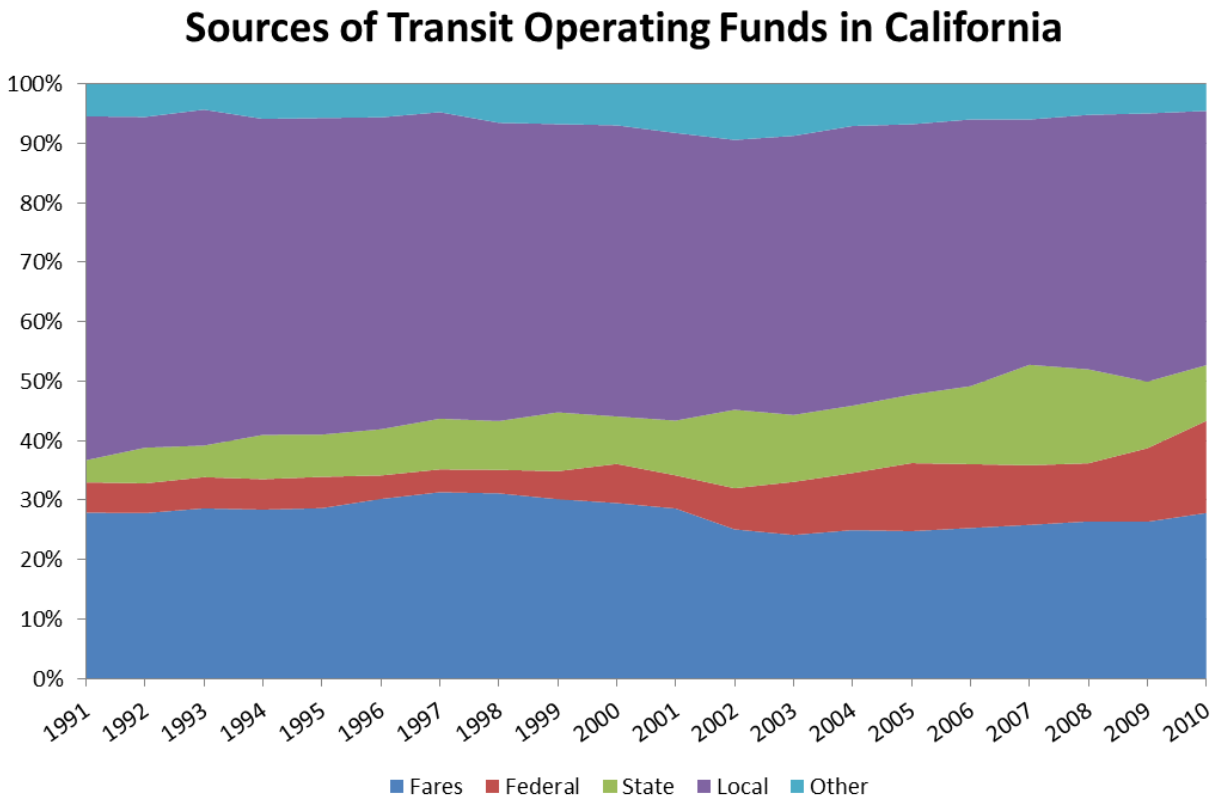
Figure 4: Cost per Transit Passenger Mile Traveled in California



Note: Inflation adjustment using BEA Table 1.5.4 - Price Indexes for GDP (State & Local Consumption Expenditure)

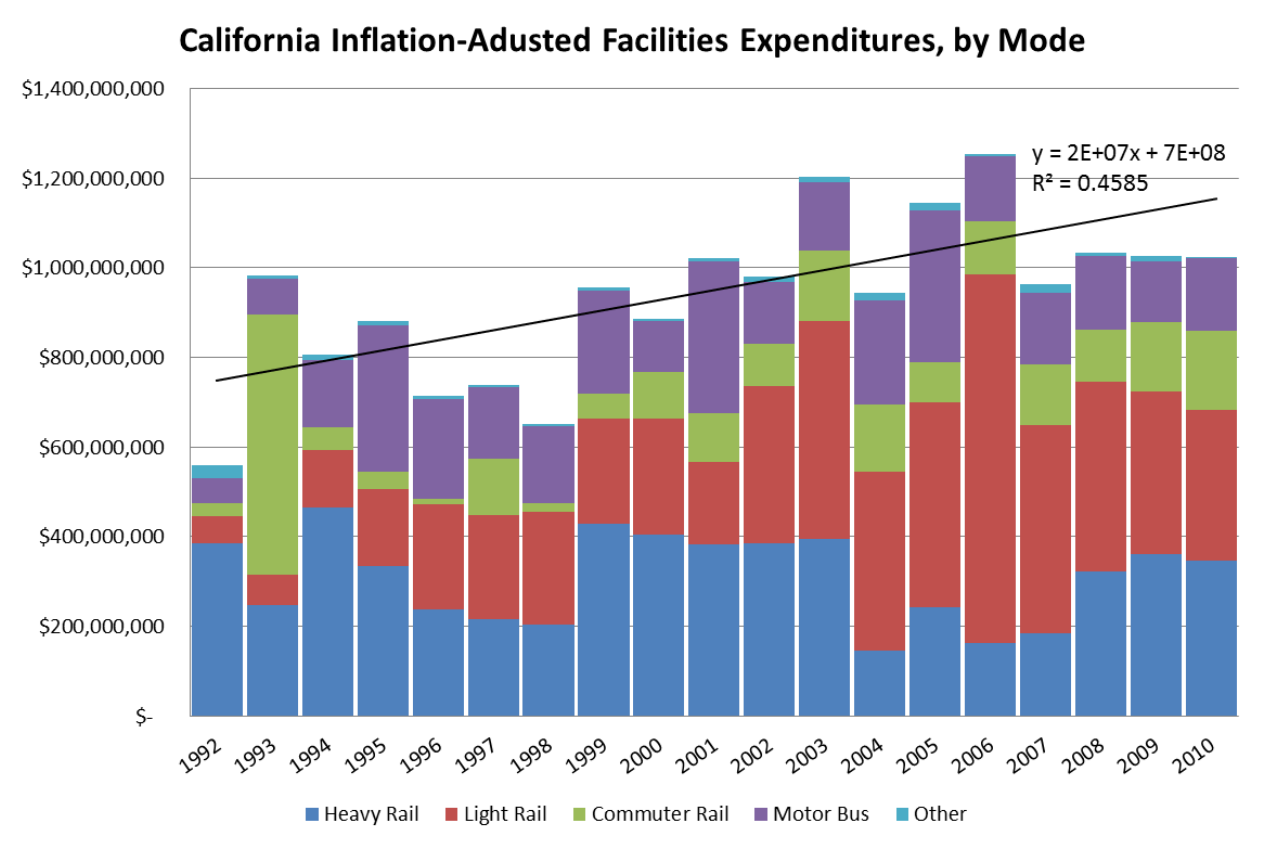
Even if operators stave off an increase in operating costs per passenger trip, they will still require additional operating subsidies from state, local, and federal sources to serve the additional ridership operators hope to attract. Figure 5 below shows that fare revenues have made up only 20-30% of operating funds in California, with the balance of funding requirements coming from other sources.

Figure 5: Sources of Operating Funds, 1991-2010



While inflation-adjusted operating costs per passenger mile traveled have largely remained steady in the past 20 years, inflation-adjusted capital costs in California have increased by an average of $20,000,000 per year as operators introduce new rail services.

Figure 6: Facility Capital Expenses, by Mode



Note: Expenditures are higher in 1993 because of startup costs for Coaster, Caltrain, and Metrolink. Inflation adjustment using BEA Table 1.5.4 - Price Indexes for GDP (State & Local Gross Investment)

Many agencies have invested in rail extensions into suburban areas. While these rail investments have attracted new riders to the transit system, they have done so at a high cost, especially due to the large investments in capital that are often necessary. Trips made on suburban rail extensions tend to be of longer distances, with lower ridership at the ends of routes. Thus, these routes often require a higher operating subsidy per passenger mile traveled than urban bus or rail service. Future capital and operating subsidies needed to build and operate these extensions may be limited by local and state funding constraints. Even when funds do exist, the multi-year lag between identifying a transit need and opening a new rail facility may mean that the benefits of a project will not be realized before 2020.

With the State Legislative Analyst's Office forecasting continued general fund deficits, it is unlikely that operators can rely on the state to increase discretionary spending for operating or capital funds in the next five years.[2] Given the state's fiscal constraints, transit agencies have limited options available to grow ridership:

1. Lobby for new sources of state and federal funds

[2] California's Fiscal Outlook. Available at: http://www.lao.ca.gov/reports/2011/bud/fiscal_outlook/fiscal_outlook_2011.pdf

2. Expand revenues from existing sources of local funds
3. Develop new sources of local funds
4. Reduce the costs of attracting new riders
5. Increase the cost-effectiveness of existing operations

This Executive Summary will discuss each of these, but will focus primarily on topics four and five because growth of transit ridership must be both (1) **cost-effective** given current resource constraints and the need to expand operating subsidies to meet increases in ridership, and (2) **easy to implement immediately** in order to meet 2020 GHG goals.

Inventory Transit's Critical Role for the Future of California

Government at all levels asks a lot of transit. Local governments seek congestion reduction and local employment. The state wants transit to pave the way to environmental sustainability, though both mode shift and by reducing the environmental impacts of transit vehicles themselves. Federal objectives include equal access to jobs, disabled access to transit vehicles, and support for domestic manufacturing jobs. Sometimes, especially during tense budget negotiations, it may be difficult for policymakers to keep track of all that transit is asked to accomplish, let alone balance goals that sometimes conflict. A thorough inventory of these policy goals and legal mandates can help communicate transit's value to California. Table 1 below provides a basis from which Caltrans can expand in the future.

Table 1: Transit's Value to California

Environmental	Economic	Social
• SB 375 - transit is an integral part of a region's Sustainable Communities Strategy to reduce per capita GHG emissions from transportation by 2020 and 2035. • AB 32 - GHG reduction • ARB's Fleet Rule for transit vehicles • Transit provides service base which triggers CEQA streamlining, density bonuses etc., including SB 226 • Increases in density, increased demand for land-use mix by transit users who seek to capture rips within walk-shed of a station • Shorter trips by all travelers due to increase in density	• Congestion reduction • Access to employment • Transit service availability provides alternative to constructing costly subterranean and structured parking in economically vibrant urban areas • Increases nearby land values due to improvements in accessibility and mobility	• Social safety-net for individuals who cannot or choose not to drive because of economic, physical, mental, legal or other reasons • Social safety-net for drivers with access to automobiles who are affected by increases in costs of automobile ownership and operation (including fuel price increases, parking fees, and tolls)

Accelerate Transit's Growth in California

Caltrans and the State can work to accelerate transit's growth in California through statewide strategies and actions that cost-effectively support transit service in California.

Understanding Market and Demographic Changes

Growth in transit ridership will not be uniform across the state. Growth in transit use will vary by geography, along with the demographics, socioeconomics, and psychographics of future transit users. Because of changes in demographics, socio-economics, and even consumer preferences, those that transit operators rely on to grow transit ridership may differ significantly from current riders. The state can employ a systematic approach to segment future ridership groups in order to better understand how to understand and attract new riders as cost-effectively as possible. By commissioning statewide market-research analysis, Caltrans can save individual operators the expense of starting from scratch. Table 2 below is a sample of information that might be gleaned from a market study.

Table 2: Sample segmentation of future riders and non-riders:

<- less costly to acquire and maintain ---------- more costly to acquire and maintain ->		
Existing High-Propensity Transit Users	**New High Propensity Transit Users**	**Low-Propensity Transit Users**
Existing high-propensity transit users will make up the base of ridership. These current "transit-dependent" users lack viable substitutes for transit trips. This can be due to an inability or unwillingness to drive, or lack of regular access to a vehicle. Because these users lack alternatives, they are likely to continue to use transit under a range of service qualities. Market segmentation may also reveal that transit dependents and "choice riders" have similar needs, and that investments to capture more choice riders will simultaneously improve existing riders' levels of satisfaction (and thus improve retention).	New high-propensity transit users will make up the bulk of ridership increases. Individuals may have a high propensity to use transit for three reasons: **Economic causes:** Current and future economic conditions may increase the proportion of the "transit-dependent" population that lacks viable substitutes because they cannot afford to own or operate a vehicle. Continued economic challenges coupled with increases in gasoline prices will increase the number of Californians in this group. **Demographic causes**: Changing demographics will expand California's "transit-dependent" population. According to department of finance data, the 65+ population will increase by 162% by 2050. Aging Californians will increase the utilization of costly paratransit services, unless other alternatives are developed. The number of individuals below the driving age is expected to grow 42.5% by 2050. **Psychographic causes:** Psychographics relates to personality, values, attributes, interests, or lifestyles. Riders who choose transit for psychographic reasons may have the economic means to drive more than they do but prioritize saving or consumption of other goods and services. These "choice riders" might explicitly seek a low-car or no-car lifestyle in urban environments with reduced parking availability relative to suburban environments. They may seek passive travel modes in order to engage in work or entertainment (reading, mobile computing) on commutes and longer trips. These riders might expect complementary policies that increase the value of the transit network, including mixed land uses, pedestrian & bike amenities, and car share in high quality transit corridors. Because these users have alternatives, they will expect a level of service comparable to driving, making them expensive to acquire relative to transit-dependent individuals. Market segmentation may also reveal that these groups may be willing to pay for premium services if reliability and frequency are improved.	Low-propensity transit users might use transit occasionally for trips to parking-constrained neighborhoods or for special events, but these trials are unlikely to lead to regular transit use. Most low-propensity transit users will continue to drive. They might consider carpools and vanpools. Additionally, this group may oppose the implementation of measures to improve transit service relative to automobiles because they do not perceive personal benefits. These riders can be very expensive to acquire.

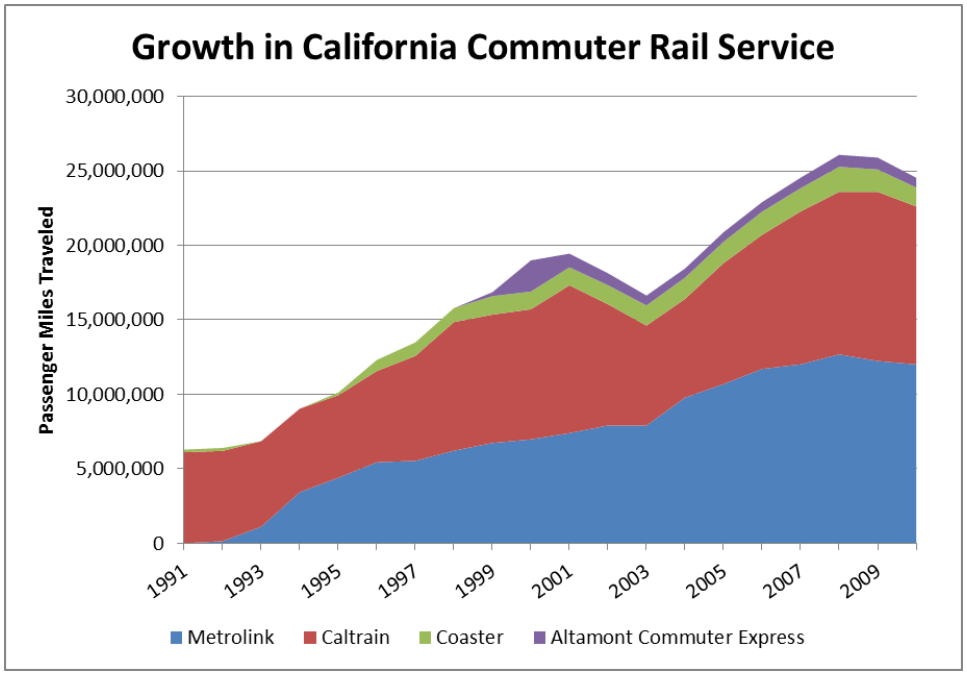
Work with other state agencies to improve the perception of transit within California

As the sole state-level agency charged with supporting transit in the state, Caltrans can coordinate with local and state agencies and departments that have an interest in transit service expansion and improvement. One area with high potential for success through coordination is a public-facing marketing campaign to promote alternatives to single occupant vehicle travel, including transit. Such a campaign could follow the lead of two successful statewide campaigns that seek behavioral change to conserve the state's resources: Flex Your Power and Save Our Water. Flex Your Power is a partnership of utilities, state agencies, and other stakeholders working together to promote voluntary energy efficiency and conservation. The program is funded by a Public Goods Charge on utility bills. Save Our Water is a partnership between the Department of Water Resources and the Association of California Water Agencies to promote water efficiency and conservation. A statewide marketing campaign focused on inducing voluntary behavioral change in transportation to reduce congestion, emissions, and household transportation expenses could learn from the successes of other statewide programs in connecting individuals with local resources (e.g. regional 511 programs). The campaign should target high-propensity transit users, particularly those who might choose transit as a lifestyle choice or because of values such as environmentalism, thrift, or other interests.

Continue to Coordinate between Caltrans Modal Divisions

Travel on commuter rail service has grown 390% from 1991 to 2010 while miles traveled on all transit modes increased by only 141% in the same period.

Figure 7: Commuter Rail Miles Traveled



Commuter rail ridership in California will continue to grow, and the State must plan for this growth. However, commuter rail exists within a fragmented planning environment, which can complicate single mode and multi-modal planning:

- Caltrans Division of Rail plans intercity rail
- Individual Joint Powers Authorities plan commuter rail
- Caltrans Division of Mass Transportation supports local operators, which plan for transit.

Nearly all commuter rail users use multiple modes for their trips. For example, twenty-three percent of Caltrain passengers take transit to their originating station.[3] In order to better serve these users and capture additional users, the state needs to increase its emphasis on integrating planning for various modes. Comprehensive planning should consider how a choice rider can go from their local transit stop and travel across the region or state on various non-auto modes. What level of service would the choice rider expect for interagency and intermodal transfers? How can the individual reach employment destinations from suburban commuter rail stations?

Leverage private investment in intercity bus service

The state should seek to leverage private sector investment in alternatives to automobile-based mobility, including intercity bus service. Currently, Greyhound, Amtrak, and small private operators[4] operate in the state. Historical changes in gas prices mean changing market conditions, which could make an expansion in intercity bus service viable in the state. Recent entrants to the national market for intercity bus service have or have had a presence in California. Bolt Bus is part of a joint venture with Greyhound, whose sister company, First Transit, operates fixed route, paratransit, and shuttle service in California. Megabus operated in California for about 1 year in 2007-2008 but withdrew service because trips from Los Angeles did not meet ridership expectations[5]. These companies have been growing nationally and may consider the California market in the future.

New entrants may be seen as competitors with Caltrans Division of Rail's Amtrak California Thruway bus service. Caltrans can leverage private sector investment by reducing subsidies for service in areas with private sector entrants and focusing state subsidies on routes that are not profitable for the private sector.

Provide state-wide expertise

Some tasks, such as research and analysis, have strong scaling efficiencies. For example, research and analysis done by Caltrans or a local agency can be used by all agencies in the state. Caltrans should work to ensure that agencies statewide are up-to-date on best practices for providing cost-effective transit.

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[3] http://www.caltrain.com/Assets/_Public+Affairs/pdf/ji-2.pdf

[4] including Lux Bus, California Shuttle, USAsia, Hoang Express operate service

[5] http://articles.latimes.com/2008/jun/21/business/fi-megabus21

Experimentation and evaluation through pilot projects can create new knowledge about successful strategies and potential pitfalls, which can lead to a set of best transit practices for the State. The identification and dissemination of best practices information can greatly enhance the implementation of successful projects across the State. With better information about pilot projects, transit operators will devote fewer resources to researching new strategies, and governing boards may view thoroughly studied strategies as less risky.

Transit operators that regularly interact with other operators or local jurisdictions could benefit from assistance in developing and maintaining these often complex and multifaceted relationships. Given its unique role as California's overseer of public transit in the State, Caltrans's Division of Mass Transportation is in a position to create or identify model interagency or inter-jurisdictional agreements and procedures. While a given agency in California may engage in few interagency or jurisdictional agreements, Caltrans's Division of Mass Transportation can compile information on agreements around the State in order to provide examples or identify best practices to interested transit operators.

Caltrans Division of Mass Transportation should develop and maintain an internet-based venue for sharing of transit information, analysis, and data. Through this venue, Caltrans can leverage existing and future studies by connecting transportation planners throughout the state with research, tools, best practices, and other data.

Table 3: Examples of tools, past, and future research includes:

Web-based Tools	Past Caltrans Studies	Possible Future Studies
Caltrans Funded ● PATH BRT Information Clearing House ● Tool for Analyzing Station Characteristics Funded by Others ● Fehr & Peers LOS+	● State & Federal Project Development Procedures for Bus Rapid Transit: Managing Differences and Reducing Implementation Delays[6] ● Assess the Trade-Offs between People Through-put and Level of Service Degradation in the Conversion of a Mixed Flow Lane to a Bus Only Lane on US 101[7] ● "Authority for Use of Freeway Shoulders by Transit Buses[8]	● Best practices for community engagement on bus priority projects. ● Study legal ramifications value-capture finance strategy specific to the contemporary California policy landscape. ● Statewide evaluation of RFID credit/debit transactions for cash fare payment ● Fuel procurement strategies to leverage buying power and reduce fuel price risk ● Case study on early implementation of real-time arrival and routing information ● Information about how value-added amenities affect ridership (e.g. WiFi service on Santa Clara VTA)

[6] by Mark Miller. Available at http://www.dot.ca.gov/research/researchreports/reports/2011/path_final_report_ucb-its-prr-2011-08.pdf

[7] By Yue Irene Li, Jing-Quan Li, Mark. A Miller, Wei-Bin Zhang

[8] By Richard Land, Deputy Director Project Delivery and Michael Miles, Deputy Director Maintenance and Operations." (2008),

Streamlining funding and reporting processes

The Division can work to streamline processes required to apply for funding and meet reporting requirements at the State level. The Division of Mass Transportation can work with other divisions of Caltrans and with other State agencies to align State application and reporting requirements with federal requirements, or develop and deploy tools that operators can use to prepare and deliver reports to meet a range of requirements. The application and reporting burdens on public transit operators are substantial, especially for smaller operators with limited staff. Reducing the bureaucratic burdens on these staff will allow transit managers and planners to devote more time and resources to strategic projects and planning.

Provide Expertise in Strategic Planning

While Caltrans will play a role in statewide strategic transit planning, it can also fill a critical gap in local transit planning by offering strategic planning workshops. Caltrans can also support intra- and inter-agency coordination through programs that enhance an agency's ability to plan for and implement change. Most operators create federally-mandated Short Range Transit Plans, but not all create their own long-range plans. Many operators may benefit from Caltrans-convened statewide or regional workshops and programs in connecting their Short Range Transit Plans to their long-range visions, goals, and objectives.

Statewide Resources for Customer Service Improvements

Previous Caltrans-funded research documented the effects out-of-vehicle experiences have on the transit experience. Passenger information systems that provide users with static information about routing and schedules are useful in reducing the burden of learning about trip options. The General Transit Feed Specification (GTFS) is a standard for sharing information about public transit. Google Maps and other services use GTFS feeds that operators publish to provide internet-based routing services can help passengers identify route and timing options that involve one or more transit operators.

In the past, Caltrans has provided technical assistance to operators interested in publishing their scheduling and routing data in the GTFS format. The proliferation of California transit operators publishing their data in the GTFS format has created network effects - users making trips across multiple service areas can use a single system to identify an appropriate route. In one example, a blogger from the newspaper *SF Weekly* newspaper used Google Maps transit directions to identify and travel a route Francisco to Los Angeles using seven transit operators and fifteen transfers[9].

Google is currently working with San Francisco Municipal Railway and the San Diego Metropolitan Transit Service to test the next iteration of the standard, GTFS-realtime, which includes vehicle arrival predictions, positions, and service alerts. Real-time transit arrival information is important to reducing perceived wait times and increasing perceived service quality. A study that considered fare levels, service quality, and external factors found that real-

[9] http://blogs.sfweekly.com/thesnitch/2011/06/sf_to_la_public_transit.php

time arrival information was responsible for a small but measurable increase in transit ridership.[10] If real-time arrival information can lead to ridership gains in California, then it can be a cost-effective option to increase the utilization of existing transit services.

Just as Caltrans Division of Mass Transportation has played a role in expanding the use of the GTFS standard in the state, they can assist operators in introducing real-time passenger information systems. Caltrans can provide technical assistance to help operators understand their options regarding real-time passenger information systems and catalyst grants to help offset the initial costs of publishing data. Caltrans should also examine cases where scale economies exist -- for example, quality control and serving published data -- where a statewide resource could work more cost-effectively than the sum of individual operators

Leveraging California's Successes

California's local transit operators can experiment with strategies to improve service in their areas. Transit operators elsewhere in the state can learn from strategies that have been particularly successful. By disseminating these strategies, Caltrans can help operators throughout the state leverage the successes of their peers to accelerate the adoption of cost-effective measures to improve transit.

Publicly-sponsored Vanpool Service

Miles traveled on publicly-sponsored vanpool service increased 8600% between 1991 and 2010, making vanpooling the fastest-growing public transit mode in California. Vanpools can be a highly cost-effective option to expand transit service because of a high level of service and willingness to pay versus low vehicle, labor, and administration costs. Transit agencies that report service metrics for publicly-sponsored vanpool service to the National Transit Database are eligible for Section 5307 formula funds for operations, which can make the already cost-effective service a net revenue generator for transit agencies. For instance, during the first four years Los Angeles County Metropolitan Transportation Authority sponsored vanpool service, the agency has subsidized vanpools an average of $1.48 per passenger trip, but has received $6.88 per passenger trip in federal formula funds.[11]

The California Vanpool Authority (CalVans) is a public Joint Powers Authority that directly operates vanpool service. As of 2010, CalVans's predecessor agency was the only agency that directly operates vanpool services. The direct operations model gives CalVans two distinct advantages over purchased transportation. First, CalVans is able to accept the 30-40% applicants who would be declined by a private vanpool operator due to poor credit[12]. Second,

[10] Tang, Lei and Piyushimita Thakuriah (2012). "Ridership effects of real-time bus information system: A case study in the City of Chicago." *Transportation Research Part C: Emerging Technologies* (22: 146-161)

[11] "Metro Vanpool Program Funding," 17 February 2011. available at: http://www.metro.net/board/Items/2011/02_February/20110224RBMItem8.pdf

[12] Interview with CalVans Executive Director Ron Hughes on September 9, 2011.

CalVans can use depreciated vehicles for low-revenue service applications such as agricultural worker transport.

Expansion of vanpool service can be a strategy to connect rural and exurban residential communities with employment centers centers. In such an application, vanpool service can mitigate the effects of fuel price increases on vulnerable populations who commute long distances. Because they are cost-effective and lower capacity relative to other forms of transit, vanpools can help build markets for transit in advance of commuter bus or rail service. Once several vans travel similar routes at similar times, it may become viable to replace some service with regularly-scheduled commuter buses.

Station Vans

Many of California's commuter rail stations serve low density suburban areas with dispersed employment. While a station's park-and-ride lots can serve residents within the stations catchment area, serving commute trips to suburban office parks within the catchment zone can be challenging because of a lack of last-mile solutions. Some larger California employers and transportation management associations offer shuttle service between transit stations and campuses. Station-based vanpools may be an alternative last-mile connection for self-organizing groups considering transit for the main leg of their trips. While the low vehicle utilization rates over short distance may make new vehicles cost-prohibitive, planners can study the possibly utilizing of high-mileage, depreciated vanpool vehicles for these shorter, low-revenue routes.

Vanpools are typically only competitive with longer trips among commuters who have regular access to a vehicle. For long trips, the time involved in traveling to a park and ride location and loading the van is short relative to the in-van travel time. Station vans may be effective for longer connections to commuter rail; for example Victorville to San Bernardino Metrolink.

Re-purpose Underutilized Space to Transit

Representatives from transit operators throughout California thought that increasing the speed of transit vehicles would be the most effective strategy to make the mode more attractive relative to automobiles and increase ridership. Traffic congestion is costly for transit operators. Reduced vehicle speeds increases the ratio of vehicle hours to miles traveled, increasing the costs of each end-to-end trip along a route. Additionally, maintaining headways under reduced speed conditions requires that an operator add vehicles to a route. As congestion typically occurs during peak periods, assigning additional busses to a route may increase the number of vehicles operated in maximum service and the operator's peak-to-base ratio -- meaning that to serve peak demand the operator much purchase additional transit vehicles that are not needed outside of the peak period.

Bus-Only Lanes

It may be difficult for many to observe that a congested mixed-flow lane is underutilized.

However, slow vehicle speeds through congested segments substantially reduce vehicle throughput versus uncongested speeds. Restricting usage of the lane can increase vehicle speeds and the lane's effective vehicle capacity. High Occupancy Vehicle and Transit-Only restrictions are common treatments used to increase the speed of traffic and a lane's vehicle flow rate. These strategies carry the added benefit of significantly increasing the flow rate of people through a lane, effectively increasing the capacity of a congested right-of-way.

While bus-only treatments are popular among California's transit operators, they face challenges in re-purposing existing mixed-flow and parking lanes to transit vehicles. These difficulties arise from community opposition, unmitigated environmental impacts, and trouble obtaining permissions from the authority responsible for the transportation facility. Caltrans Division of Mass Transportation and other departments within the state can greatly assist operators looking to implement transit priority or bus-only lanes. First, the Division of Mass Transportation can work with other transit stakeholders in the state to learn from Market Street, Van Ness, Wilshire, East Bay BRT, and other projects to identify and disseminate best practice in community engagement and project-related communications. Second, the Division of Mass Transportation can work with the Governor's Office of Planning and Research to help local governments the extent to which the vehicle-based transportation network impact methodology and thresholds they have chosen in their General Plans can lead to the identification of significant impacts during the California Environmental Quality Act review process. Such impacts can make bus-only lane implementations challenging even when they will reduce the environmental impact per person who passes through a corridor. Lastly, Caltrans can develop statewide guidance for bus-only lane implementations and adopt an internal policy to expedite review and implementation when an operators and local government request a transit priority treatment on a state transportation facility.

Bus-on-Shoulder

Allowing transit vehicles to use shoulders of controlled access highways is a highly cost-effective strategy to reduce travel times and add to the relative attractiveness of transit versus automobile use. A mid-2000s bus-on-shoulder pilot project on CA-52 in San Diego County yielded valuable experience that could inform studies and projects elsewhere in the state. After ten months, transit vehicles operating on the shoulder achieved 99% on-time performance, and the project had improved travel times and increased customer satisfaction levels (Leiter 2006). The pilot program is a prime example of how Caltrans divisions other than Mass Transportation can work to introduce cost-effective strategies to improve transit service in California. However, a Caltrans internal decision document on shoulder bus operations[13] has not been published and transit operator representatives interviewed by UCLA saw no clear path to implementing new bus-on-shoulder projects in the state.

Consolidation and Coordination of Non-Core Functions

[13] "Authority for Use of Freeway Shoulders by Transit Buses" (2008), Richard Land, Deputy Director Project Delivery and Michael Miles, Deputy Director Maintenance and Operations.

Transit operators in California employ a range of operating models. Transit agencies in California can outsource conduct planning, maintenance, operations, training, and administrative support with internal resources or work with an external service provider. External service providers can be either private or public organizations. The Southern California Regional Transit Training Consortium is an 8-year old 501(c)(3) non-profit organization governed by member transit agencies and educational institutions. The program promotes local workforce development goals while providing transit agencies with a cost-effective local option for training maintenance employees. Caltrans can support the formation of multi-agency consortia through interagency planning incentives.

Support Local Efforts to Implement Congestion Pricing

In interviews with transit stakeholders, the UCLA research team found conditional support for congestion pricing as a locally-administered policy used in limited applications. The Bay Area, Southern California, and San Diego have implemented congestion pricing on at least one facility in their regions. A study of the CA/91-Express Lanes showed that the two uncongested high occupancy toll lanes moved as many people as the four congested mixed flow lanes. Reducing or eliminating traffic congestion on roadway segments will increase the speed of transit vehicles operating on those segments. In addition, transit becomes relatively more attractive to auto use as prices drivers pay to access that roadway increase. Finally, a congestion pricing implementation can be a new source of revenue for transit capital and operations funding.

Conclusions

Because transit can address a range of policy goals, stakeholders in California ask a lot of transit. The state must increase transit ridership to meet a range of environmental, social, and economic goals. However, the cost of meeting these goals falls on the shoulders of transit, making these goals difficult but not impossible to achieve in an era of fiscal constraints. With coordinated planning and action, achieving these goals can become more cost effective.

The Division of Mass Transportation needs the support of other Caltrans Divisions and State Agencies to assist local transit operators in expanding ridership. While transit operators have many cost-effective options at their disposal that are unlikely to encounter opposition, some measures require that Caltrans and local governments make trade-offs between automobiles and transit. These are likely to be a source of conflict throughout California as the state moves toward a sustainable transportation future in pursuit of its greenhouse gas reduction goals. Caltrans can support areas that have elected to prioritize transit with supportive policies on State facilities.

Perhaps the most cost-effective option to improve transit service in California is to leverage what has already been done. Transit operators throughout the state have had success in identifying cost-effective implementation measures. Caltrans and the University of California have studied bus-on-shoulder, bus-only-lanes, and other policy options for transit. By building off these successes, California transit operators can avoid the costs of additional studies or

experimentation in implementing innovative strategies to improve transit and achieve future ridership goals.