

Attached is a draft of Transit in California: Existing Conditions and Current Practices. This draft has been updated and contains the following new sections:

Vanpools	Added to Chapter 8: Shuttles
Paratransit and Demand Response	In a new section: Chapter 4, Transportation for Disabled, Senior, and Low Income Travelers
The “true cost” of auto ownership	In a new section: Chapter 14, Cost of Driving Alone vs. Transit
Bicycle and Pedestrian Access to Transit	In a new section, Chapter 7
Rural Operators	Many of the agencies discussed in the report are rural operators, and their concerns are included in the sections as appropriate (for example, see pages 10 and 15)
“Population and settlement” approach (land use)	Discussed in the section on Transit Oriented Development (Chapter 13). It is also raised as an issue in the recommendations of Chapter 4. Transit agencies sometimes mention the connection with land use in their documents, but do not discuss it substantially.

**California Department of Transportation
Statewide Transit Strategic Plan
Resource paper**

**Lead Investigators:
Robert Cervero
Brian Taylor
Karen Trapenberg Frick
Allison Yoh**

Public Transit in California: Existing Conditions and Current Practices

By Melanie Curry and Aaron Malinoff, Graduate Student
Researchers, and Justin Shiu, Research Associate,
University of California Transportation Center



TABLE OF CONTENTS

Introduction	3
Chapter 1: Fare Policies	5
Chapter 2: Sources of Transit Funding in California	14
Chapter 3: Standards and Performance Measures	22
* Chapter 4: Transportation for Disabled, Senior, and Low Income Travelers	26
Chapter 5: Bus Rapid Transit	30
Chapter 6: Alternative Fuels	35
* Chapter 7: Bicycle and Pedestrian Access	39
* Chapter 8: Shuttles and Vanpools	42
Chapter 9: Park-and-Ride	45
Chapter 10: Triennial Review	48
Chapter 11: Regional Connectivity	49
Chapter 12: Outreach, Marketing, and Websites	51
Chapter 13: Transit Oriented Development	58
* Chapter 14: Cost of Driving Alone vs. Transit	61
* Appendix: Sources	64

* New or updated chapter

INTRODUCTION

This inventory of California transit agencies' existing transit plans aims to summarize goals, policy issues, and current strategies being used by agencies to improve operations and services, meet standards, and achieve goals. This report examines the Short Range Transit Plans and other documents from California transit agencies to find patterns among agencies in terms of policies and strategies. Issues examined in some detail include fare policies, funding sources, fleet replacement, standards and performance measures, bus rapid transit, fuel use, shuttles, park-and-ride facilities, and outreach and marketing.

Most California transit agencies publish a Short Range Transit Plan outlining their missions and goals and providing a snapshot of the agency's current services, challenges, and policies. Some agencies are required by the local Metropolitan Planning Organization to develop an SRTP in fulfillment of federal funding requirements for the region. For those agencies that don't publish SRTPs, their Long Range Transportation Plans serve as a source of information. Other documents and websites were used as appropriate or needed as well. See Appendix for a complete list of sources.

For this report we studied 38 of the 79 transit agencies in California that provide data to the National Transit Database. We classified the agencies by size based on the number of unlinked passenger trips they provided in 2008. Eleven are classified as "large," with more than 20 million unlinked passenger trips; all of the large agencies operate within the regional boundaries of the large metropolitan areas in California (Los Angeles/Orange County, San Diego, the San Francisco Bay Area, and Sacramento). Another eight agencies are medium-sized, serving between 10 and 20 million unlinked passenger trips. All of these agencies also operate within the large metro regions. There are 60 smaller agencies, serving fewer than 10 million unlinked passenger trips within large metro areas as well as in smaller cities and rural areas. The large and medium agencies operate bus, rail, vanpool, ferry, and shuttle services; three exclusively operate rail (BART, Southern California Regional Rail Authority, and Caltrain) but many of the others operate both bus and rail. With one exception (the Altamont Commuter Express, which is a rail service), all of the smaller agencies operate bus services and most also spend resources on demand response transportation.

We examined documents from ten of the eleven large agencies, six of the eight medium agencies, and 22 (37 percent) of the smaller agencies, aiming for a representative sample based on location (northern and southern California, rural and urban, coastal and inland areas), and type of agency (bus and rail, rail only). The agencies we examined are listed in the following table.

Large Agencies	Medium Agencies	Small Agencies
Los Angeles County Metropolitan Transportation Authority B&R	Fresno Area Express BUS	Santa Barbara Metropolitan Transit District
San Francisco Municipal Transportation Agency B&R	San Mateo County Transit District BUS	Golden Gate Bridge, Highway & Transp. District
BART RAIL	Foothill Transit BUS	Golden Empire Transit
San Diego Metropolitan Transit System B&R	Omnitrans BUS	Santa Cruz Metropolitan Transit District
Orange County Transportation Authority BUS	Southern California Regional Rail Authority RAIL	Monterey-Salinas Transit
Alameda-Contra Costa Transit District BUS	Cal Train (Peninsula County Joint Powers Board) RAIL	Central Contra Costa Transit Authority
Santa Clara Valley Transportation Authority B&R		Santa Clarita Transit
Sacramento Regional Transit District B&R		SunLine Transit Agency
Long Beach Transit BUS		Unitrans (City of Davis, UC Davis)
Big Blue Bus (City of Santa Monica) BUS		Antelope Valley Transit Authority
		City of Santa Rosa CityBus
		Eastern Contra Costa Transit Authority (TriDelta)
		Livermore Amador Valley Transit Authority
		Yolo County Transportation District
		Sonoma County Transit
		Western Contra Costa Transit Authority
		San Luis Obispo Transit
		Altamont Commuter Express RAIL
		Napa County Transportation and Planning Agency
		Redding Area Bus Authority
		City of Lompoc Transit
		City of Lodi Transit Division

Chapter 1 FARE POLICIES

To create a snapshot of the fares transit agencies in California charge for fixed-route service, agency Short Range Transit Plans (SRTPs) and websites were reviewed for relevant information. Information about fares was collected from 44 agencies, roughly half the agencies in the State that report data to the Federal Transit Administration National Transit Database (NTD), on the types of fares charged, their magnitude, recent fare increases, fare media, the types of discounts offered, where fares can be purchased, transfer policies, and the extent to which agencies partner with schools, employers, and each other to offer discounts to riders. To see how agencies' fare policies compare to transit operators outside of California, information was gathered on the eight largest agencies by ridership outside of California (according to 2008 NTD data).¹



A Compass Card, the tappable “smart” fare card for the San Diego area, is used to pay a fare.
Source: www.compass.511sd.com.

Fare Prices, Fare Structures, and Recent Increases

The base one-way adult fares (i.e. the minimum adult fare) range from 75 cents (Santa Monica’s Big Blue Bus), to \$5 (Metrolink), with the majority of agencies charging fares between \$1 and \$2. Of all modes, commuter rail consistently has the most expensive base fares. Figure 1-1 shows the distribution of agency base fares.

Base fares do not tell the whole story. Many agencies charge additional fares according to distance or type of fixed-route service. Fare structures for the agencies surveyed can be grouped as follows:

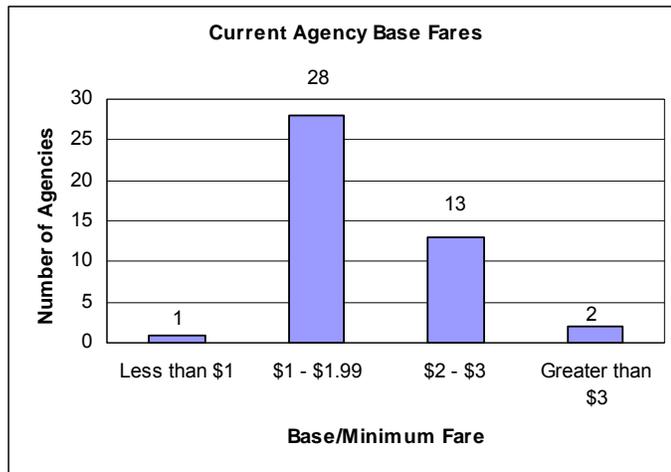


Figure 1-1. Agency Base Fares

¹ From highest to lowest 2008 ridership, the comparison agencies are: New York’s Metropolitan Transportation Authority, Chicago Transit Authority, Washington Metropolitan Area Transportation Authority, Massachusetts Bay Transportation Authority, Southeastern Pennsylvania Transportation Authority, New Jersey Transit, Metropolitan Atlanta Rapid Transit Authority, and King County (WA) Metro.

- Flat: one fare is charged for all service offered, regardless of distance, mode, or service type (e.g. local vs. express). For example, the San Francisco Municipal Railway (Muni) charges the same \$2 fare for its bus, trolleybus, and light rail service.
- Flat and Express: Fares are stratified according to type of service, but do not change based on other factors. For example, The San Diego Metropolitan Transportation System (SDMTS) charges a \$2.25 fare for local bus service, a \$2.50 fare for the trolley (light rail) and express buses, and a \$5 fare for “Premium Express” buses that travel during commuting hours between downtown San Diego and some suburbs using the HOV lanes on Interstate 15.
- Zonal or Distance-based: The fare price is dependent upon the distance a rider travels, or whether she passes between zones, defined by the transit operator to divide its service area. Figure 1-2 shows Golden Gate Transit’s fare zone map.

The fare structures of the agencies surveyed fall into these categories in roughly equal numbers; fourteen charge a single flat fare, seventeen charge different flat fares depending on service type, and thirteen charge zonal or distance-based fares. The biggest determinants of the fare structure appear to be mode and service area. All of the agencies operating commuter rail (Caltrain, North County Transit District, Metrolink) charge zonal or distance-based fares, as does BART. In addition, agencies that operate intercity or inter-county service typically adopt zonal fares or surcharges for this type of service. Note that these fare designations are not necessarily mutually exclusive. For example, Golden Gate transit has a zonal fare system, but charges a \$2 flat fare for all trips taken within Marin County, even though the county is divided among several zones. As a rule, however, agencies seem to restrict themselves to one of these fare structure approaches. One aspect of fare policy that was found in four of the comparison agencies outside of California, but that no agency in California has implemented, was the presence of peak and off-peak fares. NYMTA and SEPTA have peak surcharges during rush hours on their commuter rail services, King County Metro has a peak surcharge of 25 or 75 cents depending on zones crossed, and WMATA Metrorail fares cost from 30 cents to \$2.15 more during designated peak hours, offering a substantial discount for those who are able to travel outside of peak times.

Nearly half of the agencies (21 of 44) have raised fares since January 1, 2009, and two agencies, LA Metro and Omnitrans, are raising fares in 2010 per predetermined schedules. Many agencies cite rising operating costs, declining tax revenues, and the diversion and subsequent elimination of State Transit Assistance (STA) funds (derived from state sales taxes on gasoline and diesel fuel) as reasons for increasing fares or reducing service.² Of the comparison agencies,



Figure 1-2. Fare Zone map for Golden Gate Transit. Source: www.goldengatetransit.org

² For example, a page from San Diego MTS’s website warning of service reductions that went into effect in February states, “MTS recently had to reduce its operating budget due to a loss of State Transit Assistance

half, or four of eight, have raised fares since 2009 or have a fare increase scheduled to take place in 2010 (New York MTA, MARTA, King County Metro, and CTA). Over a long enough time period, fare increases are inevitable – at the very least, agencies must recoup some of the value of fare revenues lost to inflation. However, policies regarding fare increases vary widely, from ad hoc (i.e. no policy) to scheduling fare increases years in advance (see text box below).

One reason an agency might raise fares is to prevent declines in its farebox recovery rate, or the proportion of operating costs that are recouped through fare revenues. In California, operators are (theoretically) required to maintain a farebox recovery rate of twenty percent to receive Transportation Development Act funds (equal to 0.25 percent of taxable sales made in the state). According to the most recent data,³ fifteen or sixteen agencies⁴ did not meet this threshold. Recovery rates ranged from 64.5 percent (BART), to 5.4 percent (UC Davis Unitrans)⁵, with most agencies falling in the twenty to thirty percent range.

Agencies that only operate rail service are at the top of the recovery rate scale, with only one of the four rail-only operators, Altamont Commuter Express, coming in at less than 40 percent (a still higher than average recovery rate of 37.8 percent). The 35 bus-only agencies achieved recovery rates from 39 percent (Santa Barbara MTD) to 5.4 percent

Sample Agency Policies Regarding Fare Increases

While no transit agency relishes being in the position of having to raise fares, most do not have explicit policies for when or how to increase fares. Below are examples of steps agencies have taken to clarify the process of raising fares.

BART: fares are adjusted according to changes in the consumer price index (CPI). CPI-based adjustments are programmed through FY 2012, at which point the program will have to be reauthorized.

LA Metro: proposes adjusting fares to maintain a 33% fare recovery rate for bus and rail, but would require board approval for any increase (an increase is planned for FY 2011).

Omnitrans: programs fare increases as part of its multiyear short range transit plan in order to maintain a 25% fare recovery rate.

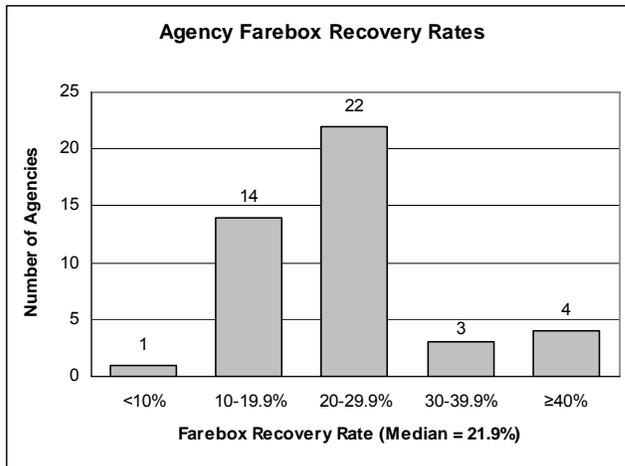


Figure 1-3. Agency Farebox Recovery Rates

funding and lower sales tax and fare revenues” while Muni’s website states, “Last spring the SFMTA, like almost all transit agencies in the United States, faced an unprecedented budget deficit because of the global and national recession. The sizeable City budget deficit and the elimination of transit operations funding by the State of California contributed to a deficit of \$128.9 million for the fiscal year that began last July 1.” Both agencies raised fares in 2009.

³ Data comes from the NTD’s 2008 data tables for agency SRTPs where NTD data was unavailable.

⁴ One agency reported a 2008 fare recovery rate of 20.5 percent to the NTD, which was flagged as “questionable.” The agency’s own SRTP stated that fixed-route bus service for the 2006-07 fiscal year achieved a 15 percent recovery rate.

⁵ Unitrans primarily serves the UC Davis community (mainly students, who ride free), so its low farebox recovery rate stems from low fare revenues, not out-of-control operating costs.

(Unitrans), while bus-and-rail (5) agencies had recovery rates from 40 percent (San Diego MTS) to 14 percent (Santa Clara VTA). Rail transit, while more capital intensive than bus service, tends to have higher fare recovery rates than bus service, because bus transit is more labor intensive, which leads to higher relative operating costs.

Fare Media and Smart Cards

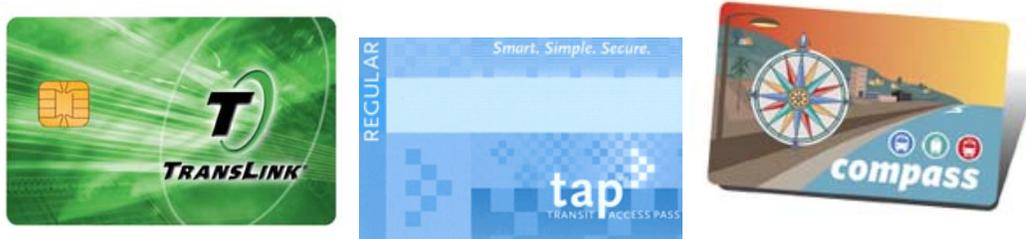


Figure 1-4. Transit smart cards in use in California. From left to right: The TransLink card, the Transit Access Pass (TAP) card, and the Compass Card. Sources: www.translink.org; www.culvercity.org; compass.511sd.com.

All transit agencies accept cash as fare payment, but many also use prepaid fare media, which come in a variety of formats. They can be “flash” passes (a pass shown to the vehicle operator upon boarding), “punch” passes (a paper card from which a vehicle operator or ticket collector deducts the fare by punching holes in the pass), magnetic-strip cards that are swiped upon boarding or at turnstiles, and, most recently, “smart” cards. Smart cards are credit-card sized plastic cards with an embedded computer chip that are read by tapping the card against a fare reader, which then either deducts the appropriate fare or recognizes a pass. Depending on the mode and agency, riders pay with smart cards upon boarding or at designated terminals before boarding, and in some cases, upon leaving a vehicle. Currently, smart cards are in use at select Bay Area, Los Angeles, and San Diego area operators. Transit agencies in Seattle, Washington (DC), Atlanta, Boston, and Chicago have also introduced smart cards.

There are many advantages to smart cards for both riders and operators. Riders using multiple transit services can use a smart card as a single form of payment, eliminating the need to carry multiple passes or pay a cash fare upon each boarding. Smart cards are capable of simultaneously holding a transit pass and a simple cash balance, either of which can be used as necessary. They can also be programmed to recognize transfers between services; any additional fare required is deducted from the cardholder’s balance upon transferring. Smart cards are more durable than paper passes, they can be registered to an individual to protect against loss or theft of the card, and value can be added to the cards in many different ways, including at stores, on the bus, at agency kiosks, and online.

Operator benefits from smart cards include faster boarding times, more reliable fare collection, easier coordination of fare agreements among multiple agencies, money saved by eliminating paper transfers, and the opportunity to gain valuable information about riders, such as what routes and stops experience the most boardings (and in some cases, alightings), and what types of passes are most popular with riders. Operators can then use this information to better tailor service offerings and payment options to current and potential riders. Given the benefits operators stand to gain through smart fare media, many are encouraging riders to switch to using smart cards by offering discounts and other incentives. Table 1 provides specific information on agencies using smart cards, the cards’ capabilities, and discounts available to the cards’ users over paying cash. Agencies outside of California are offering a variety of incentives to get riders to switch to smart cards; identifying which have been the most successful would be useful for transit operators in California that are transitioning to smart cards.

Region	Card Name	Agency/Agencies	Fare Type	Discounts	Reloadable at
Los Angeles	TAP Card	Metro, Santa Clarita Transit, Culver CityBus, Antelope Valley Transit Authority, Foothill Transit, Montebello Transit, Norwalk Transit.	Cash and/or pass (some agencies currently just read passes)	Varies by agency	Online, agency kiosks and ticket vending machines, many stores throughout area.
San Francisco	TransLink	BART, AC Transit, Golden Gate Transit, Muni, Caltrain	Cash and/or pass	none	Online (auto reload), retailers, agency properties
San Francisco	EZ Rider	BART	Cash only	\$3 bonus every time \$45 is automatically loaded	Automatically reloads after stored value drops below \$10
San Diego	Compass Card	San Diego MTC, North County Transit District	Pass only	None	Online, some stores, properties and ticket vending machines
Chicago	Chicago Card and Chicago Card Plus	CTA	Cash (Chicago Card); cash or pass (Plus)	Separate boarding lane, \$0.25 off bus cash fare (no rail discount), \$0.25 transfer	Transit vending machines or stores; automatically reloads
Atlanta	Breeze Card	MARTA, Cobb County Transit	Cash or pass	Free internal and interagency transfers instead of paying base fare again.	Agency properties and vending machines
Washington, DC	SmarTrip	WMATA, several neighboring local providers.	Cash only	\$0.10 off base bus fare; free bus-to-bus transfers, \$0.50 off bus-to-rail or rail-to-bus transfers over cash fare (DC Metro)	Online, some stores, agency properties, ticket vending machines
Boston	CharlieCard	MBTA bus and heavy rail, planned for ferries and commuter rail.	Cash and/or pass	Discounts of 15-50% off of base fares, discounted transfers.	Online, agency properties and vending machines, area stores
Seattle	ORCA Card	King County Metro, Community Transit, Everett Transit, Kitsap Transit, Pierce Transit, Sound Transit, Washington State Ferry	Cash and/or pass	Discounted interagency transfers instead of paying base fare again.	Online, agency properties and vending machines, area stores

Table 1-1. Comparison of agency smart card capabilities and benefits.

Purchasing Fare Media

Beyond agency offices, outlets, and vending machines, transit operators provide a number of alternate ways for riders to purchase fares and passes. One channel that most agencies take advantage of is private retail; Caltrain was the only sizable agency that did not offer fares for sale in stores. Some agencies also have agreements with chain stores, so that one can buy fare media at any participating store (e.g. MTS and Von's, Sonoma County Transit and Safeway, LA Metro and Ralph's/Von's; TransLink card holders can reload their cards at many Walgreen's in the Bay Area). The most common retail outlets appear to be grocery stores/pharmacies and check cashing stores. At least twelve agencies allow passes to be purchased by mail, and some allow purchase by phone using a credit card (Sacramento RT, Golden Gate Transit, Redding Area Bus Authority, Sonoma County Transit).

Many agencies, and not just the major ones, allow purchase of fare media online, either through the agency website or through a contracted sales portal. At least 21 agencies, nearly half of those surveyed, offer online purchase, including Muni, Sonoma County Transit, LA Metro, San Joaquin RTD, Santa Cruz Metro, and San Luis Obispo City transit.

Passes, Discounts, and Internal/Interagency Transfer Policies

All of the agencies surveyed offer unlimited-ride passes, with the exception of BART, which provides a 6.25 percent discount on tickets valued over \$40 (if purchased in advance through an authorized seller). The most common type of pass is a monthly pass, though weekly passes and day passes are also offered. Several agencies (for example, Tri-Delta, LA Metro, Santa Cruz Metro) do not offer or have eliminated paper transfers in favor of day passes. Pass prices can differ on the type of service offered (local vs. express and by zone) and to whom they are offered (youth under 18 receive discount passes from all but five agencies besides BART, seniors and disabled riders receive discount passes from all agencies). Monthly (basic, not including commuter rail) pass prices range from \$32 (Bakersfield GET) to \$100 (Sacramento RT), with most in the \$50 to \$80 range. VTA was the only agency to offer an annual pass, which consists of twelve monthly passes delivered at one time.

Ideally, an unlimited-ride pass offers regular riders a discount in exchange for regular patronage. This gives potential riders an incentive to take transit and provides operators the benefits of increased ridership. For 38 of the 44 agencies, monthly passes provided a discount on the base fare for regular riders;⁶ monthly savings ranged from \$7 (San Joaquin RTD) to \$44 (WestCat Lynx). This range does not include commuter rail agencies, whose passes offer substantial monthly savings (up to hundreds of dollars for the longest trips) which are difficult to represent because the pass price depends on origin and destination stations, and does not include savings from express service passes. Two agencies' monthly passes provided no discount over the base fare, and four agencies' monthly passes are actually *money-losers*; in the most extreme case, riders of Santa Monica's Big Blue Bus would have to take 94 unlinked trips each month before they would see savings from purchasing a pass (the only monthly pass the Big Blue Bus offers is a more expensive "EZ Pass," which can be used on local transit routes throughout Los Angeles County, regardless of operator).

Most agencies offer transfers to connecting services they operate (internal transfers) or to connecting services of other agencies (external transfers): 30 of the 44 agencies offer free or discount internal transfers, costing between 25 and 50 cents. Some agencies, for example

⁶ Monthly savings were calculating by subtracting the price of a monthly pass from the cost of 48 times the base fare (in other words, a round trip taken on 24 of 30 or 31 days for which a monthly pass is valid).

Antelope Valley Transit Authority, Tri Delta Transit, and Sacramento RT, have eliminated internal transfers in recent years and instead offer day passes for purchase. Eliminating transfers can also provide additional fare revenues; the San Francisco Municipal Transportation Agency estimates that eliminating transfers on Muni would generate \$20.4 million in annual revenues, even with assuming that only 75 percent of affected riders would switch to a monthly pass instead of paying \$2 per boarding.

Transit agencies with adjacent or overlapping service areas frequently develop agreements that allow riders to transfer from one operator to another at a discount or for free, or they may simply honor another agency's transfer for a discount. Of 44 agencies surveyed for this section, 26, or 59 percent, provide riders transferring from other systems with some level of fare credit. In addition, Santa Barbara MTD is in the process of developing a transfer agreement with the Ventura County Transportation Commission's intercity Coastal Express service. Policies regarding interagency transfers are far from standard — one agency's honoring a transfer from another agency does not imply that the reverse is true, and a transfer from an agency can have different values to different connecting operators. For example, UC Davis' Unitrans accepts transfers from the Yolo County Transportation District's Yolobus for a full fare credit, but Yolobus does not accept transfers from Unitrans for any sort of discount. Golden Gate Transit's interagency transfer policy presents an example of how an agency can value transfers differently: GGT accepts transfers from Muni as a \$0.50 fare credit, while transfers from Santa Rosa's Citybus and Sonoma County Transit provide a \$1 fare credit and transfers from AC Transit, WestCAT's (Contra Costa County) Lynx, and Vallejo Transit are valued at \$2. In sum, California transit operators' out-of-system transfer policies vary widely and resist classification, though their existence in some form among a majority of operators indicates that agencies are placing some value on riders' being able to transfer conveniently between operators.

The next step up from interagency transfers is a sticker or pass that can be used on multiple operators' services. Stickers are affixed to one agency's monthly pass and offer unlimited rides on other participating services. For example, owners of a Sacramento RT monthly pass can purchase a Yolobus Express sticker for \$25 that allows the rider unlimited trips on both agencies' vehicles for the duration of the pass. In the Bay Area, Muni has an agreement with SamTrans and Caltrain that allows riders of those agencies to purchase a Muni monthly pass sticker for \$55. Instead of a sticker, BART offers the BART Plus card, which comes with a stored value for use on BART and functions as a flash pass for unlimited local rides on ten agencies in the East Bay and on the Peninsula. County Connection, Tri Delta Transit, WestCat Lynx, and Livermore Amador Valley Transit Authority (LAVTA) offer the East Bay Value Pass, which provides unlimited local service on all four operators for \$60 per month. The most comprehensive regional pass in California is offered in the Los Angeles area, where the Los Angeles County Metropolitan Transportation Authority's EZpass costs \$70 a month and allows the pass holder unlimited local travel on 23 transit services in Los Angeles County (long-distance express service can be added by purchasing additional stamps at an \$18-per-zone rate).

All California agencies surveyed offer "concession fares," or fare discounts to senior citizens and persons with disabilities; agencies offer concession fares on cash fares and monthly passes to these populations. The level of discount varies from agency to agency (from 40 percent to 100 percent) but is most commonly about a 50 percent discount. K-12 student or youth (ages 6 to 18) discounts are common, but not universal; 27 of 44 agencies offer a discount of typically half-off the regular adult fare. Youth discounts are frequently smaller than discounts offered to seniors or persons with disabilities. Instead of cash fare discounts, five agencies offer a discounted monthly youth pass (note that agencies offering discount youth cash fares offer discounted passes as well).

Some transit agencies that serve large college student populations offer discounted passes to students. Depending on the agency and school, these passes are offered by the month or by the

semester, and may be obtained through the participating institution or through the agency. Table 1-2 provides specific details on discount passes available to college students.

Agency	Participating Institutions	Type of Pass
AC Transit	UC-Berkeley, Peralta Community Colleges, Mills College	Passes offer unlimited rides on AC transit and are renewable each semester. Peralta and Mills passes are also TransLink cards.
Metro	Any accredited post-secondary or vocational institution	Monthly pass loaded on TAP card. Passes are \$36/month, a 42% discount over regular price.
San Diego MTS	21 area institutions	Monthly pass is \$57.60 (20% discount) and is good for unlimited local bus and trolley service. Semester passes are offered at 10 institutions for varying prices. Both passes provide discounts on express bus and commuter rail service.
OCTA	CSU-Fullerton, UC-Irvine, Chapman University (University Pass); 12 community colleges and vocational schools (College Pass)	Unlimited rides on local OCTA buses. University Pass price and duration depend on institution. College Passes are available by quarter or semester (31% discount on both).
Metrolink	“Participating colleges”	Discounts available on 10-ride and monthly passes.
San Luis Obispo (City)	Cal Poly	Students ride free.
Santa Barbara MTD	UC-Santa Barbara, Santa Barbara CC	Free rides with fee paid at registration.
VTA	San Jose State	Semester pass offers unlimited local bus and light rail service, free transfers to AC Transit.
Yolo County Transportation District	UC-Davis, Sacramento State, Los Rios CC	Varies by school. Sacramento State and Los Rios passes are also good for unlimited travel on Sacramento RT.

Table 1-2. Discount Transit Passes Available to College Students.

Agencies can also offer employers the ability to purchase bulk tickets or passes at a discount for employees. Our survey indicates that nine California transit operators make such agreements with employers. Those agencies are listed below, along with any discounts and employers participating in the program, if that information is available:

- AC Transit (Cities of Alameda and Berkeley)
- Altamont Commuter Express (Palo Alto Medical Foundation, Rockwell Collins, Shaklee Corporation, Santa Clara University)
- Caltrain
- Livermore-Amador Valley Transit Authority (annual pass for businesses in Bernal Corporate Park, Hacienda Business Park, Dublin Corporate Centre, Emerald Point, Parkway Properties, and Carl-Zeiss Meditec)

- San Diego MTS (discounts from 10%-25% based on number of employees)
- OCTA
- Metrolink
- Indio SunLine (\$10 off monthly pass price for businesses with five or more employees)
- VTA (82 employers, including Cisco Systems, City of San Jose, the San Francisco 49ers, and Yahoo!. The annual “Eco Pass” provides unlimited service on VTA local and express service and has a “guaranteed ride home” feature in case of emergencies)

Beyond unlimited ride passes and discounts for select populations, we found several instances where operators offer free or discounted service for the general public. Napa VINE, Fresno FAX, and Long Beach Transit offer free service in downtown areas. In addition, the CCCTA County Connection provides free shuttle service in downtown Walnut Creek, which the city subsidizes. Metrolink has discounts of 25 percent for weekend and holiday trips (50 percent off for students). For Metrolink, this is a good way to make use of excess capacity for the times when ridership is likely to be lower relative to normal business hours.

Chapter 2

SOURCES OF TRANSIT FUNDING IN CALIFORNIA

This section identifies the ways in which transit operations and capital programs are funded in California. There are two major sources for examining the nature of transit funding in California: the National Transit Database (NTD) and the State Controller's *Transit Operators and Non-Transit Claimants Annual Report* (Controller's Report). Each has their own respective strengths and weaknesses. The NTD is useful for identifying specific programs and sources that fund transit (for example, individual federal programs and agency-specific activities, such as leases or parking fees), but does not clearly identify *where* the funds were raised (i.e. from state or local governments, or agency special districts). The Controller's Report appears to have more uniform standards for reporting the source of funds by level of government, and also isolates two important sources of agency funds – the Local Transportation Fund (LTF) and State Transit Assistance Fund (STA). Accordingly, this section uses data from the State Controller to describe the overall funding mix for transit operators, and NTD data to identify specific federal, state, local, and agency programs that provide funding for transit. Figures 2-1 and 2-2 display the sources of funds for operations and capital programs by level of government for FY 2007, the last year for which data from the State Controller are available.

Sources of 2007 Operating Funds (\$5.8B)

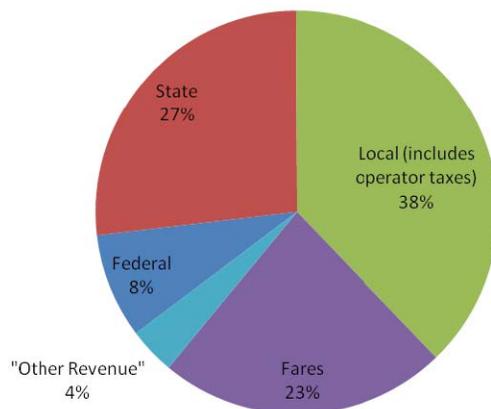


Figure 2-1. Sources of Transit Operating Funds FY 2007. Source: State Controller⁷

⁷ The Local Transportation Fund (0.25% of taxable sales) is included under State funds. This is a portion of the state sales tax that is automatically passed through to the local jurisdiction where the sale took place and is dedicated to public transportation with limited exceptions.

Sources of 2007 Capital Funds (\$1.5B)

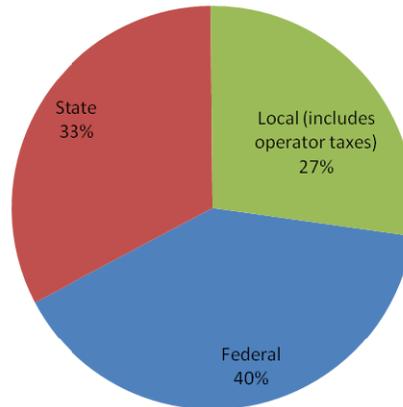


Figure 2-2. Sources of Transit Capital Funds FY 2007.
Source: State Controller

As the figures demonstrate, local governments and transit agencies provide the majority of operating revenues, but the smallest share of capital funds. However, capital revenue sources are split roughly equally between state, federal, and local governments (though the proportions for capital funding vary by year), which is not the case for operating funds. In addition, the state role in operating funds for FY 2007 is exaggerated on account of increased gas prices that provided a record windfall to the State Transit Assistance (STA) Fund. Two recently-enacted bills have changed the funding sources for the STA Fund—historically funded through sales taxes on both gasoline and diesel fuel—so that it will receive funds exclusively from the sales tax on diesel, which is increasing from 4.75 percent to 6.5 percent. This will lower overall contributions

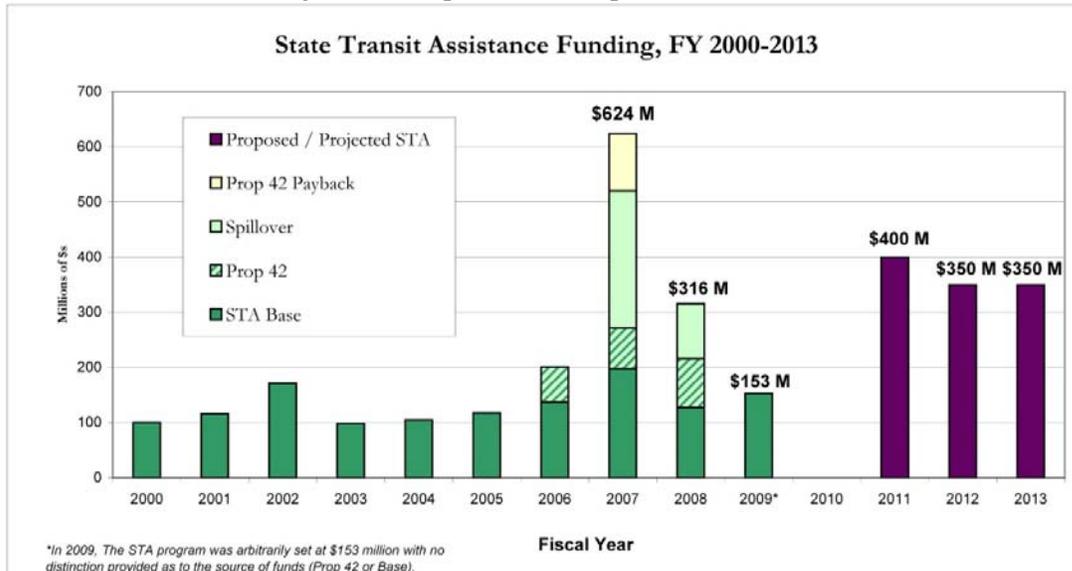


Figure 2-3. Historical and Projected State Transit Assistance Funding. Source: MTC

to the STA Fund, but may increase the stability of STA as a funding source for transit, by reducing the need for the State to divert STA funds to address budget deficits, as has occurred several times in this past decade. Figure 2-3 comes from an analysis of the new legislation conducted by the Metropolitan Transportation Commission and shows STA funding receipts from FY 2000 through FY 2013 (estimated). Note that public transit operators do not receive all

revenues deposited into the STA; Caltrans receives one-third of STA fund revenues to fund intercity rail and other transit programs administered at the state level.

The Controller's Report reveals that a significant amount of funds used for operations are derived from sales taxes. The Local Transportation Fund (LTF) and STA (both of which are funded through sales taxes) contribute 93 percent of state operations funding for transit, while local and transit agency sales taxes comprise 67 percent of local operations funding. The difficulty in predicting revenue from sales taxes, which depend on the vicissitudes of economic cycles, among other factors, makes them a problematic source for such a significant portion of transit operating funding needs in California. Uncertainty regarding the level of funding agencies can expect to receive each year can complicate operational and capital planning, which agencies respond to in different ways (see text box below). Moreover, sales taxes are regressive and bear no relationship to transportation system use, making them poor revenue sources on efficiency and equity grounds, which are among the criteria that are often used to rank sources of transportation funding.

Vehicle Replacement Strategies

Agencies develop capital improvement plans as part of their short- and long-range planning processes. Vehicle purchases to replace aging or obsolete fleets are a major part of agency capital programs – for example, of Lodi GrapeLine's \$10 million multi-year capital program, over \$6 million is dedicated to vehicle replacement, while BART plans to replace its entire fleet of revenue vehicles at a cost of over \$2 billion. In the wake of a deteriorating fiscal environment, some agencies have expressed concern over being able to fund their vehicle replacement programs. This analysis highlights programs used for vehicle replacement, and how some agencies respond to the need to replace aging vehicles in a difficult funding environment.

Agencies rely heavily on federal funding sources to finance their fleet replacement, including grants from the following programs: FTA 5307 (Urbanized Area Formula Grants), FTA 5308 (Clean Fuels), FTA 5309 (Capital Program), FTA 5310 (Elderly and Specialized Transit, for paratransit vehicles), the American Recovery and Reinvestment Act, FTA State of Good Repair funds, and grants from the Congestion Mitigation and Air Quality Program. Local funding sources, including local sales taxes from Propositions A and C in Los Angeles County, Measure A in Sacramento County, and Measure I in San Bernardino County, are often used as matching funds for these programs.

Some agencies recondition buses rather than replace them to save money (AC Transit, Yolo County Transportation District) and some plan to keep using buses beyond what is considered their "useful life," which is twelve years for a standard 40-foot bus. Funding uncertainties also cause several agencies to take a tiered approach in their capital plans, with "fully funded" plans including complete fleet replacement and "constrained" plans replacing fewer vehicles and slowing the pace of replacement. For example, Omnitrans proposes three capital plan scenarios in its SRTP: "Constrained," "Partially Constrained," and "Unconstrained." In its constrained scenario, Omnitrans mainly programs funds for vehicle rehabilitation and replacement, while the less-constrained scenarios involve increased vehicle purchases for both replacement and expansion of service.

Some agencies, for example Fresno Area Express, are using fleet replacement as a way to help them expand their fleets, so they plan to continue using some old buses after new ones are purchased. Golden Gate Transit is not expanding its fleet but plans to change its composition, increasing the number of larger buses in their fleet. In its SRTP, Santa Monica's Big Blue Bus advocates that agencies engage in joint procurement of transit vehicles to lower vehicle prices by making larger group purchases; however, it is unclear whether Santa Monica has been able to succeed in having multiple agencies coordinate vehicle purchases. There may be fewer opportunities for joint procurement in the future, as agencies explore different fuel paths for new vehicles (see Chapter 6), which may be produced by multiple different manufacturers.

The next section of this memo will go into greater detail regarding funding programs for transit at the federal, state, and local levels, as well as funds that agencies raise on their own.

Federal Funds

In 2008, California transit operators received just over \$1 billion in funds from the federal government. The vast majority of the funding comes from the Federal Transit Administration (FTA) and is allocated through Urbanized Area Formula funds, but other federal agencies, such as the Departments of Transportation and Homeland Security, provide limited funding as well. Figure 2-4 shows a breakdown of sources of federal funds for transit, each of which will be explained in further detail below.

Sources of Federal Transit Funds

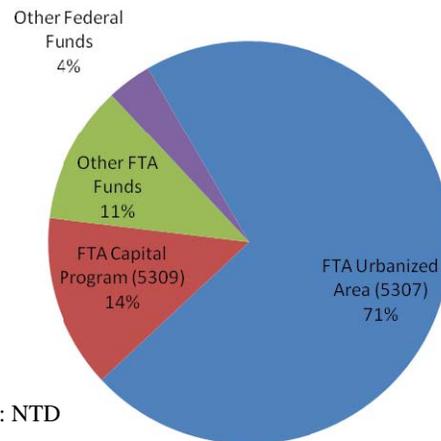


Figure 2-4. Federal Funds for California Transit in 2008. Source: NTD

FTA Urbanized Area Funds (5307) – These funds are allocated to urbanized areas (census-defined areas with population 50,000 or greater) by formula relating to population size and amount of transit service supplied. Funds must be dedicated to capital projects or preventative maintenance, though operating expenses are an eligible expenditure for urbanized areas containing less than 200,000 people. In 2008, California transit operators received over \$725 million in urbanized area formula funds and reported spending \$335 million on capital projects and \$384 million on operations.

FTA Capital Program Funds (5309) – These funds are allocated by a combination of formulas and discretionary grants. Eligible expenses include new or extension of fixed guideways, improvement of fixed guideways, purchase of rolling stock, facilities construction, and preventative maintenance. California transit operators received \$141 million in capital program funds in 2008.

Other FTA funds – a variety of programs established in the transportation authorization law SAFETEA-LU and administered by FTA provide funds for specific transit purposes. NTD data for 2008 shows transit operators in California receiving \$114 million in funds from the following programs:

- Transportation for Elderly Persons and Persons with Disabilities (5310)
- Rural and Small Urban Areas (5311)
- Clean Fuels Program (5308)
- Metropolitan Planning (5303)
- Job Access and Reverse Commute Program(5316)
- New Freedom Program (5317)

The single largest source of these funds was section 5310, which provided \$53 million for ADA-related service. Almost all of these funds (\$52.5 million) went to Access Services Incorporated, a major provider of paratransit service in Los Angeles County.

Other federal funds – Transit agencies received \$36 million in funds from a variety of other federal agencies, mainly from the Department of Transportation, the Department of Homeland Security, and the Internal Revenue Service in the form of tax credits for alternative fuels. A total of 22 disbursements were made from other federal agencies. The size of the grants ranged from \$5.5 million (to BART from the Federal Highway Administration) to \$5,400 (also to BART, from the Federal Bureau of Investigation).

State and Local Funds

State and local funds make up nearly two-thirds of transit revenues in California. As Figure 2-5 shows, the most common type of support that agencies receive are sales taxes, with 70 out of 84 agencies listed in the 2008 NTD data indicating they received funds from sales taxes. Local sales taxes may be imposed by a special district that operates transit service (for example, BART, OCTA, or LACMTA) or one that allocates funds to transit agencies (such as the Contra Costa, Fresno, or Sacramento County Transportation Authorities).

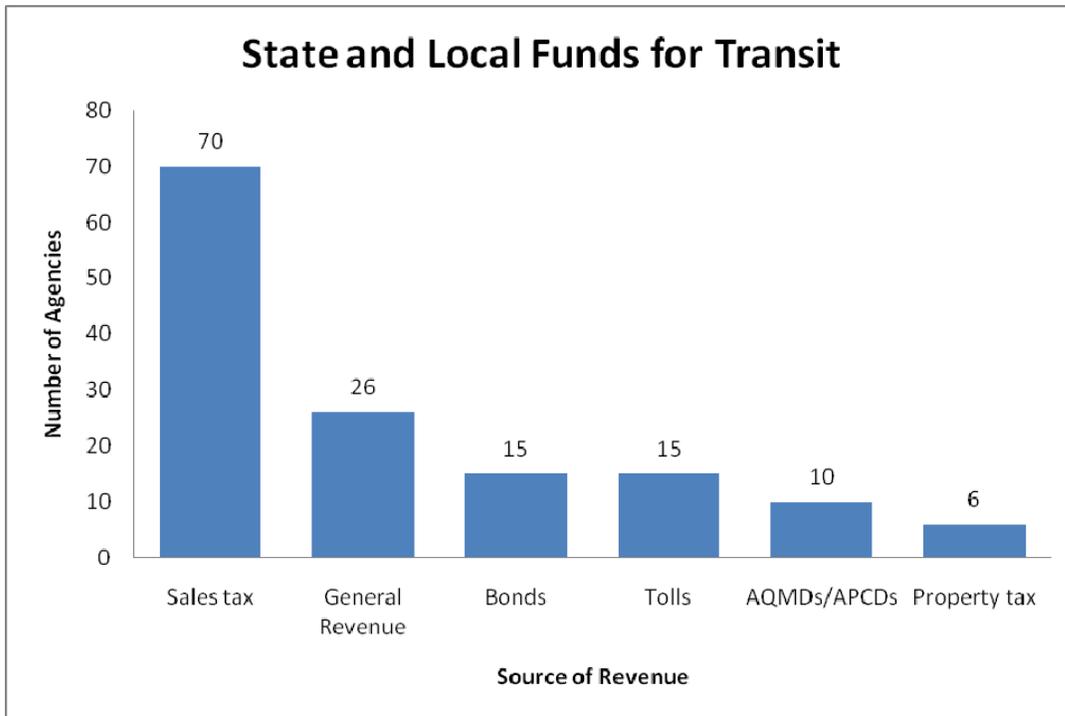


Figure 2-5. Transit Revenues from State and Local Sources in 2008. Source: NTD

The next most common source of state and local support is general fund revenue – a distant second, with 26 agencies reporting support from this source.

Revenue bonds were a source of capital funds for fifteen transit agencies. Bond proceeds were identified as mostly coming from Proposition 1B funds (only Caltrain identified funds from Proposition 116 intercity rail bonds in 2008). Some transit operators also issue bonds themselves, including BART, LACMTA, Caltrain, and the North County Transit District.

Of the fifteen operators receiving money from tolls in 2008, thirteen are Bay Area transit agencies receiving toll revenues from area bridges. The other two agencies that reported receiving toll revenues are San Diego MTS and OCTA. OCTA reported generating over \$5 million in high-occupancy toll (HOT) revenues for transit.

Funds from air quality management districts/air pollution control districts tend not to be very large (grants are typically under \$1 million), but can be useful as sources for specific transit or transit-complementary programs. For example, Caltrain receives funds from the Bay Area AQMD to support last-mile shuttle services to major employment destinations in its service area, and SamTrans receives funds to operate shuttle service to BART stations in San Mateo County. Transit agencies identified the source of AQMD/APCD funds as coming from developer mitigation fees and local option vehicle registration fees.

Only six transit agencies reported receiving funds from property taxes, but this represented a significant source of revenues for three of those agencies: AC Transit (\$145 million coming from local property taxes and a parcel tax levied by the agency in roughly equal amounts), BART (\$65 million), and OCTA (\$22 million). The other three agencies (San Joaquin RTD, Santa Barbara MTD, and City of Alameda Ferry Services) reported receiving less than \$1 million from local property taxes.

High-Yield State and Local Fund Sources Outside of California

Transit agencies across the United States receive money from many of the same state and local sources as California's transit operators, namely sales taxes, property taxes, bonds, and general revenues. Below are some examples of funding sources used outside of California that have significant revenue generation potential:

Petroleum Business Taxes: New York State levies fees on petroleum businesses, assessed per gallon of fuel sold, and dedicates a portion of the revenues to transit.

Vehicle Excise Tax: Washington State allows local governments to charge excise taxes on vehicles, whose value is determined when the vehicle is licensed. Sound Transit (the major operator for the Seattle metropolitan area) levies a 0.3% motor vehicle excise tax that generated \$69 million for the agency in 2008.

Payroll taxes: Oregon allows local governments to institute local payroll taxes and dedicate revenues to transit. This is a major revenue source for Portland Metro, providing over \$214 million in 2008. A smaller Oregon operator, Lane County Transit, received \$26 million from payroll taxes.

Income taxes: State and local governments in Indiana, New York, Ohio, and Oregon distribute income tax receipts to transit agencies. State taxes provided over \$600 million to the New York MTA, and a local income tax of 0.3% in Cincinnati generated over \$40 million for SORTA, the regional transit operator.

Directly Generated Funds

California transit agencies raised about \$1.8 billion in the course of their operations, or 23 percent of total revenues in 2008. These "directly generated funds," in NTD parlance, include fares, parking revenues, advertising revenues, and income from leasing land, equipment, or other facilities. Figure 2-6 shows the most common sources of directly generated funds, which are explained in greater detail below.

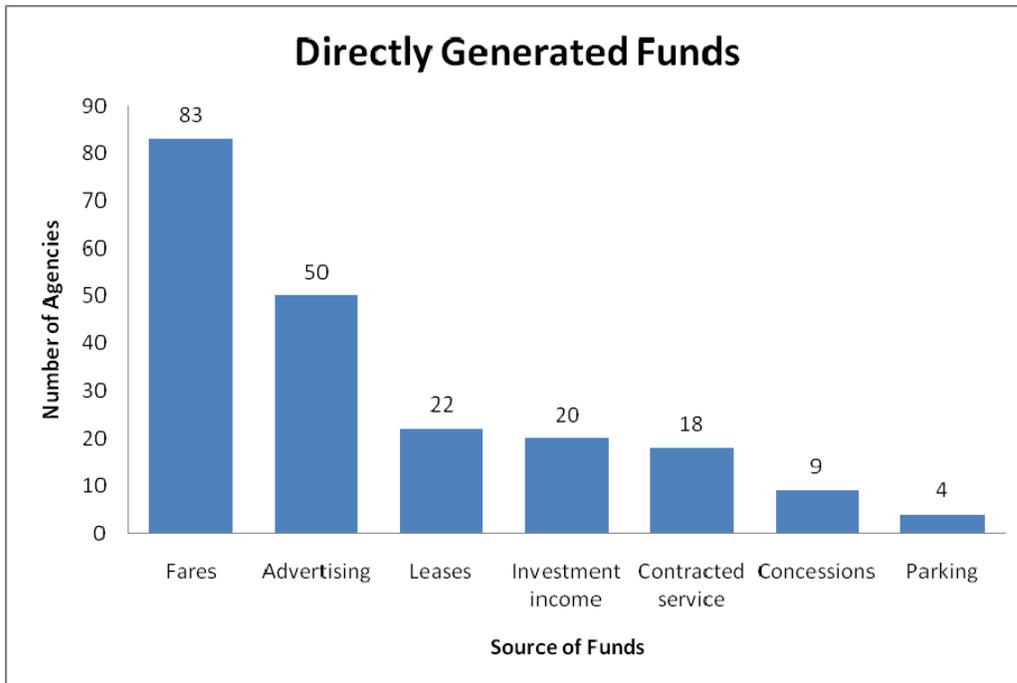


Figure 2-6. Major sources of directly generated funds in 2008. Source: NTD

Fares: Of the 84 agencies reporting to the NTD, only one (Commerce Bus Lines) does not collect fares for fixed-route or dial-a-ride service. Fares make up the greatest share of directly generated revenues, accounting for 81 percent of such funds. As noted in the first chapter on agency fare policy, many agencies have had to raise fares in response to lower-than-anticipated sales tax revenues, state cuts in transportation funding, and higher operating costs. Most agencies discuss fare increases on an ad hoc basis, but there are a few exceptions: LA Metro and Omnitrans schedule fare increases in multiyear plans, while BART has a program to adjust fares according to changes in the consumer price index through 2012.

Advertising: Transit agencies frequently receive payment for hosting advertising space on or inside vehicles, bus shelters, and other agency properties; fifty agencies reported receiving funds in exchange for advertising space. It stands to reason that the largest transit agencies (LA Metro, BART, Muni, OCTA) are also the ones that gross the most advertising revenue, since these agencies have the most space on vehicles and other facilities to offer for advertisements. However, advertising revenues can make up a significant share of directly generated funds for smaller transit agencies. For Petaluma, 16 percent of directly generated funds come from advertising revenues, and CCCTA’s County Connection gets 12 percent of directly generated funds from this source. Of the larger transit agencies, Muni receives the largest proportion of directly generated revenues from advertising, which is 7 percent of all Muni revenues.

Investments: Some agencies manage “enterprise funds” that engage in investment activities. BART reported the largest amount of investment income among California transit operators, \$49 million.

Leases: Transit agencies generate revenues from leasing facilities, agency-owned land, and equipment. Some examples are:

- BART received \$5 million from telecommunications companies to run fiber optic cables alongside BART’s right-of-way and to install other equipment on agency property.
- LA Metro received \$1.5 million for rental space in agency-owned buildings.
- Golden Gate Transit received \$600,000 from leasing vehicles and agency property.

Leases are classified in the NTD under “non-transportation” revenue, along with investment income, various fees, and sales of assets, so it is often not possible to distinguish which of these sources raised what revenues (unless the agency supplies that information in an adjacent field). Importantly, if transit agencies are receiving funds from joint development activities, this is not indicated in the NTD.

Contracted Service: Eighteen transit agencies reported providing charter or contract service for public and private entities. Contracted service can be for regular or one-time events (for example, LA Metro received \$240,000 for providing shuttle service to the Hollywood Bowl).

Parking: Only four agencies reported receiving revenues from parking facilities, in amounts ranging from \$1.4 million (BART) to \$64,000 (SamTrans). Undoubtedly, many more agencies provide parking for riders without charging for it, indicating that this remains a source of untapped revenue for transit agencies.

Conclusion

Transit agencies receive funds from a diverse source of state, federal, and local funds, as well as revenues that transit agencies generate during the course of ordinary operations. Most federal funding comes from the Urbanized Area formula grant and Capital programs. The most common source of state and local funds was sales taxes, followed by general fund revenues. The heavy reliance on sales taxes at the state and local levels creates uncertainty for transit agencies, because revenues can fluctuate heavily. Nearly all agencies charge fares; advertising is also a common source of directly generated revenues. In many cases, it is difficult to draw precise conclusions about how transit agencies finance their operations and capital expenditures due to ambiguous categories within the NTD and a lack of uniform reporting standards for agencies.

Chapter 3 STANDARDS AND PERFORMANCE MEASURES

Standards and performance measures are important components of short range transit plans. Almost every agency has one or several sets of standards by which to judge the effectiveness of existing services. Twenty-four of the 39 agencies in this study have included specific numerical and performance targets in their transit plans against which to measure the degree of success in operations, financial management, and customer satisfaction (see Figure 3-1).

Both internal evaluations and external surveys allow agencies to establish guidelines for setting performance goals. Performance indicators in BART’s Quarterly Performance Report, for example, measure the achievement of specific goals based on benchmark standards in the areas of customer experience, transit travel demand, physical infrastructure, and financial health. Customer surveys can also influence the planning of standards. BART uses a passenger survey conducted by an independent research firm every two years as an external evaluation of their services (see Figure 3-2).

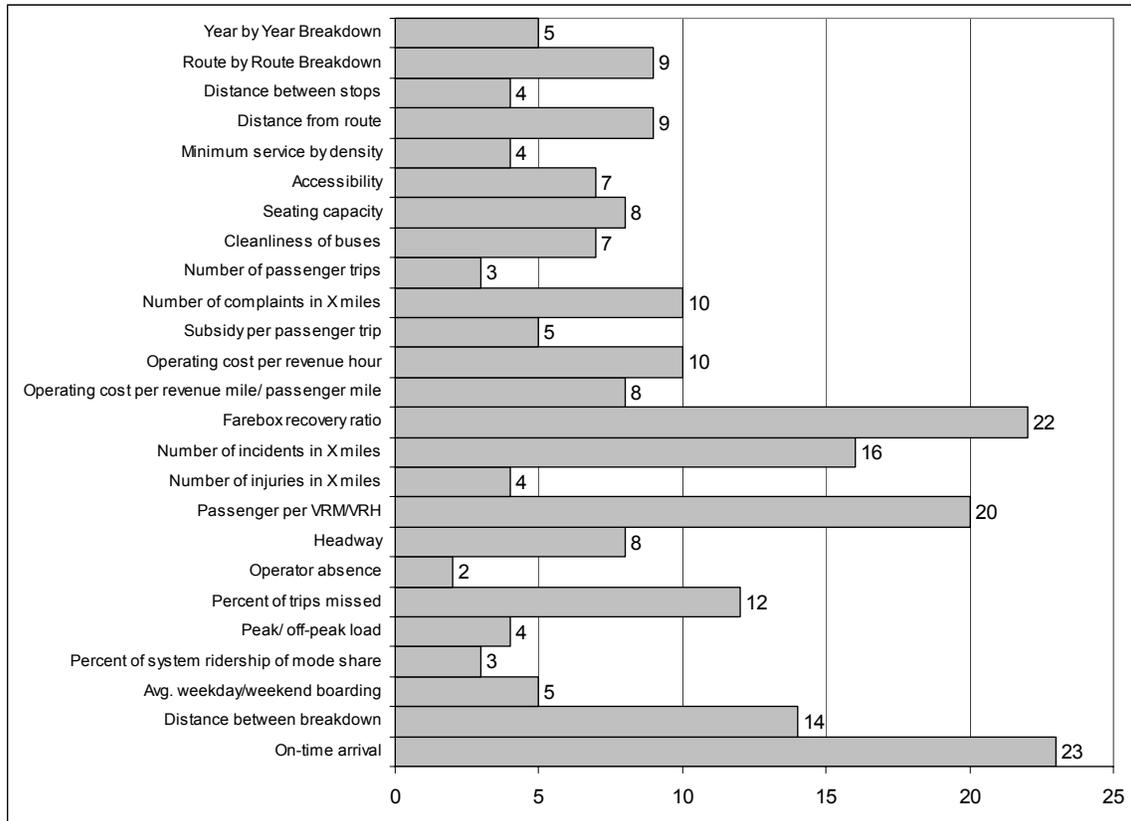


Figure 3-1: Common Performance Measures

Common Standards

The most commonly shared standard is *on-time performance*. On-time performance is frequently defined as arriving less than five minutes after the scheduled arrival time and departing less than one minute before scheduled arrival time, or never departing early at all; most agencies aim to achieve between 90 and 95 percent on-time arrivals.

Another common standard is the *farebox recovery ratio*, usually defined as the proportion of revenue generated through fares by its paying customers as a fraction of its total operating

expenses. In California, operators are (theoretically) required to maintain a farebox recovery rate of 20 percent to receive Transportation Development Act funds (equal to 0.25 percent of taxable sales made in the state). However, target recovery ratios vary widely among agencies. Some agencies have little trouble meeting this particular target, while some choose to set more ambitious ones. Fresno Area Express has a 28 percent farebox recovery ratio target and Foothill Transit has set a target of 26.33 percent recovery ratio. Santa Barbara Metropolitan Transit District has been able to maintain a high farebox recovery and has set their target at 40 percent. Other agencies may have to set lower targets due to the travel characteristics of the service population or the physical characteristics of their service area. The Napa County Transportation and Planning Authority had difficulty achieving a 20 percent recovery ratio because it services a wide area with varying transportation needs. To adjust to the challenges presented by its service coverage, the agency lowered its expected recovery ratio to the MTC-set standard for mixed-service areas with local suburban and intercity rural service, which is 17 percent.

Farebox recovery ratio targets may fluctuate depending on the type of service, the characteristics of the ridership, and possible funding opportunities for the service. For example, Amador Valley Transit set a 90 percent recovery rate on certain lines. Some agencies are only willing to operate certain services if they can achieve greater sustainability in farebox recovery with minimal investment. Agencies also understand that passengers are willing to pay a higher price for services like fast commuter routes, so they can charge a higher fare. Santa Clarita Transit has set a higher farebox recovery ratio for its commuter services than for its other fixed-route services: 30 to 35 percent commuter compared to 20 percent fixed-route.

Passenger boarding is also used to measure the effectiveness of routes. Counting the number of average boardings per day, week, or month allows agencies to compare short-term usage to long-term trends and goals. The Santa Clara VTA uses passenger boardings to identify underperforming services (see Figure 3-3). The primary

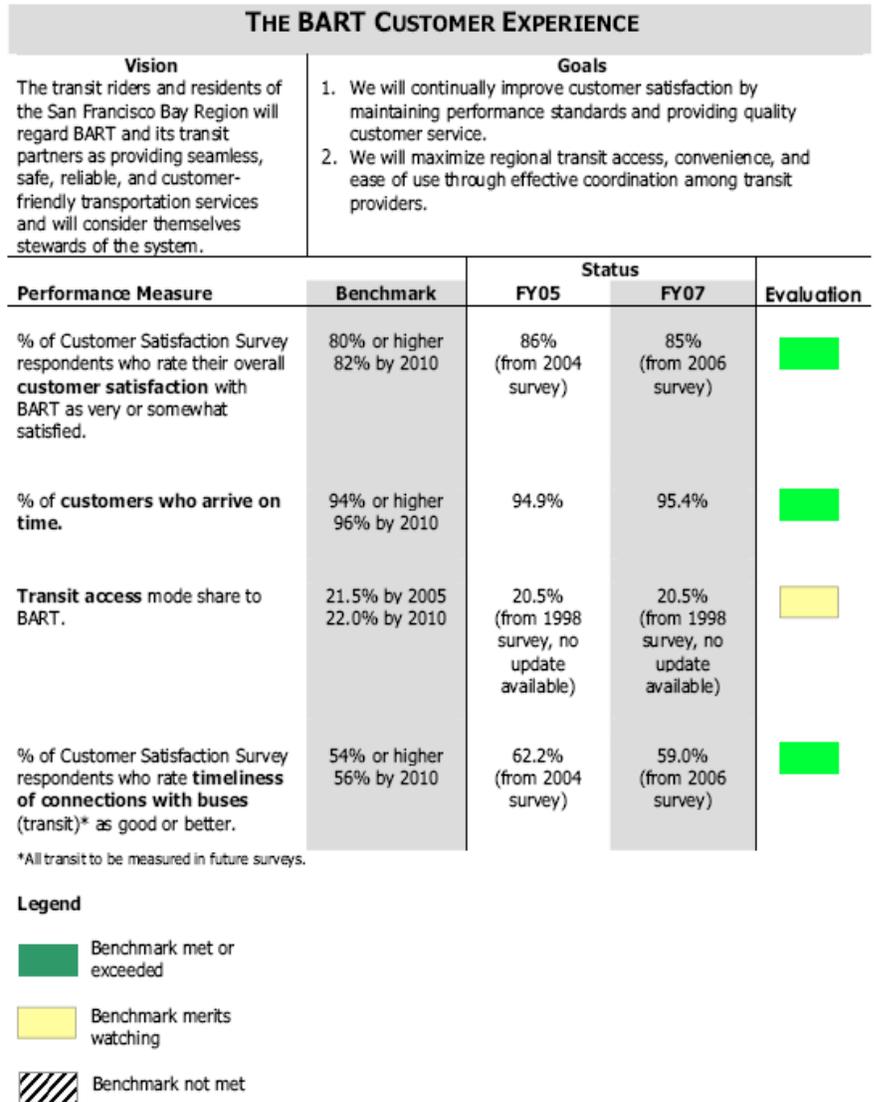
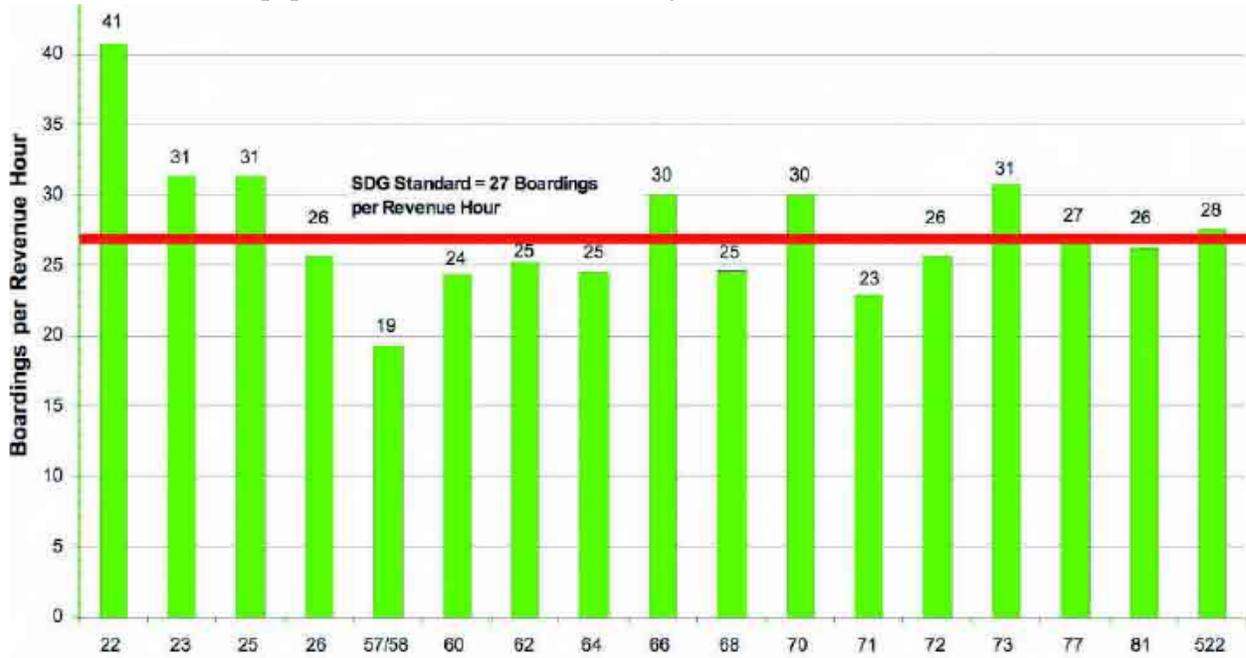


Figure 3-2: Performance evaluation in BART's Strategic Plan
Source: BART Short-Range Transit Plan 2008-2017

standard for buses is average boarding per revenue hour, and the secondary standard is daily boardings per station. Routes that do not meet minimum boardings per revenue hour and still have not met that minimum after restructuring and operation refinement might be discontinued. For rail services, that may mean that underperforming stations are skipped or closed. Passenger boarding can help determine the efficiency of a service, but can vary greatly between agencies due to the different populations and areas that transit agencies serve.



Source: Average Weekday Boardings, VTA Performance Operational Report, FY 2007.

Figure 3-3: Evaluation of Boarding Levels on VTA Routes

Source: Santa Clara Valley Transportation Authority Short Range Transit Plan 2008-2017

Many commonly used standards among transit agencies have values that vary greatly depending on the context of the service area and population (see Figure 3-4). Passengers per revenue hour and passengers per revenue mile, for example, vary widely among agencies. Agencies that serve denser areas with larger transit-dependent populations will expect greater passenger use than less dense areas with a dispersed population and fewer route services. Aside from common standards, such as the 20 percent farebox recovery, agencies develop standards unique to their own operations and appropriate for the amount and extent of service they provide. For example, revenue miles between roadcalls range from 4,000 for San Luis Obispo Transit to 9,000 for Santa Rosa CityBus. From a service and safety perspective, standards are just as varied. Revenue miles between preventable accidents range from 70,000 for San Luis Obispo Transit to 400,000 for the Golden Gate Bridge, Highway and Transportation District.

Review Procedures

Despite different approaches to route evaluation and different indicators, most agencies follow the same fundamental steps to review service. The Central Contra Costa Transit Authority provides a good example of the evaluation process. The first step is the collection of information for each productivity indicator. Next, the information on each route is evaluated based on standards for each indicator, then overall effectiveness is reviewed. Using a productivity rating based on four quantitative measures and one qualitative measure, CCCTA conducts quarterly

route evaluations. Routes that do not meet the minimum standards set by the four quantitative indicators — 1) passengers per revenue hour, 2) passengers per revenue mile, 3) subsidy per passenger trip, and 4) morning peak load factor — or that fall below a 30th percentile route productivity ranking for consecutive quarters — will be subject to corrective action. An exception can be made if the route fills a need, which is evaluated by numbers of route-dependent riders served, the value of the route to the community, and level of subsidy from outside sources.

The final step of the review process includes recommendation for corrective procedures, and the route will be reviewed again in the next cycle of evaluations. If it still fails to meet standards, it will either be corrected again, restructured, or discontinued. The use of specific indicators may vary between agencies, but each procedure to evaluate performance follows the basic order of operations: acquire information for indicators, measure against a set standard, and take corrective action.

Establishing quantifiable standards is a fundamental requirement for evaluating the operating efficiency of transit routes. Although many common performance indicators are used to measure service effectiveness, the numerical performance goals of each agency are different, and they are shaped by targets formed within each service context. Some standards, such as farebox recovery ratios, are relatively easily carried over from agency to agency. Other standards are more difficult to translate due to distinctive service areas, both in quantifiable terms—for example, population size and density—and in qualitative terms, such as mode choice. It is difficult to set uniform standards for all transit agencies, but adopting common performance indicators can provide a list of measures that will help agencies evaluate their transit operations.

System Performance	Safety	Financial Sustainability	Customer Focus	Other
On-time arrival	Number of injuries in X miles	Farebox recovery ratio	Number of complaints in X miles	Minimum service by density(dwelling units per acre)
Distance between roadcall/ mechanical breakdown	Number of incidents in X miles	Operating cost per revenue mile/ passenger mile	Number of passenger trips	Distance from route
Average weekday/ weekend boarding		Operating cost per revenue hour	Cleanliness of buses	Distance between stops
Percent of system ridership or mode share		Subsidy per passenger trip	Seating capacity	
Peak/ off-peak load			Accessibility	
Percent of trips missed				
Operator absence				
Headway				

Figure 3-4: Common Performance Measures

Chapter 4

TRANSPORTATION FOR DISABLED, SENIOR, AND LOW INCOME TRAVELERS⁸

Inventory

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of August 2005 required metropolitan planning organizations to create a Coordinated Services Plan that identified the transportation needs of elderly, disabled, and low-income individuals and come up with strategies for meeting those needs. The first necessary step in the process is creating an inventory of existing services. The task is complicated by the fact that transportation services are provided by many different entities, including public transit agencies, public health services agencies, and private entities, both for-profit and not-for-profit. Some of the MPOs used stakeholder surveys to find out what services various groups offered to different populations; some interviewed responsible parties; some held public meetings and invited users as well as providers and operators.

Transportation providers can include transit agencies, cities, counties, senior centers, faith-based agencies, independent living centers, adult day health care centers, social service agencies, and for-profit paratransit companies. Each group offers different services to different population groups. Transit agencies, for example, provide disabled access (such as ramps and lifts for wheelchairs) on regular fixed-route services, but also provide on-demand services where fixed-route buses are infrequent or nonexistent. Some demand-response services are run by the agencies themselves; some are provided by other operators on contract. Other providers offer transportation to certain groups for certain purposes (for example, medical appointments for disabled clients) but not for other groups and/or not for other purposes. Some subsidize transit trips or provide vouchers for taxis.

Not all of these agencies and providers report to the National Transit Database, and there is no central deposit of data that lists all the groups that provide transportation to these populations, although Caltrans' Division of Mass Transit lists the California agencies and their Coordinated Plans on its website.

Coordination

The Coordinated Services Plans reviewed for this report (from the MPOs for Los Angeles [SCAG], Orange County [OCTA], San Diego [SANDAG], Sacramento [SACOG], and the Bay Area [MTC]) all identified coordination of transportation services as a key to improving efficiency and closing service gaps. However, coordinating is made challenging by a number of barriers, including the lack of a centralized services inventory: many agencies did not know with whom to coordinate. Also, funding requirements make coordination difficult; some don't allow or make it difficult to mix social service clients with other consumers. Agencies frequently operate on tight budgets, and insufficient staff, vehicles, and funds can prevent coordination efforts such as developing plans and programs which would require extra time and resources. Other barriers identified in the Coordinated Plans include variations in consumer/client needs, trip lengths, language barriers, liability insurance, service quality and timing concerns, same-day trip requirements, training, and jurisdictional constraints, especially in large metro areas where people must cross city and county lines to reach their destinations. In addition, some entities say they are not interested in coordinating with other agencies.

⁸ For the purposes of the report based on documents reviewed, "seniors" are defined as people age 65 and over, and "low income" is based on the US Census-defined poverty level

There is also the matter of overall goals. The Coordinated Services Plan developed by the Southern California Association of Governments (SCAG) points out that “for public transit, transportation services are its core business, around which significant infrastructure has been built. For human services agencies, transportation is a support service and often viewed as a distraction from the agencies’ primary purpose.”

Also in the SCAG plan, the following paragraph highlights other differences between agency types which might contribute to the difficulty of coordinating existing services:

Although both serve the public, differences are clearly evident at the institutional level. Human service organizations are closer to the client, have a better understanding of individual needs and requirements, and focus their day-to-day efforts on addressing and resolving issues on behalf of the individual. Public transit is more attentive to “mass” needs only in relation to providing service, with considerably less awareness of the individual. This was evidenced in the inventory process where human service agencies/organizations identified a breadth of needs while a much smaller proportion of responding public transit agencies/organizations could pinpoint customer needs. Public transit operators talk in terms of one-way passenger trips, and apply productivity measures of cost per hour and passengers per hour. Human services personnel speak of client days and per diem rates, and often understand trips as vehicle trips.

The Bay Area Metropolitan Transportation Commission’s (MTC) Coordinated Services Plan points out that coordination may require a larger effort than can be anticipated: “Perhaps the most important ‘lesson learned’ ... is that successful implementation of coordination strategies will require the joint cooperation and effort of multiple entities that may or may not have coordinated well in the past. Often, a champion is needed to assume leadership and manage implementation efforts; this ‘champion’ may vary from case to case.”

Funding

Major funds for transportation services for these populations come from federal programs such as JARC (Job Access and Reverse Commute), New Freedoms (integration of disabled workers), and Section 5310 (Americans with Disabilities Act) funds. However, these are not the only potential funding sources; the Sacramento Coordinated Plan includes an appendix containing a long list of federal programs that can fund transportation for the “transportation-disadvantaged,” including health, labor and training, development, and equity grants.

Funding regulations that prevent combining transportation funds with human service agency funds can erect barriers to coordination. According to the Bay Area Metropolitan Transportation Commission’s Coordinated Service Plan, “often, social service funds are dedicated to meeting the needs of a specific clientele (e.g. developmentally disabled individuals, seniors, etc.) and funding source or agency rules preclude using these funds in combination with others because of their need to ensure agency funds are appropriately utilized for their respective clients.” Most funds come with restrictions on their use, and many can only be used for specific purposes. For example, JARC/New Freedom funds cannot be used to subsidize fares on existing fixed route or paratransit service. In California, MediCal funds cannot be used to purchase transit passes (although federal regulations allow this) so those agencies that would otherwise provide transit vouchers to their clients cannot do so, unless they find a different funding source for that purpose. Frail elderly people who cannot ride fixed-route buses but do not qualify as disabled under the American Disabilities Act may have difficulty finding transportation for nonmedical trips because many human services agencies can only pay for medical trips. All of this can make it very difficult for clients to figure out how to get a needed ride (see Figure 4-1).

This inability to combine funds also makes it difficult for providers to share resources and costs for equipment and operations. For example, vans used for job access may be underutilized at off-peak times, but under funding rules it may not be possible to use them for

other kinds of trips or by other trip providers. Being able to share resources could be a huge efficiency gain for these operators.

City-operated systems and public transit operators receive continuing, relatively stable funding from federal, state, and local dedicated transit sources. Human services agencies generally rely on private donations, general fund allocations, and special grants. Ironically, given the large cutbacks suffered by many transit agencies in recent years, public transit therefore has a more reliable year-to-year budget for transportation than many human services agencies.

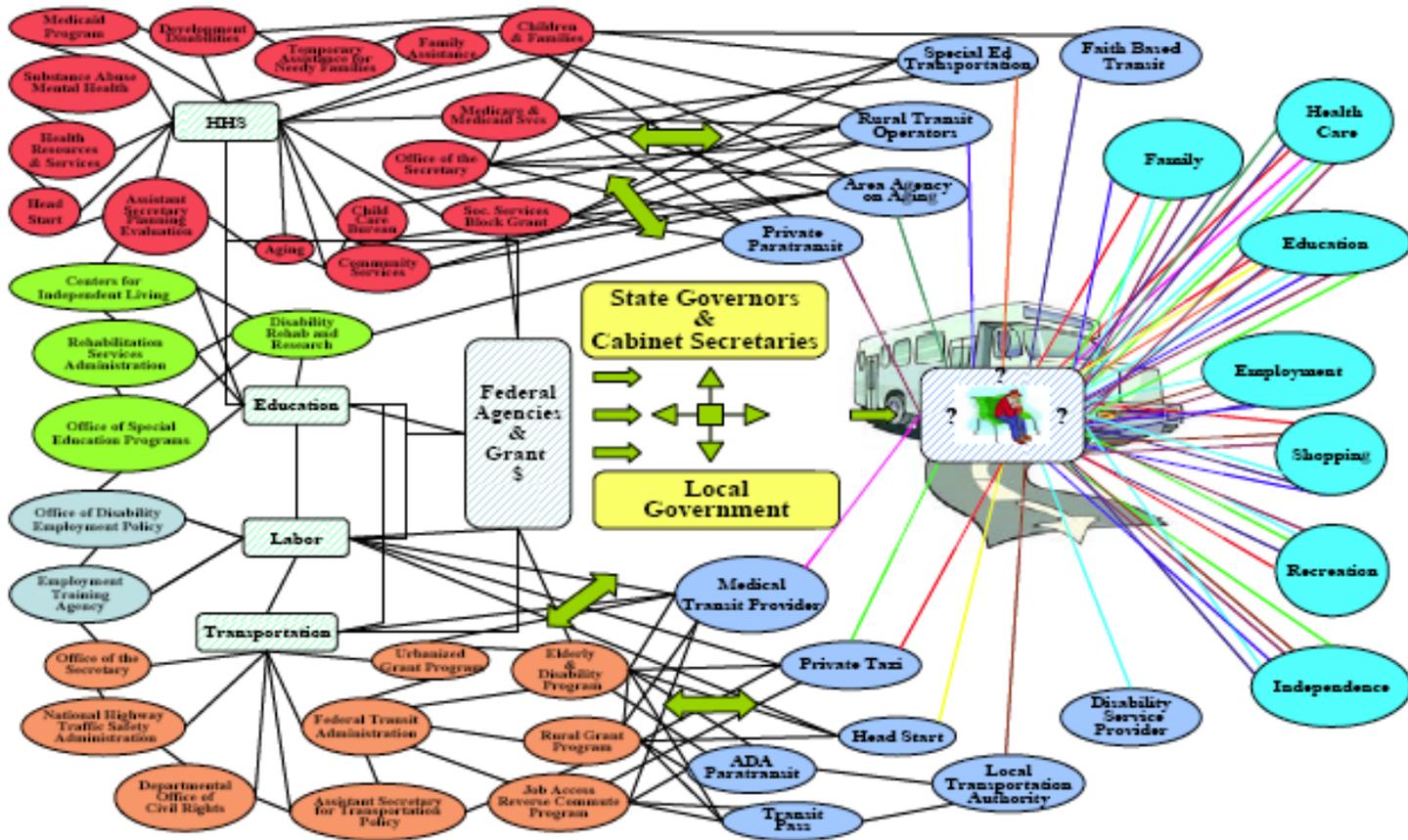


Figure 4-1: Finding a Ride
Source: United We Ride, 2007

Trip Purposes for Special Needs Populations

The Los Angeles Coordinated Services Plan ranked medical trips, same day transportation, multiple errand trips and weekend and evening trips as the top five areas of need in its service area. Medical trip needs were the highest need reported by participating agencies, and more than half reported serving same-day trip needs.

The Los Angeles coordinated plan also found that non-emergency medical trips and inter-community medical trips were the most consistently difficult-to-meet trip type needed across all groups. This is in part due to MediCal reimbursement policy, as mentioned above, and is a particularly a problem in Los Angeles, where medical trips can be to distant regional facilities.

The types and purposes of trips taken by disabled, elderly, and low-income people vary widely and are not easily categorized, and therefore not easy to serve with a simple, generic plan. Transit can serve some of these needs, and indeed the need for expanded public transit was the most frequently raised transportation barrier in the outreach process conducted by the Bay Area's MTC. However, not everyone can take public transit, and public transit doesn't cover every area. For example, in rural areas where there are no fixed-route services, demand response is a lifeline for elderly and disabled people who would otherwise be without any transportation. SANDAG sounded a note of dismay in this regard, saying, "It seems unlikely that the region will be able to provide the same level of human service transportation services and mobility choices for people living in rural areas as for those people who are living in urban areas."

Taxis can be a solution for some transportation needs, for example for seniors who may need special care but may not be ADA paratransit eligible, or low-income residents traveling during off-hours or for emergency purposes when regular transit may not be available. But, as MTC points out, "taxis are regulated at the local level, and most jurisdictions do not require the availability of accessible vehicles within the local taxi fleets. Even within a county, regulatory oversight of taxi programs is not necessarily consistent from city to city."

Recommendations in Consolidated Plans

Two key recommendations were found in the plans reviewed. First, MTC recommends establishing "mobility managers" based on geographic areas to oversee the coordination of programs and funding for all modes of transportation for senior, disabled, and low-income people. One possibility is to use a Consolidated Transportation Service Agency in this role. Presently there are no CTSA's in the Bay Area. In Los Angeles County, the designated CTSA is Access Services, Inc., which serves as the regional paratransit provider. A state-mandated local governmental agency, it is also responsible for disabled access on public transit as well as for coordinating the transportation programs of the county's social services agencies.

Second, improved coordination between land use development and transportation was raised as an issue during MTC's outreach process. Social service agencies, medical facilities, senior housing, and employment centers are not always easily accessible by public transportation, and location decisions for key services may not fully account for existing transit routes.

Chapter 5

BUS RAPID TRANSIT

Bus Rapid Transit, or BRT as it is commonly known, is a term for a variety of ways to speed up bus service and make it more like rail. It commonly but not always includes bus-only lanes to eliminate competition with other traffic, stations with raised platforms to ease boarding, and other elements such as fare prepayment, signal priority for buses, real-time arrival information, and limited stops. One of the attractions of BRT for transit agencies is its relatively low infrastructure cost and flexibility compared to rail, as well as its potential for quick implementation. Also, by providing faster, high-quality service, agencies hope to attract more riders to their system. BRT can combine the best features of rail with the flexibility and cost advantages of roadway transit. In fact, sometimes BRT is considered a precursor to rail—a quickly built, flexible alternative that might one day become a more permanent system.

Not every BRT contains all the elements of a complete Bus Rapid Transit system, and there is no strict definition of what comprises BRT. The first such system, built in Curitiba, Brazil, was built quickly and relatively cheaply, and its large and rapid success led to a great amount of interest in other countries, including the US. The Federal Transit Administration maintains a BRT website (www.nbtri.org) and publishes several guides to planning and implementing BRT, including information about how to adapt it to local needs. Caltrans also published *Bus Rapid Transit: A Handbook for Partners*, with definitions of the various elements that comprise BRT and a discussion of existing and planned BRT systems both within California and outside the country. See Figure 4-5 for a Caltrans map of BRT in California. Of 40 California transit agencies studied, at least 22 operate some kind of express bus service, and 13 agencies specifically mention Bus Rapid Transit in their future plans. These range from proposed plans and guidelines, to completion of Environmental Impact Reports and an ongoing process for public input, to detailed consideration of a future BRT system that may or may not have public support (Livermore/Amador Valley). Each BRT proposal is unique, and few adopt every element of a complete system. Some consider express buses, for example, a kind of “BRT light,” and several agencies are considering an “incremental” BRT, in which they adopt a few easily and relatively inexpensive components, with an eye toward adding more pieces in the future.

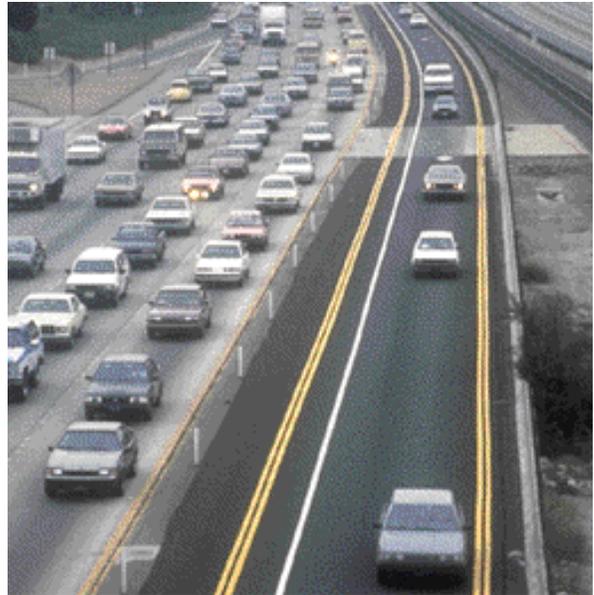


Figure 4-1: El Monte Busway
Source: US Department of Transportation

Existing BRT Systems

The first exclusive bus lanes built in California were the El Monte Busway lanes (Figure 4-1). Opened in 1974, the bus-only route parallels the I-10 freeway into Los Angeles from El Monte, and serves three bus stations and several park-and-ride lots. In 1976 the lanes were opened to carpools, so although the 13-mile route is no longer exclusively a bus-only facility, it speeds up bus service considerably along its route. Foothill Transit runs an Express bus route called Silver Streak which uses the El Monte busway to carry commuters to and from the San

Gabriel Valley to downtown Los Angeles, providing a quick commute between designated station stops. (A US Department of Transportation Executive Report, *Effects of Changing HOV Lane Occupancy Requirements: El Monte Busway Case Study* discusses what happened in the El Monte Busway when the HOV occupancy requirement was changed from three to two—congestion on the busway increased considerably—and raises other issues that are germane to BRT, such as enforcement and management of lanes.) Other existing BRT systems in California include the Orange Line in Los Angeles, a fourteen-mile route in the San Fernando Valley that



Figure 4-2: Orange Line, San Fernando Valley
Source: LACMTA

uses a former railroad right-of-way as a dedicated, bus-only lane. The Orange Line, the first of several BRT systems planned for the Los Angeles area, also features low-floor buses, pre-board payment, and articulated buses that can reach speeds up to 55 mph between stations. It connects at one end with the Metro Light Rail system, and as such is a primary feeder for the LA Metro into downtown Los Angeles.

The Los Angeles Metropolitan Transportation Authority also operates a Metro Rapid system that has some BRT features, including traffic signal priority for buses, low floor buses, and "NextBus" real-time traveler information. According to Metro, ridership has increased by up to 40 percent and travel time has decreased by up to 29 percent (source: <http://www.metro.net/projects/rapid/>). The system

covers 450 miles throughout Los Angeles, beginning with the Wilshire and Ventura Boulevard corridors in 2000.

Long Beach Transit operates Zap, a limited-stop express service, during peak hours only. This service utilizes signal prioritization but does not have dedicated lanes.

Because there was an unused rail right-of-way available, the Orange Line is able to travel along completely separated lanes, not along a freeway or arterial but along the back fences of suburban houses. This is an unusual situation in built-up cities, where available space for new right-of-ways is limited, and therefore finding enough room for a bus-only lane can be difficult. There is also a difference between systems that are primarily commuter buses using highway HOV lanes—not usually considered BRT, but not completely unrelated, as in the case of the Foothill Silver Streak mentioned above—and BRT systems that operate on congested city streets. The city of Ottawa, Canada, operates a successful BRT that uses a combination of transit ways (2-way transit-only separated roadways), highway shoulder lanes in outlying areas, and bus-only lanes on streets in the downtown core. According to Ottawa's transit officials, more than half of the people arriving downtown do so by bus. But this success also has led to bus congestion on downtown streets, where both local and rapid bus services use the bus-only facilities: 180 to 190 buses per hour clog the lanes. The city is now considering future plans to convert some of the transitways to LRT, and is considering grade-separating some of the lanes to help speed up the BRT. Its buses use a proof-of-payment system, and transit officials claim a dwell time of under twenty seconds, so there may not be much more scope for speeding up service in that arena.

Planned BRT Systems

The Southern California Association of Governments lists a number of planned BRT projects in its Regional Transit Plan (see Figure 4-3). Many of these will add bus-only or bus-

priority lanes to existing roads; when complete, the system will crisscross most of the Los Angeles metro area (see Figure 4-4).

The San Diego Association of Governments is planning a South Bay BRT line that will include arterial “transit only” lanes, transit signal priority, special bus-only shoulder lanes on the freeway, and enhanced customer amenities. Construction on freeway express lanes and BRT stations has begun, and the 21-mile route is slated to open in 2013.

San Francisco Metropolitan Transportation Agency is working on proposals for two BRT lines, one along Van Ness Avenue and a connecting east-west route along Geary Blvd., two of the most heavily traveled corridors in the city. These are busy urban corridors with already high numbers of transit riders. A citizens’ advisory committee has developed design principles which include dedicated bus lanes, ticket vending machines and a proof-of-payment system, real-time bus information, and curb extensions, islands, and medians to minimize pedestrian crossing distances, among other guidelines. No final decision has been made about these proposals.

Alameda/Contra Costa (AC) Transit is studying a proposed BRT line from Berkeley to San Leandro along a heavily traveled bus route. The current plan includes dedicated bus lanes, a proof-of-payment fare system, and raised platforms with at-grade boarding. However, BRT has been controversial in Berkeley, one of the cities it would serve, and the Berkeley city council recently voted not to dedicate bus-only lanes on Telegraph Avenue, which may jeopardize the project. One of the other objections raised by local riders is the loss of bus stops, since a faster

BRT would require stops that are farther apart than the express bus currently serving the corridor. This can make BRT less attractive for existing local riders or residents with limited mobility who might have to travel farther to reach the nearest stop.

SamTrans in San Mateo has been participating in a regional Grand Boulevard initiative along El Camino Real, a major arterial. The vision is to transform El Camino Real into a pedestrian and

transit-friendly, high-performing arterial where all modes move efficiently and safely. The plan will examine multimodal opportunities and innovative approaches such as signal timing, signal

Capital Projects	Destinations	Status
Bus Rapid Transit Projects		
Metro Rapid Bus Expansion (to 28 lines) in LA County	Various	Planned
San Fernando Valley North-South in LA County	Reseda/Sepulveda & Canoga Corridor	Planned
Wilshire Blvd/Mid-City Transit Corridor in LA County	Vermont to Santa Monica	Planned
Harbor Blvd BRT in Orange County	Fullerton to Costa Mesa	Planned
Westminster/17th BRT in Orange County	Santa Ana to Long Beach	Planned
28-Mile BRT in Orange County	Brea Mall to Irvine Transportation Center	Planned
OmniTrans - E Street BRT	San Bernardino	Planned/EIR

Figure 4-3: Planned BRT in the Los Angeles region. Source: SCAG RTP, 2008

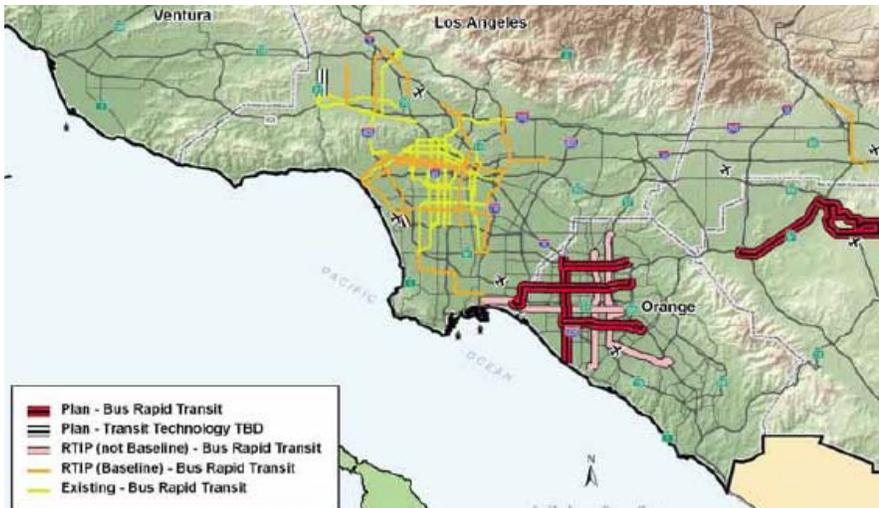


Figure 4-4: Planned BRT routes in the Los Angeles region. Source: SCAG RTP, 2008

prioritization, queue lanes for buses, bulb-outs, countdown signals and the integration/interoperability of these systems to provide seamless transitions across jurisdictional boundaries. The final scope, budget, and schedule are still being developed.

Orange County Transportation Authority is studying three possible BRT routes to include transit signal priority, real-time bus arrival information, and enhanced shelters rather than stations. The agency plans to use queue jump lanes rather than separated bus-only lanes, and also plans a separate “branding” program (with unique colors for the buses) to make it very clear to riders which bus to get on.

Santa Cruz Metro serves four cities separated by rural highways and open spaces, including mountain barriers. Several transportation studies have led the agency to conclude that an “incremental” transition to BRT is a reasonable solution for some of the issues it faces. Real-time bus arrival information, queue jump lanes for buses, signal priority for transit, and fare prepayment are elements that are being considered for the Metro’s bus system. But first, in order to move towards something closer to a full BRT system, the agency has proposed to restructure its bus routes into a trunk-and-feeder system, which would be more in line with the region’s topography as well as work better with BRT. In addition, there would need to be an HOV lane along Highway 1, the main intercity connector, to allow quick bus travel along that route. These two important changes, however, are not planned for the near future, in part due to financial reasons.

Sacramento Regional Transit has adopted a set of Bus Rapid Transit guidelines, and its long range plan includes three “enhanced bus corridors” that complement and extend the already existing light rail service. The design guidelines for these corridors recommend a minimum distance between stops (1/2 mile), easy station access for other modes, traffic signal priority, queue jump lanes, and off-board fare collection, but does not require dedicated bus-only lanes.

Omnitrans in San Bernardino has identified seven key transit corridors where express or BRT services could be used, and has chosen the E Street corridor as the highest priority. Called sbX, the E Street project has concluded an environmental review process and is beginning the planning and design stage, with plans to begin service in 2013. The system’s design is not yet completed, but transit signal priority, low-floor buses, and in some areas dedicated lanes are being considered.

In Santa Monica, the concept of BRT was adopted by the city council in 2005. Currently, the Rapid Bus Line along Lincoln Blvd. uses signal priority and limited stops approximately one mile apart. Pending Caltrans approval, Rapid 3 will operate on a bus-only lane within the Santa Monica city limits to improve travel times and reduce delays. The Lincoln Blvd. bus-only lane will be a 2.1 mile segment in each direction.

San Joaquin Regional Transit District operates several intercity express bus routes, and has developed a BRT master plan, with corridors, transfer stations, and signal priority; future implementation depends on finding new funding.

Bus Rapid Transit offers an opportunity to create a fast and relatively inexpensive system upgrade to attract riders who might not otherwise take transit. It is supported by the federal and state departments of transportation and has caught the interest of agencies throughout the state. Because BRT is a flexible, relatively easily implemented system, bus agencies have been willing to think creatively about how to use it within their service areas, choosing those aspects that are most locally appropriate and experimenting with different elements to best fit their community’s transit needs.

AC TRANSIT marketing slogans:

BRT = Better Rapid Transit

**“Imagine light rail
without the tracks.”**

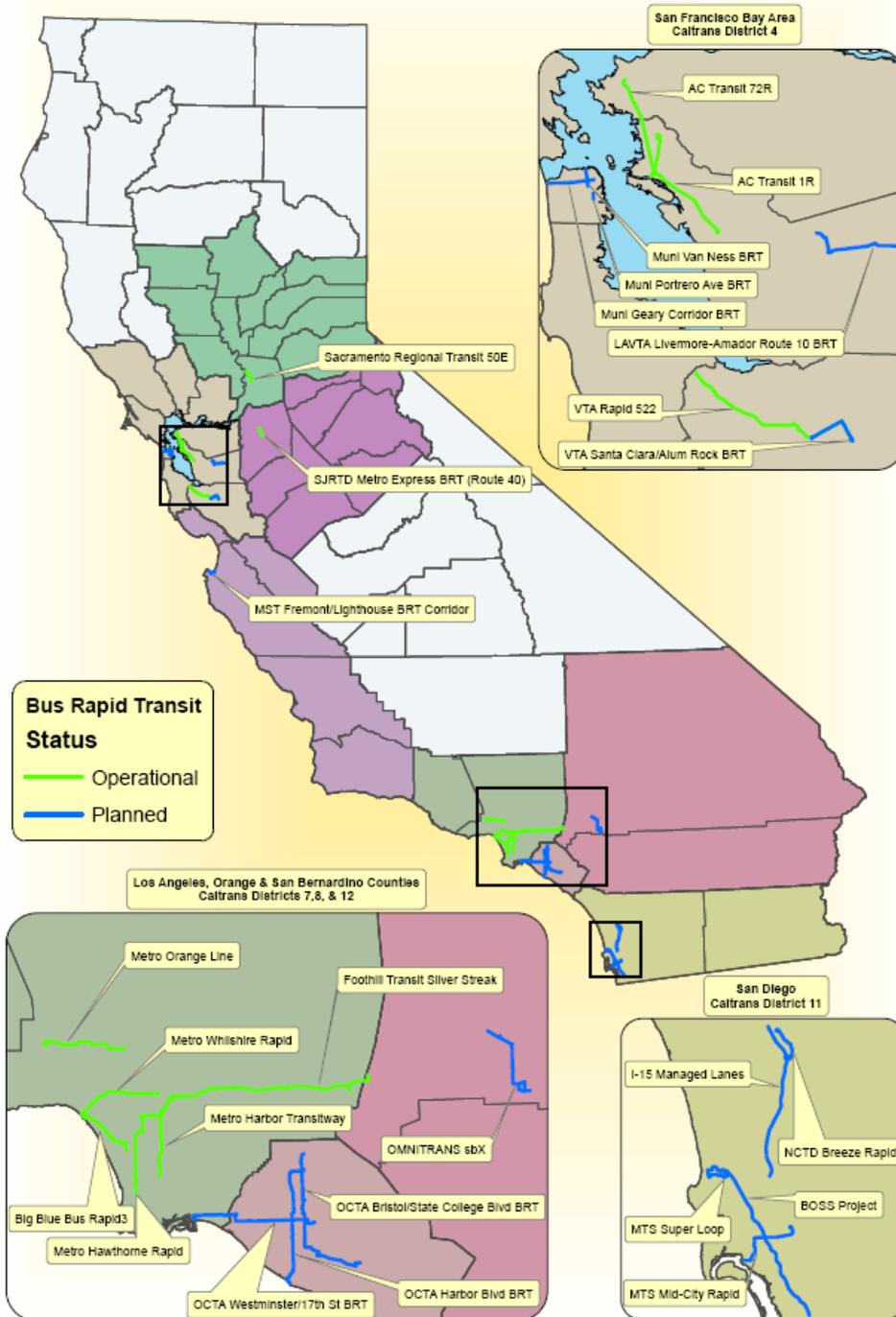


Figure 4-5: BRT in California, current and planned Source: California Department of Transportation

Chapter 6 ALTERNATIVE FUELS

In 2000, the California Air Resources Board established new rules to regulate emissions from transit agency vehicles. Agencies were required to choose either a “diesel path” or an “alternative fuel path” towards helping their regions meet clean air goals. If they chose the former they were required to retrofit their older diesel buses with NO_x (nitrous oxide) and PM (particulate matter) filters, to buy new diesel buses that meet stringent emissions requirements, and to use low-sulfur fuel. If they chose to follow the alternative fuel path, at least 85 percent of their bus purchases and leases must use an alternative fuel (compressed natural gas or CNG, propane, ethanol, methanol, gas/electric hybrid, electricity, or hydrogen). All agencies, no matter which path they chose, were also required to lower total diesel emissions relative to their January 2002 levels. Those using diesel were supposed to have reduced their total NO_x and PM emissions by 85% of their January 2002 levels by 2007; those using alternative fuels have to achieve the same reduction as of 2010.⁹

In addition, any agency with a fleet size of over 200 buses must plan to acquire zero emission buses (hydrogen fuel cell or electric). This rule applies to the ten largest agencies in the state, who together operate about 6,800 urban buses, or about half of the total buses statewide. The rule originally stated that by 2011 (2012 for those on the “alternative fuels” path), 15 percent of all new bus purchases must be zero emission vehicles. It also requires agencies to participate in tests of Zbuses. Five Bay Area agencies were slated to participate in a test of twelve hydrogen fuel cell buses, but delivery of the buses took longer than anticipated. Therefore data from the tests is slower in coming than had been anticipated, and the purchasing requirement has been delayed until CARB has enough information to decide when it would be feasible to impose it. The plan is to make that decision in July 2012.¹⁰

Among the agencies sampled for this report (see Figure 5-5 for a list of agencies), there were more zero emission and very low emission (hybrid electric) buses in use at agencies that chose to follow the diesel path than among those on the alternative fuels path. This may be because investment in new infrastructure and buses for alternative fuels is expensive, and while following the diesel path requires expenditures on new buses and equipment, it is less expensive than some of the alternative fuels. This might allow an agency to concentrate more of its limited resources on developing hybrid electric vehicles and other alternatives.

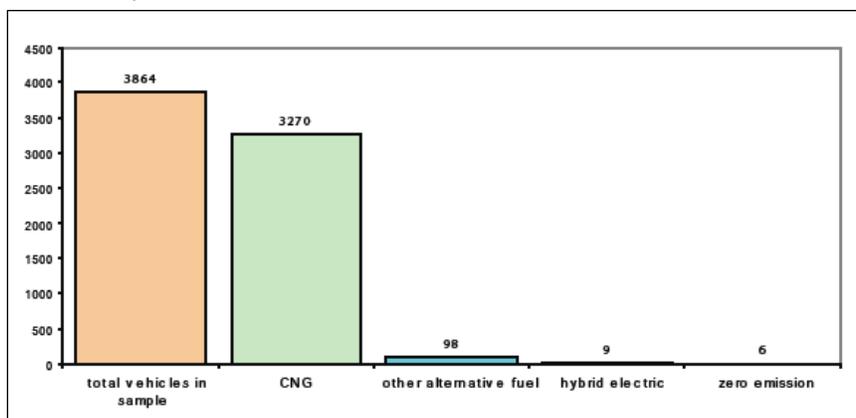


Figure 5-1: Fuel Use Among a Sample of Agencies on Alternative Fuel Path

As Figure 5-1 shows, most of the agencies that have chosen the alternative fuels path have concentrated on developing fleets that use CNG, or compressed natural gas. CNG buses have lower PM emissions than *conventional* diesel buses, and some studies have found them to

⁹ Public Transit Fleet Rule, California Air Resources Board

¹⁰ Mail-Out #MSC10-04, Air Resources Board, January 29, 2010

have lower carbon dioxide emissions than the newer advanced, low-sulfur diesel buses as well. However, advanced diesel buses using low sulfur fuel and particulate filters have comparable PM emissions levels. Also, some studies have found that greenhouse gas emissions from CNG buses are similar to those from diesel buses, and they may be higher if you take into account the entire CNG production lifecycle. In addition, CNG buses are twenty to thirty percent less energy efficient than diesel engines, they are more expensive to maintain, and their fueling facilities are more expensive to build and maintain (see text box). Nevertheless, some agencies preferred to switch to CNG rather than retrofit older diesel engines or replace them with newer diesel engines.

Compressed natural gas is popular, but is it better than clean diesel?

- **PM emissions:** CNG buses **lower** than *conventional* diesel buses and **lower**¹¹ or **about the same**¹² as “clean diesel” engines.
- **NOx emissions:** CNG **lower**¹³ than “clean diesel”
- **Greenhouse gas (GHG) emissions:** **lower**,¹⁴ **higher**,¹⁵ or **about the same**¹⁶ as “clean diesel” engines.
- CNG is **cheaper** than diesel
- CNG buses can be twenty to thirty percent **less energy efficient** than diesel engines^{17 18}
- CNG buses are **more expensive** to maintain¹⁹
- CNG fueling facilities are **more expensive** to build and maintain²⁰
- CNG buses are quieter than diesel buses²¹

Alternative Path

Among the earliest to adopt CNG was the Los Angeles County Metropolitan Transit Agency, which in 1999 had a bus fleet that was already 80 percent CNG (1,900 vehicles, out of a fleet of 2,400). By 2006, its bus fleet was almost 100 percent CNG and the agency had built ten CNG fueling facilities. Sacramento Regional Transit District has also been at the forefront of CNG bus technology; its entire fleet is fueled by CNG, and it has invested in an extensive CNG refueling facility to service its buses. The Orange County Transportation Authority is also in the midst of replacing its bus fleet with CNG vehicles, with a total of 52



Figure 5-2: Omnitrans hybrid gas-electric bus

¹¹ Bult, et.al, *Euro2 and Beyond*. For full citations see source list in Appendix.

¹² Cannon et al, *Bus Futures*

¹³ Cannon

¹⁴ Kojima, *Breathing Clean*

¹⁵ Bult

¹⁶ Cannon

¹⁷ Hammit, et al, *Risk in Perspective*

¹⁸ Austin, et al, *A Comparative Analysis of the Feasibility and Cost of Compliance with Potential Future Emissions Standards*

¹⁹ Austin

²⁰ Cannon

²¹ Lane, et al, *An Assessment of the Emissions Performance of Alternative and Conventional Fuels*

percent of its fleet using CNG in 2009. Foothill Transit in the San Gabriel and Pomona valleys began converting its buses to CNG in 2002, with 262 of its fleet of 314 buses using CNG that year. The agency plans to have a 100 percent CNG fleet in 2011. It has also operated an electric bus demonstration project using three buses, the plan being to replace all of the buses on one of its main routes with electric buses. The hope is to develop a fast-charge docking station that allows a battery bus to recharge in less than ten minutes, reducing the cost of zero emission buses and infrastructure by fifty percent or more over hydrogen fuel cell buses. Omnitrans in the San Bernardino Valley operates CNG buses (98 percent of its fleet—168 of 176) and is also developing a hybrid gas/electric program with three buses currently in operation (Figure 5-2). The agency also participated in a 2004 study of the environmental impacts associated with its fueling facilities. Santa Monica’s “Big Blue Bus” chose to use liquified natural gas (LNG) rather than CNG to power half of its fleet of 102 buses. Its remaining buses operate on biodiesel.

Diesel Path

Agencies that chose to follow the diesel path have also pursued alternative fuels, with more variety among the alternatives, as Figure 5-3 shows. The San Francisco Municipal Transit Agency (Muni) chose the diesel path although it operates a large fleet of electric trolleybuses,

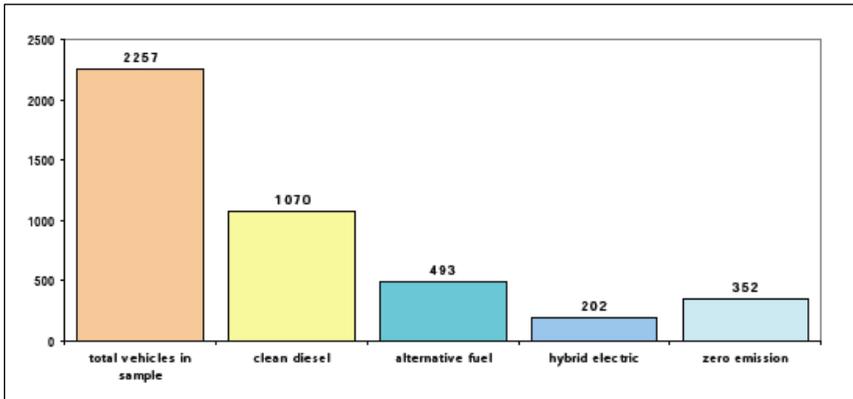


Figure 5-3: Fuel Use Among a Sample of Agencies on the Diesel Path

using overhead wires and tracks in the street. By 2003 52 percent of Muni’s fleet (of a total revenue fleet of 1,045 coaches, buses, and trolleys) were running on electricity. The agency has adopted a Clean Air Plan that proposes to electrify its entire fleet, to achieve a zero-emission fleet by 2020. Muni is unusual among California transit agencies because it has always operated electric vehicles and therefore already has

the infrastructure in place. Its fleet replacement costs must take into account the need to replace overhead wires and tracks, but it does not have to build the system from scratch.

AC Transit has also retrofitted and replaced its fleet with clean diesel technology.



Figure 5-4: AC Transit Hydrogen Fueling Station

Meanwhile it is participating in a fuel cell demonstration project, including developing a fueling and maintenance center for fuel cell vehicles (Figure 5-4).

Many medium and smaller agencies, such as the Central Contra Costa Transit Authority, chose the diesel path and are retrofitting and replacing diesel buses (131 buses). Santa Barbara Metropolitan Transit District runs 65 clean diesel buses, and it also operates 20 electric shuttles. Other agencies are replacing some of their diesel buses with diesel-electric hybrids; for example, the

San Joaquin Rapid Transit District currently operates 33 diesel-electric hybrid buses out of a total fleet of 81, and plans to expand its hybrid fleet to include 75 percent of its service vehicles. Long Beach Transit’s fleet includes 87 hybrid electric buses (37 percent of the fleet), and the remainder are ultra-low-sulfur diesel buses. In addition, 58 percent of its support fleet (41 cars, tow trucks, etc) are hybrid electric. This agency has also developed a Sustainability Program that includes the use of energy audits and solar power at its facilities (including to power the electronic bus information signs at bus stops), as well as energy efficient heating and lighting, an emphasis on reuse and recycling at its facilities, and a program to train its drivers in “conservation driving.”

Diesel Path	Alternative Fuel Path
<p style="text-align: center;">AC Transit: 99% clean diesel; total fleet 532*</p> <p>San Francisco Municipal Transit Agency: 36% electric, 9% hybrid, 54% biodiesel; total fleet 914 (excluding streetcars)°</p> <p>San Mateo County Transit (SamTrans): 75% clean diesel; total fleet 335°</p> <p style="text-align: center;">Long Beach Transit: 49% hybrid electric buses, 51% clean diesel; total fleet 179*</p> <p>Central Contra Costa Transit Authority: 100% clean diesel; total fleet 131°</p> <p style="text-align: center;">San Joaquin Transit: 41% diesel-electric hybrid; total fleet 81*</p> <p>Santa Barbara Metropolitan Transit District: 24% electric shuttles, 76% clean diesel; total fleet 85°</p>	<p style="text-align: center;">Los Angeles Metropolitan Transportation Authority: 95% CNG; total fleet 2261°</p> <p>Orange County Transportation Authority: 52% CNG; total fleet 556*</p> <p style="text-align: center;">Foothill Transit: 83% CNG; total fleet 314°</p> <p>Sacramento Rapid Transit District: 100% CNG; total fleet 251*</p> <p>Santa Monica Big Blue Bus: 50% LNG, 50% biodiesel; total fleet 198°</p> <p>Omnitrans (San Bernadino) 95% CNG; total fleet 176°</p> <p>SunLine Transit Agency (Palm Desert): 90% CNG; total fleet 67°</p>

Figure 5-5: Fleet Size and Composition of Agencies Sampled
Sources: * Federal Transit Administration National Transit Database
° Individual agency’s Short Range Transit Plan or website

Chapter 7

BICYCLE AND PEDESTRIAN ISSUES

Transit can be a part of a package of solutions to many of our pressing transportation problems, including congestion and air pollution. Several agencies state the goal of “encouraging alternatives to driving” in their Short Range Transit Plans. Alternatives can include transit, but also other modes such as walking and bicycling. Many agencies have worked hard to promote these two modes for accessing transit.

Pedestrian Concerns

Transit passengers are also pedestrians at both ends of their trips, and need safe ways of accessing transit. Wide streets with heavy or high speed traffic, nonexistent pedestrian signals and crosswalks, and bare-bones bus stops that do not include seating or weather protection can all negatively affect the experience of transit users and may make the difference between taking and not taking transit for those riders who have a choice. Agencies’ Short Range Transit Plans generally recognize the need to improve pedestrian access via broadly worded goals such as “improve pedestrian linkages to transit facilities.” Although pedestrian access is crucial, transit agencies are sometimes limited in what they can do directly because usually cities or counties are responsible for maintaining and improving local streets. Station areas, escalators, wayfinding, and protected seating are within the purview of transit agencies, but larger-area pedestrian facilities, street crossings, and pedestrian signals require partnering with local jurisdictions.

Agencies address pedestrian issues somewhat more directly in their Coordinated Plans for disabled and senior transportation in fulfillment of the Americans With Disabilities Act. These documents address the need for improved pedestrian access to transit, especially in suburban and rural areas. Areas of concern include better synchronized pedestrian walk signals, especially at multi-lane intersections, and improved crossings, sidewalks, and bus stops. Some rural areas lack sidewalks entirely, and some bus stops require passengers to disembark onto the shoulder of a road or are otherwise awkwardly placed, making navigation difficult for all passengers as well as disabled and elderly riders.

Because implementing pedestrian improvements is often the purview of local cities and counties, MTC recommends developing city-based pedestrian plans, like the one the city of Oakland created. The pedestrian plan provided much-needed data (for example, 148,000 weekday pedestrian trips are made to and from AC Transit bus lines in Oakland) and helped Oakland develop policies and design guidelines to better accommodate pedestrians. Another kind of effort is a planning document like AC Transit’s *Designing with Transit*, a “handbook for elected officials, local staff, and other community builders” that includes guidelines for pedestrian design around bus stops.

Bicycles

Transit and bicycles are sometimes competing modes, especially in areas where mild climate and topography make bicycle trips a good commute choice. However, bicycles can also complement buses and trains, providing the “last mile” connection for transit passengers when the first or last leg of the trip is a little too far to walk. Riding the bus also can be useful for bicyclists in hilly areas, or in inclement weather, and rail especially can extend a trip far beyond the reach of most bicycles. Accommodating bikes can increase the numbers of potential riders on a transit system by increasing the passenger “catchment area,” because bicycles can be ridden several miles to reach transit, whereas pedestrians come from a more limited area.

Bikes can be taken onboard buses and trains—in fact, every transit agency reviewed for this report, with a few peak-hour restrictions and one notable exception (discussed below), allows passengers to bring bikes onboard either via bike racks on buses, bike cars on trains, or allowing bikes the same way strollers and wheelchairs are allowed. Capacity limits, especially during peak hours, unfortunately prevent some bicyclists from using transit, especially for commute trips. Rail agencies sometimes have flexibility to add capacity; for example, Caltrain has added special bike cars to some of its trains in an effort to increase bike capacity. But buses are generally limited to two or three bikes on racks. These capacity limits can discourage riders, especially if there is inconsistency in the way they are handled. The city of Davis bus agency, Unitrans, contemplated this issue early on when it considered adding bike racks to its buses. The agency realized that, with the very high bicycle use on and around the UC Davis campus, any bike racks it provided were likely to be almost always filled,



Fruitvale Bike Station.
Source: Karen Frick



Fruitvale Bike Station.
Source: Karen Frick

and potential users wouldn't be able to count on finding an open rack space. For that reason, Unitrans, operating in one of the most bicycle friendly cities in California, decided not to provide any bus racks on its buses.

Although it is not possible for transit agencies to directly provide bicycle lanes or street bike racks, they can advocate for and support them. Despite the jurisdictional constraint, AC Transit is developing a bicycle parking plan for its bus stops because it recognizes the importance of secure bike parking for its riders. Rail and bus agencies that own station areas can easily provide parking within their property. An innovation that takes this further is the Bike Station, available at rail stops in Long Beach, Berkeley, San Francisco, Palo Alto, and other Covina. Bike stations can be run by private or nonprofit groups,

and can provide secure bike parking, retail and services (such as repairs), showers and lockers, bike rentals, and bike sharing. Bike sharing is also one way around the problem of capacity on transit; bicyclists can theoretically park a bike at one end of the transit trip, and pick up another at the other end to finish the last leg. Bike sharing has been highly successful as a way of extending the reach of transit in Paris and Barcelona, and recently launched in Washington, D.C. The Long Beach bike station began offering bike sharing to city employees in 2008, and now offers it to all its members.

Another issues faced by agencies is bicycles and buses having to share road space. Designing separate bike lanes is not always possible, and even with bike lanes, if buses stop at the curbside, bikes and buses can be



Chicago Bicycle Program “Share the Road” training video

forced to leapfrog each other, creating dangerous situations. especially for the more vulnerable bicyclists. As a partial solution, the Chicago Bicycle Program created a training video for both bus drivers and bicyclists on the safest ways to share the road. The video has received some positive attention in part because it speaks to both groups; neither drivers nor bicyclists get the message that they are the ones who must change their behavior unilaterally.

Public information about bike access is also important; while most California agencies accommodate bikes, it is not always easy to know this from their websites. Using a bike rack on a bus takes some instruction, if not training and practice, and not every agency has this information readily available (and some agencies forbid their drivers from helping). Los Angeles MTA provides a “pocket riders guide” that contains rules, instructions on how to use bike racks, and even notes on helmet use and safe riding.

Bike access to and cyclists usage of rail stations is another important issue. In the case of San Francisco Bay Area Rapid Transit, bicycles are not allowed on escalators, so riders must search for elevators which are not always easy to find, or be able to carry their bikes up and down long staircases which are sometimes full of people. BART has experimented with “bike ramps” along staircases, with varying degrees of success.

Transit passengers are at one point or another in the course of their journey also pedestrians, and more and more are also bicyclists. It behooves agencies to create a safe and attractive environment for them. Accommodating pedestrians and bicycles also has the potential of increasing riders, as a more pleasant, easy transit trip can make people more inclined to add transit to their mix of travel modes.

Chapter 8

SHUTTLES AND VANPOOLS

For many transit agencies, providing transit to the largest number of residents possible while maintaining efficiency and cost effectiveness is a tricky balancing act. Shuttles and vanpools can extend the reach of transit. They can fill in service gaps and complement larger transportation networks with services to smaller niches. They may also be a lifeline service for people unable to use fixed-route transit. Shuttles are flexible in terms of costs, route planning, service provision, and operation, and they can be used for employment transportation, neighborhood access, and travel to specific recreational destinations. The range of possibilities for shuttle use also brings opportunities for cooperation among agencies, businesses, and employers for transportation provision. Vanpool services can range from ride-matching, to incentives for sharing a ride to work, to operation of regional van or car services.

Shuttles

Shuttles offer flexibility for smaller groups without having to implement a large transportation network for specialized transportation purposes. They may provide direct trips to selected locations, such as airports. The Santa Barbara Metropolitan Transit District, for example, operates two lines of airport shuttles called SuperRide and Santa Barbara Airbus. Shuttles may also serve smaller communities with a loyal or captive ridership base. The Santa Barbara MTD operates UCSB and City College shuttles to serve students in and around college campuses. Shuttles may serve highly specialized events—for example Westlink’s 49ers Express Shuttle that takes fans to football games—or locations, such as VTA’s eight shuttle routes to and from Great America. They are usually implemented to serve specific needs of certain groups, and the growth in demand for these services may create larger, more complex shuttle systems. The DASH shuttle bus service of the Los Angeles Department of Transportation, which began as a small downtown circulator, now serves 27 communities around LA.



Figure 6-1: Emery Go Round in Emeryville

Shuttles can provide “last-mile” service to carry passengers to their destinations from transit hubs and stations. Their specialized nature allows them to extend service at a lower cost and with greater flexibility than larger transportation systems. The Altamont Commuter Express relies on its ACE Express Shuttle to bring 1,300 passengers every weekday from the ACE train stations to their destinations. Caltrain provides shuttle service to employment sites in San Mateo and Santa Clara, operating 31 weekday commute shuttles and 1 weekend shuttle, serving 5,000 riders per weekday.

Many shuttles run only during peak commute hours. The Santa Clara VTA operates a shuttle that carries passengers from light rail stations to employment sites between 6 and 9 am and back again between 3 and 6 pm. Regional transit systems coordinate shuttle service with local

transit providers by synchronizing schedules among different services and operators. VTA's Downtown Area Shuttle (DASH) makes all-day connections to rail service —ACE, Caltrain, VTA light rail — and carries 700 passengers each weekday to business, employment, and school sites in downtown San Jose. Large transit networks may provide self-operated shuttles or they can coordinate with private companies or other agencies to fulfill travel needs. The relationship between shuttles and fixed-route transit systems can be mutually beneficial when well-coordinated.



Downtown-Waterfront Electric Shuttle, Santa Barbara MTD. Source: http://www.nytimes.com/slideshow/2008/04/30/travel/escapes/0502-SANTABARBARA_2.html

Congestion reduction is an important contribution of shuttles, aiding traffic mitigation measures via cooperation between transit agencies and cities. The Santa Barbara MTD entered into an agreement with the City of Santa Barbara to activate several shuttles to reduce congestion. The partnership has attracted passengers with low fares and alleviated heavily-impacted corridors. The Downtown-Waterfront Shuttle and the Seaside Shuttle are part of that effort, offering subsidized fares at \$0.25 per ride; in addition, a “Wharf Woody” offers free rides in beach areas.

Cooperation between different stakeholders can be key. In many cases, funding agreements can be entered into by transit agencies that want to extend service coverage, employers who want to provide a transportation option for work, planning organizations that want to decrease congestion, and environmental quality agencies that want to decrease carbon emissions. In areas where shuttles serve as transportation to work, employers make a significant contribution to operating funds. Caltrain operates a service in San Mateo and Santa Clara counties funded by a combination of Caltrain Joint Powers Board local funds (21%), local employers (41%), and TFCA regional grant funds (38%). For the Santa Clara VTA, operating costs are divided between Santa Clara VTA (52%), local employers (31%), and the Bay Area Air Quality Management District's Transportation Fund for Clean Air (17%). The City of San Jose

contributes approximately \$1.2 million annually (30%) towards the operating costs of the Free Airport Flyer service that connects the airport, LRT, and ACE and Caltrain stations.

The flexibility of shuttles for a variety of trip purposes makes them relatively easy to implement and operate. Usually, more than one group benefits from the provision of shuttle services. Employers benefit from easy, reliable transportation for their employees, cities may see reductions in the number of vehicles on the road, and riders can more easily get to their destinations.

Vanpools

Vanpools are another convenient and efficient alternative commute mode, providing benefits to riders such as reduced commute expenses, convenient transportation without having to drive, and the use of carpool lanes for speedier commutes. Vanpools are encouraged as a way to save energy, cut down on emissions, and lessen congestion, and they are embraced by air quality agencies as well as regional traffic management agencies.

Most vanpool riders are long-distance commuters who share a ride with others commuting a similar distance on the same schedule. Most “official” vanpools (those registered with the local MPO to take advantage of ride-matching services and financial incentives) carry seven to fifteen passengers. They are generally formed by the riders themselves, although a few vanpools are operated by employers for their employees. In San Luis Obispo County, the Transportation Management Association provides the van, insurance, maintenance, fuel, registration, and washing of the van through its RideOn division for a monthly fee; generally the driver rides free and the passengers split the cost of the fee.

In other areas, agency roles are limited to providing ride-matching services and other information to ease the formation of vanpools. In the San Francisco Bay Area, 511.org’s regional ridesharing services include lists of existing vanpools with available seats, information about starting a vanpool including from whom to lease a van and how much it generally costs, and details about incentives available to vanpools such as free tolls and reduced parking fees. The site also provides “vanpool consultants” and a ride-matching service to make it easy for vanpools to recruit new riders and keep the vans as full as possible. San Diego’s RideLink service provides vanpool matching services and also uses funds from the Congestion Mitigation and Air Quality Improvement program to subsidize part of the costs of leasing vans (up to \$400 a month). In the San Diego area, drivers negotiate their own lease agreements, maintenance and insurance is usually included in the lease, and passengers then split the cost of fuel and the unsubsidized remainder of the lease.

Chapter 9 PARK-AND-RIDE

The question of how people get to transit is not a simple one to solve. In dense areas, some people live close enough to walk or ride bikes to stations, but driving a car remains the most convenient

choice for many commuters. Rail transit agencies, with permanent stations, frequently build parking lots to accommodate commuters, and many have allowed their customers to park for free, although this is beginning to change. Bus operators usually do not have stations, but if they operate express or commuter buses that serve employment centers, they might make use of lots in outlying areas.

Park-and-ride facilities can be operated by transit agencies or private companies, and they can be planned or informal. They can offer connection to a variety of transportation modes, from traditional fixed-route transit to buses to carpools, and they can serve people arriving by car, bicycle, on foot, or by transit. The main difference between park-and-ride facilities and general parking lots is their purpose, which is to facilitate the use of public transportation and carpooling. According to the California BusPool project, about 27 percent of Caltrans park-and-ride lot users took a bus once they arrived, and the remainder joined a carpool or vanpool (See Figure 7-2). Figure 7-4 shows Caltrans park-and-ride facilities in San Diego.

For some transit agencies, park-and-ride lots play an important role in bringing riders to their systems. Golden Empire Transit in Bakersfield, for example, recognizes the need to build more park-and-ride lots before it can expand its express bus services. Foothill Transit and Fresno

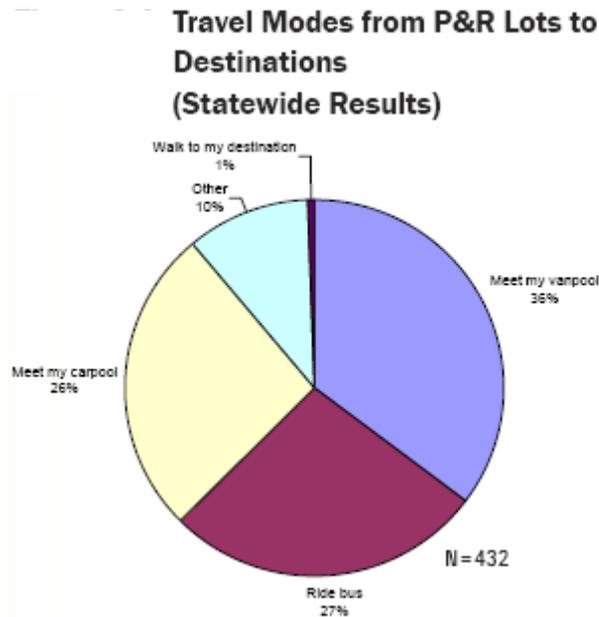


Figure 7-2: Sample results from Caltrans Park-and-Ride Survey. Source: The California BusPool Project, 2005



Figure 7-1: TriDelta advertisement for free parking and quick BART access via park-and-ride. Source: http://trideltatransit.com/park_ride.aspx

Area Express (FAX) see park-and-ride lots as a means to increasing ridership on their systems, and FAX also emphasizes park-and-ride as a way to relieve parking congestion in central Fresno. AC Transit uses park-and-ride lots as collectors for suburban bus services, and emphasizes the need for schedule coordination among bus routes that stop at park-and-ride lots. The agency has the goal of improving amenities at its lots, including bike lockers, shelters, and increased infrastructure for safety (i.e., lighting).

It is important to assess the needs and potential use for park-and-ride in each region, as it varies considerably. Many Caltrans lots are oversubscribed, frequently filling to capacity and sometimes leading to parked cars spilling over into surrounding areas. Conversely, some lots are undersubscribed, leaving more than half

the spaces open. Understanding the travel needs of a population can help determine the level of use park-and-rides receive. A survey of Caltrans park-and-ride users by the California BusPool project found that over ninety percent of them are commuters, so it is vital to understand work trip patterns and where people need to get to and from. Where distance between destinations, travel time, and convenience appear to be better served by personal automobile, where available transit options don't serve travel needs, and where there are no HOV lanes to encourage carpooling, a park-and-ride lot may not be well utilized. Placement of a facility can also affect its use. Tri Delta (Eastern Contra Costa Transit) discovered a major problem when it built a park-and-ride facility a few miles away from a BART station and planned to provide bus service to the station. The distance turned out to be too short (or the transit connection too infrequent or inconvenient) to offer much incentive against driving directly to the BART station. The quality of a park-and-ride facility and the ease of getting in and out of it can also play a role in its usage, as can perceived security of the lot.

Park-and-ride facilities are funded and operated in different ways. Most agencies offer free parking to encourage use of transit or carpooling as an alternative to driving alone. Parking fees can provide a return on expenditures but can also act as way to regulate demand for some oversubscribed lots. Funding for park-and-ride can be acquired from federal sources and from local measures, and the source of funds can shape decisions about planning, implementation, and operation of facilities.

Jurisdiction over these transportation connectors varies. Often, large transit agencies have partial, if not complete, control over a park-and-ride facility. Agencies may also enter into agreements with other entities. The Santa Clara Valley Transportation Authority (VTA), for example, operates 31 park-and-ride lots, of which 23 are owned by the VTA and eight are operated under shared use parking agreements with cities and shopping centers. Some lots are privately owned. The Golden Gate Bridge Highway and Transportation District (GGBHTD), which provides a regional commuter service between San Francisco and the North Bay counties of Sonoma and Marin, serves two park-and-ride lots owned by GGBHTD and twelve park-and-ride lots in other jurisdictions, including two privately-owned shared-use lots.

Although frequently seen as a necessity by transit agencies to help them serve customers and potential customers, park-and-ride lots are not a perfect solution. The California BusPool survey (see Figure 7-3) discovered that one-third of people using park-and-ride lots drive only ten minutes to reach them, and most drive no more than twenty minutes. Because emissions are higher from engines that have not had the chance to warm up, encouraging short car trips to reach transit can produce more pollution, at least at one end of the

Lot Usage and Travel Characteristics

- Nearly three-quarters (73%) of respondents drove 10 miles or less from their home to a P&R lot. (See Figure 6-3.) Within this group the average driving distance was 8 miles.
- The vast majority of respondents (83%) indicated that their travel time from home to a P&R lot was less than 20 minutes. Just over one-third (34%) said it took them less than 10 minutes. (See Figure 6-3.)
- The distribution was fairly even between those who used a carpool (26%), rode a bus (27%) or used a vanpool (36%). (See Figure 6-4.)
- The average distance from the P&R lot to the final destination was 37 miles. Nearly a third (30%) said the distance traveled was more than 46 miles.
- The average travel time from a P&R lot to the final destination was 48 minutes. Nearly one-third (31%) of respondents indicated that it takes them over one hour.
- Just over three-quarters of respondents (76%) are using an HOV lane. This is split 57% car/vanpools and 19% bus.
- 96% are "regulars" who use a lot daily or at least 3 to 4 times per week.
- 35% of respondents have been using a lot for more than 3 years. Another one-third (31%) can be considered "newbies" who have been using a lot for less than a year.

Figure 7-3: Sample Results from Caltrans Park-and-Ride Survey
Source: The California BusPool Project, 2005

transit trip. Large parking lots with impervious surfaces can create water pollution and runoff issues, as well as heat islands, which increase temperatures. Also, maintaining surface parking lots may preclude using available land to build transit-oriented development, which could greatly increase the number of transit riders living at transit nodes. On the other hand, parking lots can also be a form of land banking for future TOD.

Park-and-ride can be an important connector between private and public transportation and carpooling, and a useful measure when there is a service gap between transit stations and homes. Like other transportation resources, it takes careful planning and understanding of area contexts to avoid unbalanced resource use, under- or over-subscription of park-and-ride lots, and unwanted negative consequences from parking lots.

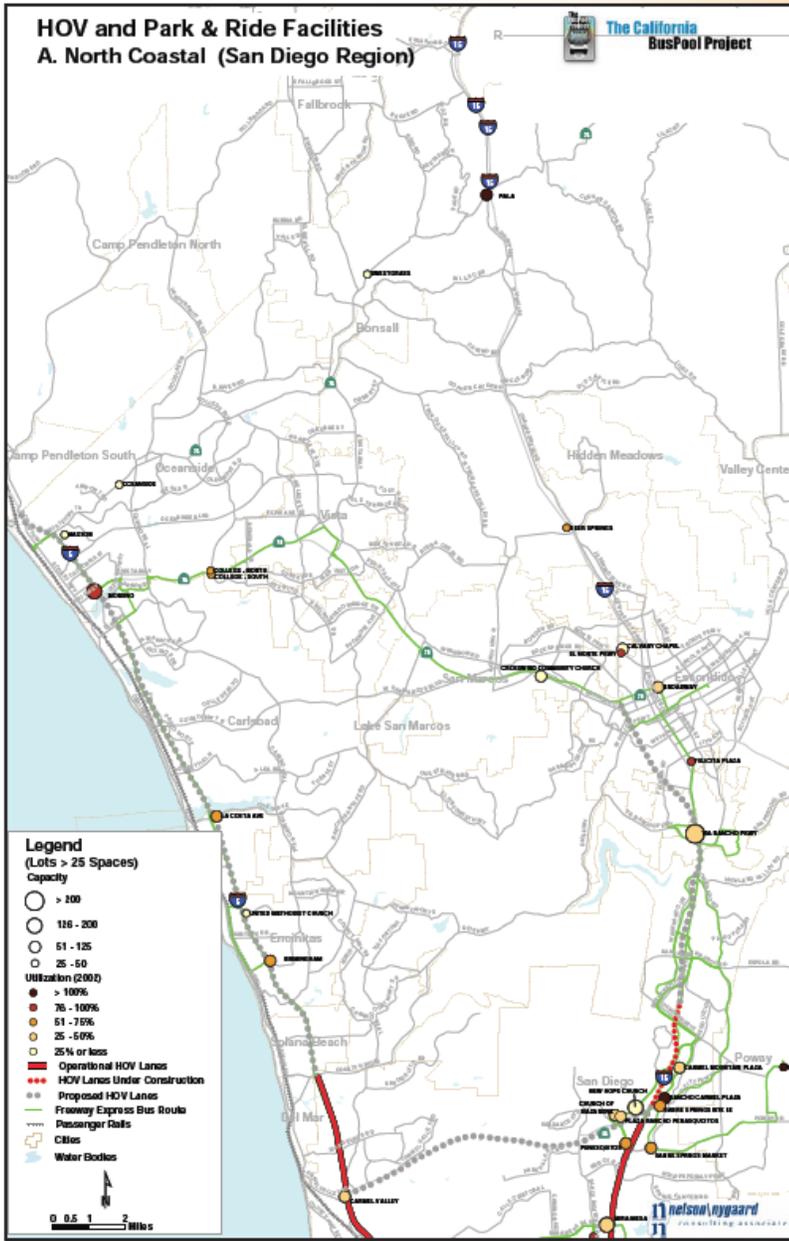


Figure 7-4: Some sample park-and-ride facilities in San Diego
 Source: The California BusPool Project, 2005

Chapter 10

TRIENNIAL REVIEW

When transit agencies receive funding from the California Transportation Development Act (TDA), the state government requires them to submit a report every three years, called the Triennial Performance Audit. The government uses the report to check for compliance with regulations. In order to be eligible for federal funding, agencies must also submit a triennial review to the Federal Transit Administration. Each agency is evaluated in 23 categories. If they do not pass the audit in any of those categories, they must correct it during the next three-year cycle, before the next audit is performed. Agencies that receive FTA funding are also checked for compliance with Title VI of the Civil Rights Act of 1965, which requires that no person be denied access based on race, color, or national origin. The triennial audit is a procedure in which transit agencies check themselves against state and federal standards, and which influences the goals the agencies set in subsequent years.

While any agency receiving funding from TDA is required to submit a Triennial Performance Audit, less than a third of the agencies mention the triennial audit in their short range, strategic, or business plans. The West Contra Costa Transit Authority (WestCAT), for example, simply notes that they plan to use the information from the audit to promote productivity. While all agencies are required to take corrective actions to meet TDA standards, only some agencies connect the recommendations of the audit to their short range planning decisions. Those that do mention the Triennial Performance Audit use it as a guide for planning goals and standards.

Agencies within the nine counties of the San Francisco Bay Area must comply with the triennial review conducted by the Metropolitan Transportation Commission (MTC), the Bay Area's Metropolitan Planning Organization. Although MTC is required by federal and state funding regulations to conduct a performance audit of each transit operator every three years, only six agencies within MTC's jurisdiction mention the Triennial Audit in their short range transit plans. The MTC uses performance standards as a guide for improving the quality of an agency's service. The MTC Triennial Audit, for example, forced the Santa Rosa CityBus to address the deterioration of its on-time performance and its inability to achieve road call standards. As a result of its Triennial Audit, the Santa Clara VTA took steps to improve its financial stability, including further evaluating their performance using an externally conducted assessment and expanding its performance monitoring program.

Performance audits also help agencies structure their goals. The Golden Gate Bridge, Highway and Transportation District was able to clarify its performance objectives after receiving comments from the MTC Triennial Performance Audit raising the issue of vaguely defined performance standards that rely on words such as "reduce" and "improve." Following those comments the agency developed performance standards with numerical targets with quantifiable standards. For example, its goal of maintaining or increasing use of service is now quantified as achieving 25 percent of transbay mode share.

The triennial audit is a necessary procedure for transit agencies to procure state and federal funds. Recommendations from these audits shape the short-term direction and focus of transit operation planning by influencing how agencies develop their goals in subsequent short range transit plans.

Chapter 11

REGIONAL CONNECTIVITY

Reciprocity and regional cooperation between transit agencies in planning and coordinating operations is imperative for structuring cohesive regional transportation networks. Where multiple operators serve an area, cooperation among them is vital for eliminating duplication and ensuring connectivity. By coordinating among themselves, transit agencies can build upon the strengths and specializations of other agencies to create a more complete travel network. Regional cooperation is supported at many different levels in the public and private sectors, and each effort made to develop stronger connections in transportation planning bolsters the usability and accessibility of transit systems.

Cooperation can create efficient, well-managed systems within a more complete network than any single agency can maintain. Agencies that contribute to the system mutually share the benefits of attracting riders to the broader network. In areas where multiple operators have not found a way to collaborate, disjointed provision of conflicting and duplicative services may squander resources, while agencies that work together can find ways to increase the efficiency of their own systems. Monterey-Salinas Transit and Santa Cruz Metro, for example, coordinate with each other to complement service and minimize redundancy. Cooperation can achieve many objectives that individual operators cannot, broadening the scope of service and encouraging agencies to look holistically at transit service and operations as it pertains to regional connections. In Los Angeles, many municipal operators extend their services into nearby cities, and the LACMTA guides management of the transportation network by having the smaller operators work together to restructure transit, reduce service duplication, and coordinate public information.

Many people who work in urban centers but live in neighboring suburbs find that regional transit works well for long commute trips, but they also depend on local transportation connections to complete their trip, such as park-and-ride facilities, local bus services, and dedicated shuttles. The VTA's Downtown Area Shuttle (DASH) connects with a variety of different modes: ACE, Caltrain, Capitol Corridor Intercity Rail, Highway 17 Express, Monterey-San Jose Express, and VTA bus and light rail. TriDelta coordinates its schedules with BART by setting bus arrivals and departures five minutes before and after BART train arrivals. Collaboration between operators and other entities such as employers or businesses also helps extend service to a greater portion of the population and to more places. Buses and shuttles that connect regional transit with employment sites or community or shopping centers often result from cooperation between transit providers and businesses. This collaboration is a crucial aspect of public transit, providing that important "first and last mile" connection that make transit a viable option for riders.

There are many avenues for cooperation related to fares, schedules, and stops, and each step taken to guide passengers through easy mode transfers makes transit a more user-friendly experience and promotes an image of an organized and cohesive system. Omnitrans, for example, has Cooperative Service Agreements with other agencies that help them coordinate schedules and match transfers and boarding passes. The Golden Gate Bridge, Highway and Transportation District (GGBHTD) has a Transit Connectivity Plan with strategies for improving passenger movement between transit systems through more reliable connections, less complicated fares, better directional signage, and improved travel time. Promoting connectivity doesn't require large expenditure of resources. Simple measures like clear signs and simplified fare connections between different agencies can go a long way towards making transfers easier for passengers.

Coordinating fares is a common form of collaboration. LACMTA, for example, began the EX Pass program in 2002, a cooperative effort between 13 local operators that allows unlimited pass usage on Metro bus and rail. The extent of fare coordination is affected by the relationships among operators, the feasibility of linking systems, the availability of resources, and the potential

to maintain or enhance service through cooperation. Some projects have solved feasibility problems by gradually developing a cooperative agreement among large operators before expanding to smaller operators. The TransLink fare payment program began in 2002 as a universal pass for several Bay Area transit operators: AC Transit, BART, GGBHTD, Muni, and SamTrans. Eventually the system, which recently rebranded itself as the Clipper card, will include 27 transit operators, extending coverage throughout the nine counties of the Bay Area.

Reciprocity also ties in closely with land use issues. High-density development around transit depends on a system's successfully providing thorough transportation connections. Regional connectivity and coordination provide larger, more dependable transit networks that can attract riders, but coordination in land use and community planning establishes the framework that makes transit use a viable option. Land use can often determine the structure of transportation systems as well as the degree of cooperation possible under systematic and financial constraints. Few transit agencies have sustainable solutions for stretching fixed-route services across suburban sprawl and decentralized residential areas. For this reason, cooperation in transportation and land use planning for new development is vital to the integration of transit into new communities and to reduced dependency on the single-occupant automobile. The inclusion of transit early in the planning phase involves cooperation between transit agencies and local governments, as well as cooperation among transit agencies. TriDelta, the Eastern Contra Costa transit provider, consults and coordinates with intergovernmental and community-based land use and transit planning efforts, including the Metropolitan Transportation Commission and the Association of Bay Area Governments, along with local governments, businesses, community members, and transit customers. Monterey-Salinas County Transportation Authority has been actively involved in promoting coordination of land use planning for the former Fort Ord area, where planned new housing will greatly increase the urban population and could negatively affect local congestion and air quality if transit is not included as part of the initial planning.

As limited funding will continue to restrict transit operators' options in the foreseeable future, smart management of current transportation resources is vital to retaining and enhancing transit. Cooperation between operators establishes a more comprehensive transportation network than any one operator can provide. Collaboration fosters a sense of understanding and promotes recognition of different perspectives as well as the breadth of issues that influence transit planning for each transit agency, governmental organization, and community group. Cooperation between transportation providers and various stakeholders can structure service to provide for the needs of the community. Transit coordination can link long distance regional trips with the local "last mile" trips. Including transit agencies in land use planning can provide needed input in areas of new development and increase the ability of new residents to access transit. Connectivity and cooperation is meaningful in both transportation and land use planning and should not be limited to transit operation.

Chapter 12

OUTREACH, MARKETING, AND WEBSITES

Physical Outreach

Transit agencies have found that in order to better understand their market, the needs of their riders, and the needs of potential new riders, they must find ways to engage their communities and get feedback from them. Agencies can accomplish this through outreach and marketing activities, which can be conducted in person or by using a variety of media, including the Internet. Many agencies use their websites to provide information to a variety of user types. Beyond distributing information, transit agencies can use their websites to sell fare media and employ trip planners that help users reach their destinations by transit. Examples of transit agency outreach, marketing, and use of websites to promote transit use are reviewed below.

Outreach can take many forms and target different groups, including community members and large employers, students and seniors, commuters and occasional riders. A productive outreach effort can create a positive public image for a transit agency as well as encourage transit use, in addition to providing valuable information to the agency about its constituencies.

Some outreach efforts actively seek out potential transit users to explain transportation options available to them. For example, the Santa Barbara Metropolitan Transit District's How to Ride the Bus Program seeks out potential riders by meeting with groups of seniors, mobile home residents, neighborhood association members, and businesses to promote transit usage and help with trip planning. Other transit agencies target students, seniors, and other groups with limited mobility options. Presentations in schools can educate children on transportation safety and trip planning. The Santa Clara Valley Transportation Authority hosts a Youth Outreach Program, which gives presentations to students from kindergarten to the eighth grade to introduce transit to children who may never have used public transportation. Agencies like the Santa Barbara Metropolitan Transit District encourage parents to accompany their children and experience public transit by giving out Parent Pass tickets in trip education programs at schools. Senior outreach helps inform the elderly population about transit options. Fresno Area Express provides outreach and education to seniors, and provides free Sunday rides to seniors through the Silver Sundays Program.

Foothill Transit is unique among transit agencies in California for operating a set of "transit stores," where employees sell fare media (for Foothill Transit and connecting operators) and provide one-on-one trip planning services for patrons. While brick-and-mortar transit stores can be expensive (Foothill had to close one of six stores in 2008 to cut costs), they offer an opportunity to directly connect with current and potential riders on a regular basis; personal communication of the benefits of transit and showing potential riders how they can use transit to meet their transportation needs may be more effective for some audiences than communication in print or online.

Many new immigrants to California have few choices about travel options. In many areas they comprise a large group of potential transit riders, although language barriers can make transit challenging. The Fresno Area Express has taken steps to address these concerns through bilingual



Figure 10-1: VTA Transit Ambassador explains redesigned bus service. Source: Metropolitan Transportation Commission



Figure 10-2: 2010 VTA Eco Pass. Source: <http://www.flickr.com/photos/bike/4271805817/>

advertising. Santa Clara Valley Transportation Authority created Vietnamese, Chinese, and Spanish language marketing programs to target transit information for these cultures (Figure 10-1). Long Beach Transit publishes public service information in English and Spanish, and provides Spanish and Khmer translators at all public meetings as well as on their phone information system. The Napa County Transportation and Planning Agency is among a few agencies that have developed a Transit Ambassador program to make trip planning easier in its service area.

Transit Ambassadors are dispatched to streets, clinics, community meetings, classes, and events to answer questions about transit service and inform community members of service changes. One of the more important aspects of this program is the face-to-face interaction between a transit representative and the people of the community, and the inclusion of multilingual staff members is an important part of its success. Organizing outreach to multicultural populations can create new mobility options for many who are disadvantaged and have few travel options, and it can create a new base of riders for transit agencies and develop a loyal ridership.

Large employers can be a market for transit agencies to target, as they offer agencies many potential riders in concentrated locations. The Los Angeles County Metropolitan Transportation Authority works with employers to persuade employees to seek alternatives to single-occupant vehicle commutes. Some agencies conduct transit demonstrations to expose employers to new routes that serve their locations. Before the launch of the Santa Barbara MTD's Valley Express Commuter Bus, buses were brought to work sites to give employees tours of the vehicles and transit information. In addition, several transit agencies offer transit pass programs in conjunction with employers (see Chapter 1). The Eco Pass program, for example, is a partnership between Santa Clara VTA and employers in the Silicon Valley to decrease commute congestion by offering an unlimited-ride transit pass to employees (Figure 10-2). The cost of the pass is deducted before taxes from employee wages, and employees receive a greatly discounted fare. Even if employers choose not to institute a pass program, they may be receptive to promotion of transit services. Company newsletters offer advertising opportunities. Agencies can also work with large employers to match flex-time hours with bus schedules.

Most transit agencies conduct surveys to understand the travel patterns and transportation needs of their service area. These frequently take the form of surveys conducted on board a transit vehicle, but this only captures the attitudes of current riders. To identify the attitudes of individuals who do not ride transit regularly, it is important for agencies to conduct surveys outside of transit vehicles. As part of the background research for its Short Range Transit Plan, the Redding Area Bus Authority (RABA) conducted both on-board surveys and telephone surveys of residents in its service area, which allowed RABA to incorporate the attitudes of current and potential riders into its service planning.

During their planning processes, agencies work with a variety of stakeholders to identify the needs of diverse transit constituencies. Samtrans made outreach efforts to citizen's advisory committees, the County Association of Governments Board of Directors, the City Manager's Association, and town hall meetings to gain input on public response to their goals and initiatives. Caltrain has a Citizens Advisory Committee, a Bicycle Advisory Committee, and an Accessibility Advisory Committee, all made up of Caltrain riders. Monterey-Salinas County Transit went to great efforts to define community expectations using census data, state and regional planning documents, county data, surveys of public service agencies and riders, and by holding public meetings about transportation needs. Though outreach serves to inform planning decisions, transit

agencies do not have to narrowly focus on operations. Transit can become part of the change to create better and more livable communities. The vehicles of Santa Clara VTA became a part of “Project Safe Place,” a partnership between communities, schools, and businesses that designate safe locations for children who may be exposed to crime. When transit agencies collaborate with stakeholders, they can expand beyond the purpose of service provision and work towards larger regional planning goals.

Outreach through Websites

Physical outreach is an important element of educating the public about transit service and marketing transit to a variety of users. However, it is limited by the resources transit agencies can expend to promote outreach. Agencies have a more economical and potentially wider-reaching way to connect with users through transit agency websites. Websites present a great opportunity to communicate with regular and potential riders about service



Figure 10-3: Buttons appearing on Foothill Transit’s landing page. Source: www.foothilltransit.com.

updates, fare and pass information, where to purchase fares, and how to best reach destination via transit. Many transit agencies also sell fare media online. As more and more people of all age groups use the Internet as a source of information, transit agencies must invest in making websites visually attractive, easy to use, and able to satisfy the informational needs of many different kinds of visitors. This section provides a survey of agency website design, information available on websites, and ease of navigation around the sites, identifying good examples of site design and some areas for improvement.

One initial area that is a source of both opportunity and difficulty is the need to



Figure 10-4. Panels on Foothill Transit and BART websites that focus on important information. Sources: www.foothilltransit.com, www.bart.gov.

accommodate several types of visitors to a website, each with different levels of knowledge about an agency’s services (and of riding transit). A website that assumes every visitor is already an experienced rider may confuse the occasional or first-time viewer of the site. Foothill Transit has addressed the problem of appealing to different rider types by having “new rider” and “rider” buttons on its landing page (see Figure 10-3).

Clicking the “new rider” button leads to basic information about how to ride the bus and the different types of fare media available. Clicking “rider” directs viewers to pages that have information about the TAP smart card and the site’s trip planner. At the bottom of both pages is a “rider’s toolbar” that offers easy-to-identify links to fare charts, a trip planner, Google Transit, and Foothill’s system map. BART’s homepage has a similar “New to BART?” panel, which is next to the navigation bars at the top of the page and offers quick links to trip planning tools, ticket information, station parking, and airport information (Figure 10-4).

Regardless of the type of visitor, a transit agency website should have clear, visible links to valuable information such as fares, types of service, schedules, and “how-to” guides for riders (e.g. how to reach major destinations like an airport, purchase fares, or connect to other operators’ services). In general, links that are arranged horizontally at the top of a webpage are easier for visitors to recognize and access. Figure 10-5 shows two “top navigation” bars from different agencies.

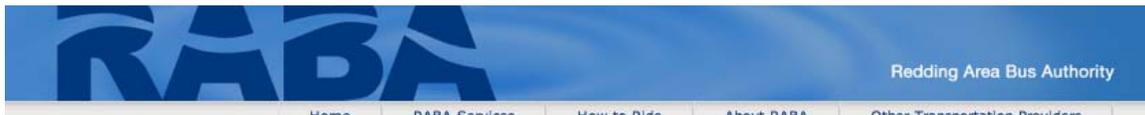


Figure 10-5a. Top navigation bar on RABA’s website. Source: www.rabaride.com



Figure 10-5b. Top navigation bar on Santa Clarita Transit’s website. Source: www.santaclaritatransit.com

Note the tradeoff between the number of top navigation options and website clarity that both agencies negotiate in different ways. In matters of website design, less is generally better, since adding too much content can impede effective communication. While Santa Clarita’s top navigation bar has many options that could potentially lead to confusion, it make sense to break out links to what are likely to be frequently sought items, such as fare information and trip planning capabilities.

A related challenge lies in being able to present information in a succinct manner without leaving out too much of what is important. LA Metro has negotiated this challenge by compartmentalizing information by subject area, and then further separating more detailed information by tabs, so that very particular pieces of information can be logically obtained in two or three clicks. In contrast, a webpage with too few links must cram information in small spaces, resulting in a proliferation of small text, and may also force the user to scroll down the page for some time looking for relevant information. Also, too much unbroken text can make information difficult to find and may make users impatient.

Nearly all websites offer information on fare types, where fares can be purchased, route maps, schedules, and links to other transit providers. However, not all information is presented

with the same level of clarity or usefulness. For example, most agencies that sell fare media in stores simply include a long list of participating stores on their website, forcing viewers to wade through unnecessary information to find the precise location they need; an easier solution would be to allow site visitors to search for a store by name or location. BART's website allows users to select a city or search by zip code, and returns stores in the inputted city or zip code that sell BART fares, along with the particular fare types sold at the location. The TAP and TransLink smart card websites also allow visitors to search by city and zip code for participating locations that sell the smart cards and can load fares. The TransLink search function also allows searches by location (e.g. an intersection or address), and nearby TransLink vendors appear on an adjacent map.



Figure 10-6. A trip planning feature on Monterey-Salinas Transit's website. Source: www.mst.org.

As with any other mode of transportation, people take transit to get where they want to go. Beyond providing links to route and system maps, transit websites help riders discover how they can take transit to a desired location via trip planners or by listing popular destinations that reference which routes serve those locations. Of these two options, trip planners are in more widespread use; seventeen websites have an integrated trip planner or link to an external trip planner (typically Google Transit or a regional transportation site, such as 511 for the Bay Area and San Diego), while nine websites provide lists of what destinations are served by the agency, with varying degrees of specificity (e.g. a site may say that the agency's service reaches a particular destination, but not which route).

One drawback to providing a list of destinations is the risk of this information becoming outdated; keeping destination lists up-to-date requires constant revision of content, something many agencies may not have the time or resources to do. Some agencies provide both features in their trip planners, i.e. an option for users to either enter their own origins and destinations or select from a list of places of interest. Figures 10-6 and 10-7 show how Monterey-Salinas Transit's trip planning feature, using Google Transit, can be used to create a route for a transit trip.

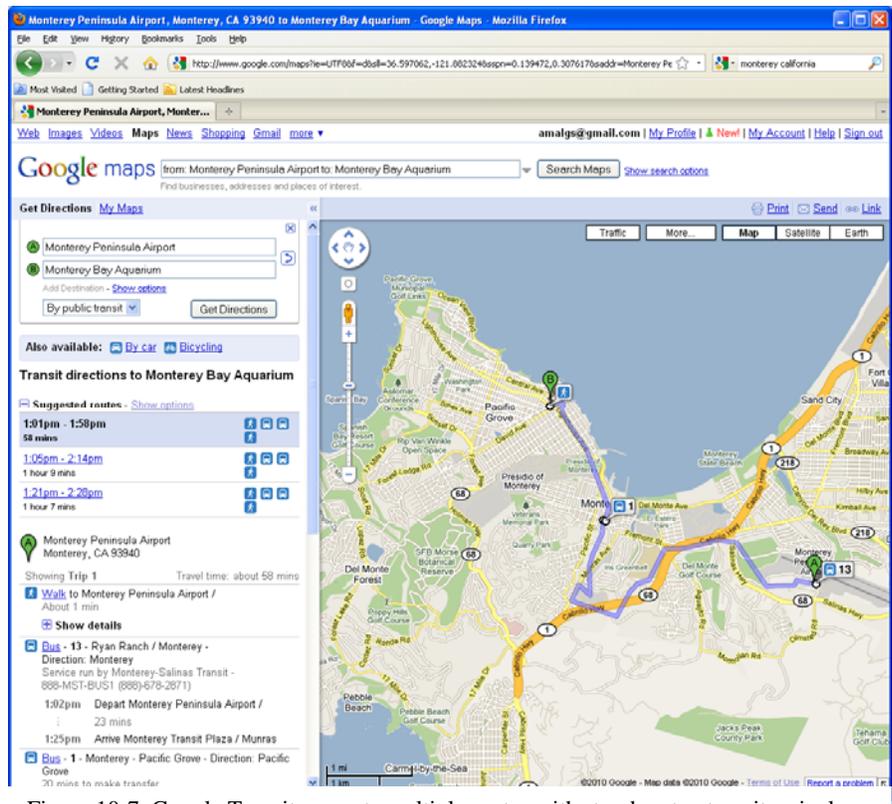


Figure 10-7. Google Transit presents multiple routes with step-by-step transit arrival and transfer information for a trip on Monterey-Salinas Transit.

The role of an agency’s website does not necessarily end with communicating information about the operator’s own service. While most operators that connect to other agencies’ services discuss interagency transfer policies and provide links to other agency websites, fewer agencies specify where connections can be made. Golden Gate Transit’s website has a list of transfer locations by city that has details on what other agencies serve that location, along with route numbers. The chart is reproduced in Figure 10-8 below.

Major Transfer Points

Not all trips on routes noted by an asterisk (*) serve the referenced location.
Be sure to review either the most recent Bus & Ferry [Transit Guide](#) or online [schedules](#).

GGT Bus/Ferry Stop Location	Served by Other Transit Systems	Served by GGT Routes
SAN FRANCISCO		
Golden Gate Bridge Toll Plaza	Muni PresidiGo Shuttle	2, 4, 8, 10, 18, 24, 26, 27, 38, 44, 54, 56, 58, 70, 72, 72F, 72X, 73, 74, 76, 80, 92, 93, 97, 101
San Francisco Civic Center 8th and Market Streets	BART, Muni, SamTrans	10, 70, 72*, 73, 76*, 80, 92, 93, 101
San Francisco Embarcadero BART Station 1st and Market Streets	BART, Muni	Larkspur & Sausalito Ferries, 2, 4, 8, 10, 18, 24, 26, 27, 38, 44, 54, 56, 58, 70, 72, 72F, 72X, 73, 74, 76, 80, 101
San Francisco Ferry Building Embarcadero and Market	Alameda/Oakland Ferry, Amtrak Shuttle Bus, Harbor Bay Ferry, Muni, Tiburon Ferry (Blue & Gold Fleet), Vallejo Baylink Ferry	Larkspur & Sausalito Ferries
San Francisco Transbay Terminal Mission and 1st Streets	AC Transit, Greyhound, Muni, SamTrans	2, 4, 8, 10, 18, 24, 26, 27, 38, 44, 54, 56, 58, 70*, 72, 73, 74, 76, 80, 101
Richardson & Francisco (Northbound transfer point only)		2, 4, 8, 10, 18, 24, 26, 27, 38, 44, 54, 56, 58, 70, 72, 72F, 72X, 73, 74, 76, 80, 93, 101

Figure 10-8. A list of interagency transfer points from GGT’s website. Source: www.goldengatetransit.com.

While this survey has identified positive features that agencies have included in their websites, it appears that in many cases, web design is mostly an afterthought. This may be because of a lack of resources or competing demands; the websites with the lowest quality of design and information tend to be those of the smallest agencies or cases where the transit operator is a component of a city or county. In the latter case, the agency “website” is generally a section within the municipal website, which can lose transit in a sea of links to other municipal departments. It also means that the transit section can only get as much attention devoted to it as the city or county web designers can spare from dealing with other sections of the municipal site.

One way that agencies have been able to cope with a lack of resources for web design is to leverage external sources of information on transit. Agencies can outsource trip planning capabilities to providers such as Google Transit or regional transportation websites such as 511.com or LACMTA’s socaltransport.com. Smart card websites like clippercard.com or taptogo.net have detailed geographical information on where to purchase smart cards, and the Clipper site also has pass and fare information for agencies that use the Clipper card. A number of California agencies, including AC Transit, Muni, Davis Unitrans, Camarillo Area Transit, and Simi Valley Transit provide vehicle location data to nextbus.com, which can tell viewers when a bus for their chosen route and stop will arrive. In addition, the growing market for smartphones gives agencies an opportunity to open up vehicle location feeds to developers to make “apps” that can announce when the next transit vehicle will be at a stop, so that users don’t have to be at a

computer to find out when their bus will arrive.²² By coordinating content with outside websites or developers, agencies can forgo the need to provide such information themselves and concentrate on other forms of website improvement.

Whether they are using it or not, transit agencies have a robust and valuable source of information on website quality in the form of records of visits to the site from viewers. By analyzing how frequently and what portions of their sites generate “hits,” and comparing this with the results of other transit providers, agencies can optimize the way they deliver information to consumers to create a better user experience. Agencies can supplement this data by making it easy for website visitors to leave comments and ask questions. As web content becomes more

interactive, agencies may be able to bring some of their physical outreach activities online, for example by conducting live webinars that can be broadcast to multiple locations. Web design is another area that is an opportunity for interagency collaboration. By sharing experiences and tactics that have led to website improvement and positive user feedback, transit agencies will be better positioned to help the general public satisfy its travel needs by using local transit providers.

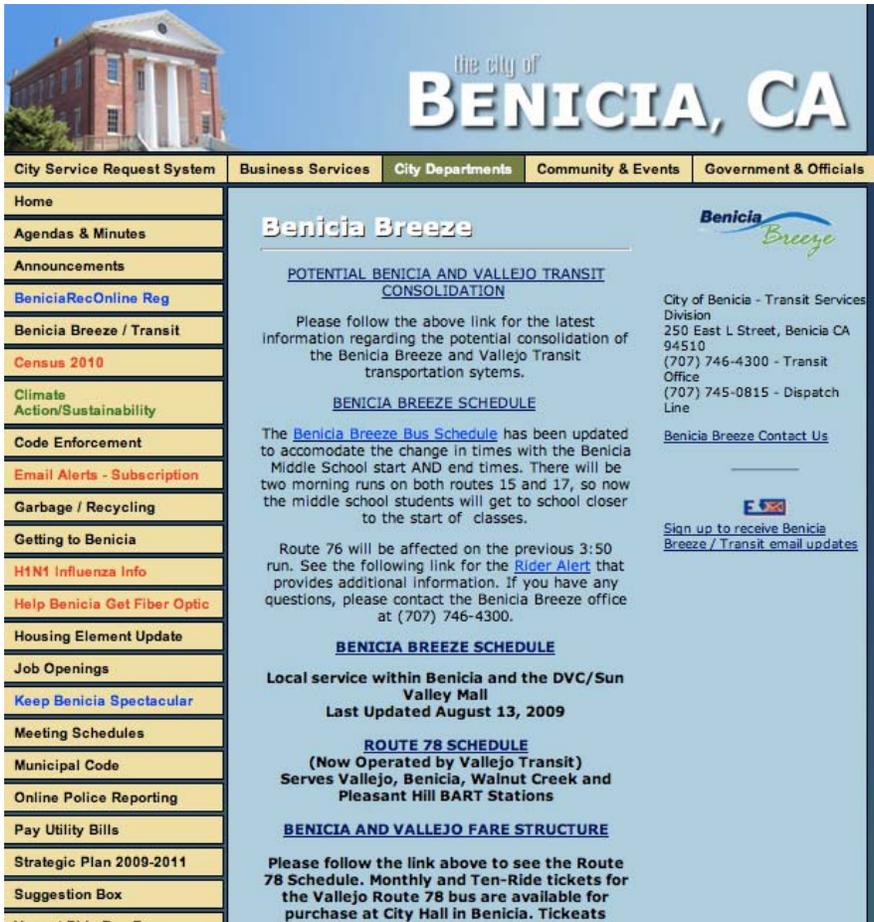


Figure 10-9. A transit webpage with too much competing unrelated information. Source: www.ci.benicia.ca.us.

²² Transit agencies should consider the legal issues associated with releasing data to private parties before any agreements are reached.

Chapter 13

TRANSIT-ORIENTED DEVELOPMENT

Transit-oriented development, generally defined as high-density development with a mix of residential, employment, and shopping located within walking distance of major transit stops, can facilitate higher transit use. Consumer housing preferences, employment location strategies, and transportation investments are all shifting attention towards smaller, walkable urban neighborhoods with a variety of travel options. The Center for Transit Oriented Development has estimated that a quarter of new households in the United States – 14.6 million households – will be searching for housing within a half-mile radius of fixed-guideway transit stations, and the amount of housing needed to meet this demand would more than double the existing number of houses in these “transit zones.” Transit-oriented development (TOD) has the potential to expand in areas that have extensive transit networks and in those with small but growing networks. In California, thirteen agencies discuss TOD in their short-range transit plans: BART, Caltrain, LACMTA, SacRTD, Samtrans, Omnitrans, Santa Monica Big Blue Bus, Fresno Area Express, LAVTA, OCTA, WestCAT, VTA, and MUNI.

TOD creates opportunities for integrated and cooperative development arrangements to connect land use and transportation, which can ultimately influence travel patterns for many people. Transit operators can greatly benefit from the development of housing close to their service networks. A survey cosponsored by the Santa Clara Valley Transit Authority revealed that people who live near rail stations use transit five times more often than the average person in the county.

The location of a TOD may influence the proportion of land use in square feet devoted to residential versus commercial use. Caltrans’s California Transit-Oriented Development Database compares land use at 12 urban and 9 suburban stations;²³ at urban rail stations an average of about 31 percent of TOD land use area is residential while commercial footage averages about 50 percent. For TODs in suburban settings, this proportion is reversed: average land use among nine areas studied is 65 percent residential and 22 percent commercial.

Infill development or redevelopment around transit stations can create new opportunities for more effective use of space through higher density. Since the passage of AB32 and SB375, cities have also been taking a look at the potential of TOD to help achieve greenhouse gas reductions by bringing more people closer to easily accessed transit.

TOD Near Rail Stations

The majority of TOD projects in California are sited near rail stations because their permanence can ensure long-term transit access for residents and employers. Some rail systems



Figure 11-1: Fruitvale Village, Oakland. Source:

²³ Caltrans Division of Mass Transit. Transit-Oriented Development Database Comparison Graphing Engine (<http://transitorienteddevelopment.dot.ca.gov/station/NewCompareGraph.jsp>)

are embedded within some of the most active urban areas in metropolitan regions of the state, which creates potential to invest in projects around stations.

Transit-oriented development in metropolitan areas can become attractive, high-value projects. Some of the most highly valued property in dense metropolitan centers is centered around rail stations. Investment in a quality environment with a mixture of residential, commercial, and recreational space and walkable destinations can enhance the image and value of a redeveloped area. The 4th Street MUNI Light Rail station is a central element of a project in the Mission Bay Redevelopment Area that adds over 6,000 residential units along the historic waterfront district together with retail space, parks, and a research center. Fruitvale Village in Oakland is often held up as an example of TOD. Built next to the Fruitvale BART station, it includes retail, office, and housing, including a proportion of affordable housing (see Figure 11-1). In San Diego, the Rio Vista Light Rail station is surrounded by a new development which includes retail and housing within a quarter mile, including new condominiums constructed right next to the station (see Figure 11-2).

TOD also provides an opportunity to address accessibility issues of low-income individuals by providing opportunities to include affordable housing and services, which can simplify trip making for individuals dependent on public transit. Including affordable housing in redevelopment around stations can promote greater accessibility for low-income, transit-dependent families.

The BART Station Area Planning Policy promotes community partnerships in the development of areas around BART stations to address planning, access, and functionality. The policy also advocates for transit support at all levels of the



government. In Fruitvale, the negotiations between the city and community groups with BART set plans for the Fruitvale Transit Village. Development around the BART station became a focal point for community revitalization and economic rejuvenation around transit to bring a mix of housing and retail into a low-income, inner-city area.

BART has assembled a Joint Development Policy Review Panel to examine the feasibility of TOD. Their reviews expressed a need to examine new development practices to maximize the use of land rather than follow standard development practices. For example, the 1:1 parking replacement practice has hindered the development of joint development and TOD in some areas. Adjustment of parking or access modal mix by using ground-leasing revenues can better optimize revenue and ridership.

TOD requires a commitment on the part of local governments as well as support from transit agencies. The land use planning and zoning necessary to develop TOD is outside the scope of most agencies, even if they own property they can develop, and so cooperation between cities and agencies is crucial. The San Mateo County Transit-Oriented Development Opportunity Study helped Samtrans assess opportunities and constraints for TOD within a ½ mile radius of rail stations in San Mateo County. One finding identified the reduction of on-site parking requirements as a possible incentive for smaller development projects. Cities can play a large role in the promotion of TOD through TOD-friendly zoning codes, preparation of specific or station area plans, and cooperation with entrepreneurs to develop small parcels.

TOD Served by Bus

While many TODs focus on rail, buses can also play a key role in the success of a TOD project either as a connection to rail systems or the transit centerpiece of the development. Even when TOD is oriented more towards rail stations, other modes of transit should still receive a net positive impact from TOD. Local operators like Samtrans promote local service to and from rail stations where they have set up transit supportive projects. TOD projects may also develop around reliable and frequent bus connections. The Uptown District in San Diego is an example of a pedestrian-oriented retail and residential center well served by several bus connections.

TODs each have distinctive characteristics influenced by its region and by the development patterns of its metropolitan area and transit services, and buses may contribute to a greater mode share in certain regions. Within the more dispersed transit zones of Los Angeles, where the total commute transit share is sixteen percent for TOD residents, buses capture most of the transit commute share (fourteen percent of residents). In Washington D.C., however, buses only capture a small portion (eight percent) of transit commute trips in an area where thirty percent of TOD commuters use transit. Suburban TODs are also more likely to be served by buses because they lack the established rail lines of urban centers in metropolitan regions.

Cooperation

Transit-oriented development requires cooperation between transit providers, city and community leaders, and land developers. The Los Angeles County MTA created the Smart Growth Partnership, a cooperative effort between public and private sector leaders to explore land-use potential, particularly for TOD near rail and bus stations. The Livermore Amador Valley Transportation Authority's Short Range Transit Plan suggests that cities designate "priority development areas" near rail and intensive bus lines as a way to ease the development of TOD.

A dedicated effort towards TOD is often made early in the planning process due to the complex nature of integrated land use and transportation planning. The difficulty of accommodating multiple transit systems may lead cities to develop specific station area plans. In the development of a TOD at the Waterfront District in the City of Hercules, the complexity of a TOD that incorporates a ferry station, a Capitol Corridor station, and local and express buses warranted a comprehensive transit plan to manage the integration of each mode.

*"Essential to good TOD plans are a mix of uses within walking distance of each other, a site layout supportive of walking and transit use, and a well-designed pedestrian and bicycle system that emphasizes convenience and safety."*²⁴

²⁴ "VTA Helps Keep the Valley Green," Santa Clara Valley Transportation Authority

Chapter 14

COSTS OF DRIVING ALONE VS. TRANSIT

When people make choices about transportation, costs are part of the calculation. In comparing driving a car, for example, to taking transit, a traveler is likely to weigh the out-of-pocket costs of gas, tolls, and parking against fares, and to judge the relative time costs of the two modes. If a transit trip takes much longer, especially if it involves transfers and waiting time, the car trip may appear to be the better choice. This is partly because many people do not take into account the “fixed costs” of owning a car (loan payments, insurance, taxes, maintenance). If they own a car, those costs must be paid whether they use it for a particular trip or not, and therefore it makes some sense not to count them towards the total costs of any individual trip. And very few people consider the external costs of driving—those costs paid by society, or by others, rather than the driver; costs such as increasing congestion or smog levels. There is little incentive for an individual to include them in their calculations: the driver doesn’t pay them, it is difficult to even know how much they are in order to compare among alternatives, and there is little gain to the individual from *not* imposing them (i.e., one person choosing a transit trip over a drive-alone trip will make very little difference in the quality of the air that day).

A quick calculation under these conditions will likely make a car trip seem less costly than one on transit, because the out-of-pocket cash outlay for a transit trip can be higher than for driving, and the time costs of transit (especially waiting time) can be much higher than for a car trip that can carry one directly from origin to destination.

The American Automobile Association estimates that the average cost of owning a car is approximately 71 cents a mile, or \$5,925 a year if the car is driven 10,000 miles. This includes only fuel, license, registration and taxes, insurance, tires, depreciation, financing, and maintenance and repairs; it does not include tolls, parking, or external costs.

The U.S. Bureau of Labor Statistics estimates are higher: in 2007, the average U.S. household spent \$8,758 on transportation, of which \$8,003 was for automobile costs. Only \$537.81 went towards public transportation, and two thirds of that amount was for airline fares. Average per-household expenditure on mass transit was only \$51 in 2007.

Figure 14-1 illustrates researcher Todd Litman’s estimate of the different costs associated with owning and driving a car. Internal variable costs (37% of the total) include fuel, maintenance, taxes, tolls, short-term parking, crash risks, and travel time.²⁵ Internal *fixed* costs include ownership (car payments), parking (off-street residential and long-term leased), and insurance. External costs (35% of the total) include crash risks to others, road facilities not paid for by fuel taxes, land use impacts, land value, congestions, smog, greenhouse gases, water runoff, noise, and waste. Not on Litman’s list are unpaid on-street parking and opportunity costs from transportation planning’s historical focus on highways and cars rather than transit and alternative modes.

Figure 14-2 breaks out Litman’s estimates by individual cost, showing that

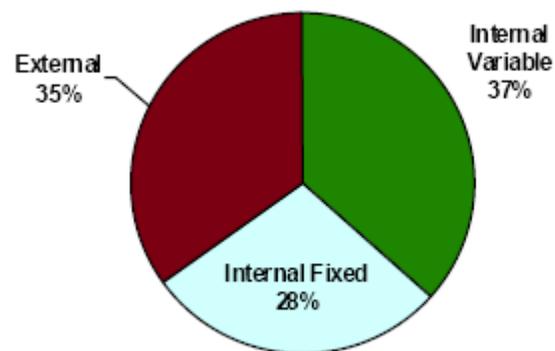
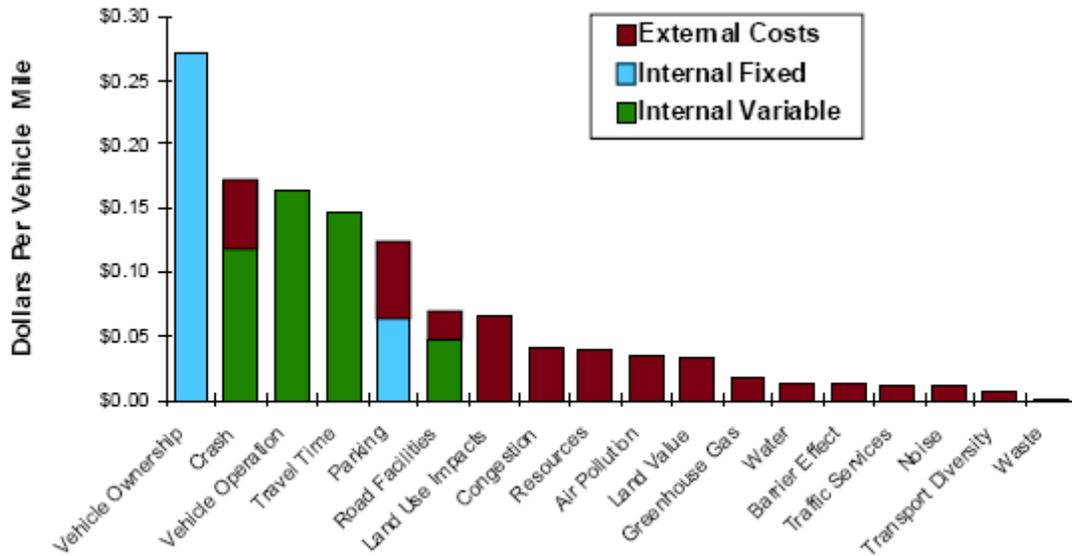


Figure 14-1: Costs of Owning an Automobile
Source: Litman, *Transportation Cost and Benefit Analysis*

²⁵ Todd Alexander Litman, *Transportation Cost and Benefit Analysis: Techniques, Estimates, and Implications*, Victoria Policy Institute, 2009.

external costs tend to be small for each auto driver, but there are many of them, which is why they are such a high portion of total costs.

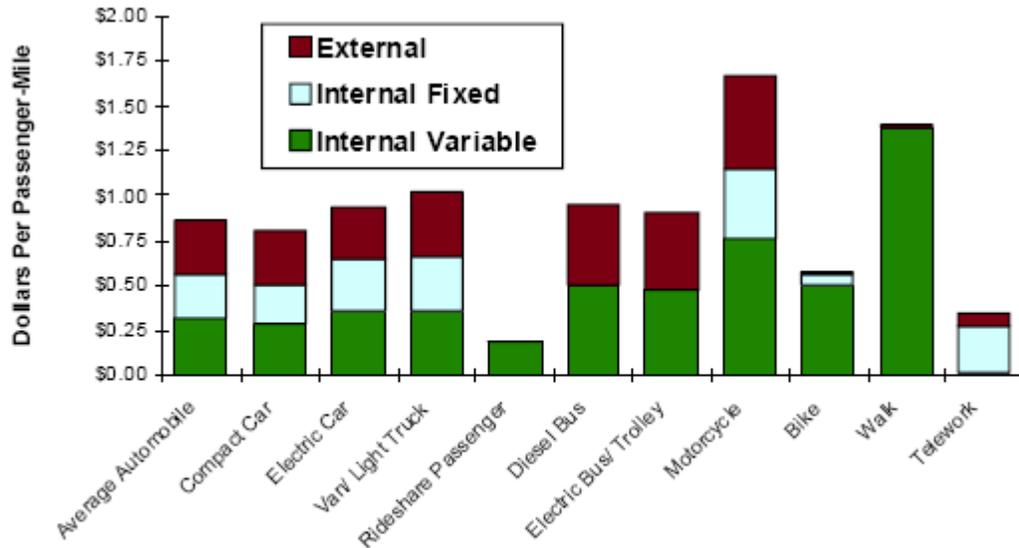


This figure shows Average Car costs per vehicle mile, ranked by magnitude. External costs tend to be small but are numerous.

Figure 14-2: Average Automobile Costs
Source: Litman

Litman makes the argument that external costs are underpriced, and that non-market costs (like congestion, air pollution, water runoff, and noise) are undervalued in transportation planning. Furthermore, failing to adequately consider these costs leads to planning decisions that can result in negative net benefits (his example is of a roadway expansion that saves drivers five cents a mile in time costs but imposes ten cents a mile in economic and environmental costs).

Of course many of these costs are difficult to quantify, and assigning a value involves a number of assumptions which may or may not hold. Litman’s estimates of the total costs of various forms of travel (Figure 14-3) is but one way to estimate them; although other estimates are possible, it is useful to note some points about these numbers. Notice that buses and autos have similar average total costs, although cars have higher fixed costs. Much of the internal variable costs for buses (and bicycling and walking) are time costs. Because transit is more efficient when there are more riders, and because in many cases transit currently has excess capacity, people switching from cars to buses will reduce the total cost of autos more than they will increase the total costs of bus travel.



This graph shows the cost distribution of each mode. Transit costs are based on average U.S. ridership levels and would be lower in areas with higher ridership rates.

Figure 14-3: Cost Distribution by Mode
Source: Litman

Implications

Litman makes important arguments based on his findings, among them: The fixed and internal transportation costs create an incentive to driving more to “get your money's worth.” It may be that motor vehicle travel would decline significantly—and transit travel would rise—if prices reflected full costs. Kenneth Small, however, has found that drivers don’t always respond to higher prices by driving less, or not much less.²⁶ However, there may be other ways to get the desired result of less car use and more transit use. London, Stockholm, and Singapore, for example, have used pricing to deter people from driving by charging them a fee to enter the central business district. Small, writing about the London pricing scheme,²⁷ points out that one of its benefits was an increase in transit use. Importantly, all three cities did more than just impose a toll; they dedicated the funds to improving and expanding transit capacity and services.²⁸

²⁶ Kenneth Small, “Real Costs of Transportation and Influence of Pricing Policies”, Working Paper No. 187, University of California Transportation Center, 1993

²⁷ Small, “Road Pricing and Public Transit: Unnoticed Lessons from London”, *Access*, University of California Transportation Center, No. 26, spring 2005

²⁸ Hårsman, Björn and John M. Quigley, “Political and Public Acceptability of Congestion Pricing: Ideology and Self-Interest,” University of California Transportation Center, Working Paper UCTC-FR-2010-17, 2010.

Appendix SOURCES

Agency Plans and Documents

AC Transit, *Short Range Transit Plan 2003-2012*

Designing With Transit: Making Transit Integral to East Bay Communities, A Handbook for Elected Officials, Local Staff, and Other Community Builders, AC Transit, 2004

Antelope Valley Transit Authority Long Range Plan, Dan Boyle & Associates, Inc., 2005

Antelope Valley Transit Authority Performance Standards and Service Guidelines, Dan Boyle & Associates, Inc., 2004

San Francisco Bay Area Rapid Transit District, *Short Range Transit Plan FY08 through FY 17, Fiscal year 2008*, 2007

Caltrain Short Range Transit Plan—Fiscal Years 2008 through 2017, Peninsula Corridor Joint Powers Board, 2008

The County Connection: Short Range Transit Plan Fiscal Years 2008 through 2017, Central Contra Costa Transit Authority, 2008

City of Davis Short Range Transit Plan, Nelson/Nygaard Associates, 2005

Foothill Transit Fiscal Year 2010 Business Plan, Foothill Transit Governing Board, 2009

Fresno-Clovis Urbanized Area Short Range Transit Plan 2007-2012, City of Fresno Planning Division, 2007

Short Range Transit Plan FY09/10-13/14, Golden Empire Transit District

Golden Gate Bridge, Highway and Transportation District Short Range Transit Plan 2008-2017

Livermore Amador Valley Transit Authority Short Range Transit Plan, Fiscal Years 2008 to 2018, 2008

City of Lodi Short Range Transit Plan, FY 2008/09-FY 2017/18, Nelson/Nygaard Associates, 2009

City of Lompoc Short Range Transit Plan, FY 2004 through FY 2008, Moore & Associates, 2003

Short Range Transit Plan 2010-2012, Long Beach Transportation Company

Action Plan: A Locally Developed, Coordinated Public Services Transportation Plan for Los Angeles County, Access Services, Southern California Association of Governments, and Los Angeles Metropolitan Transportation Authority, 2007

The City of Los Angeles Transportation Profile 2009, Los Angeles Department of Transportation

Los Angeles County Metropolitan Transportation Authority, *Short Range Transportation Plan for Los Angeles County*, 2003

Marin Transit's Short Range Transit Plan FY 2008/09-FY 2018/18, 2009

Change in Motion: Transportation 2035 Plan for the San Francisco Bay Area, 2009

Coordinated Public Transit Human Services Plan: Elderly and Disabled Component, Nelson/Nygaard, Metropolitan Transportation Commission, 2007

Coordinated Public Transit Human Services Plan: Focus on Low-Income Populations in the San Francisco Bay Area, 2006

Monterey-Salinas Transit Business Plan and Short Range Transit Plan, FY 2006 through FY 2008, 2005

Napa County Short Range Transit Plan FY 2008-2017, Draft Report, Nelson/Nygaard Associates, 2008.

New Directions: Charting the Course for Orange County's Future Transportation System, Orange County Transportation Authority 2006 Long-Range Transportation Plan, 2006

Public Transit-Human Services Transportation Coordination Plan for Orange County, AMMA Transit Planning, 2008

Omnitrans Short Range Transit Plan FY 2008-2013, Final Report, IBI Group with Arellano Associates/Connetics Transportation Group, Inc., 2007

Omnitrans Strategic Plan, FY 2009-2014, Evans Planning Group, Inc., 2008

Redding Bus Authority Short Range Transit Plan 2007-2012, Moore & Associates

Public Transit and Human Services Transportation Coordinated Plan, Amendment #1, Sacramento Regional Transit District, 2009

Sacramento Regional Transit District Strategic Plan, 2004-2009

One Region, One Network, One Plan: The Coordinated Plan, 2008-2010, San Diego Association of Governments, 2008

2030 Regional Transportation Plan: Pathways for the Future, San Diego Association of Governments, 2007

Regional Short Range Transit Plan, 2005-2009, San Diego Association of Governments, 2005

San Francisco Municipal Railway Short Range Transit Plan FY 2006-2025, 2005

San Francisco Municipal Transportation Agency 2008-2012 Strategic Plan

Now We're Commuting: Draft San Joaquin Regional Rail Commission Short Range Transit Plan, Fiscal Year 2006/7-2016

San Joaquin Regional Transit District Short Range Transit Plan, Fiscal Year 2009-2013

San Luis Obispo Transit Short Range Transit Plan, 2003-2012, Final Report, Urbitran, 2004

San Mateo County Transit District, Strategic Plan 2009-2013

San Mateo County Transit District, Short Range Transit Plan, 2008-2017, SamTrans Board of Directors, 2008

Short Range Transit Plan, FY 2006 to FY 2010, Santa Barbara Metropolitan Transit District, 2005

Short Range Transit Plan, Santa Clara Valley Transportation Authority, FY 2008-2017, 2008

Santa Clarita Transit Transportation Development Plan 2006-2015, Michael Fajans & Associates, 2006

Santa Cruz Metro Short Range Transit Plan, 2007-2008, Wilbur Smith Associates, 2008

Santa Monica's Big Blue Bus Short Range Transit Plan FY 2009-2011, 2008

Santa Rosa CityBus Short Range Transit Plan 2008-2017, 2008

Solano Transportation Authority Comprehensive Transportation Plan: Transit Element, 2005

Sonoma County Transit Short Range Transit Plan FY 2008-FY 2017, Sonoma County Department of Transportation and Public Works, 2008

Sonoma County Transit Mini-Short Range Transit Plan FY 2009-FY 2018, Sonoma County Department of Transportation and Public Works, 2009

SCRRA Strategic Assessment, Southern California Regional Rail Authority, 2007

SunLine Transit Agency Annual Report FY 2008

Tri Delta Transit Short Range Transit Plan FY 2007/08-2017/18, Eastern Contra Costa Transit Authority, 2008

Western Contra Costa Transit Authority Short Range Transit Plan, FY 2008-2017

Yolo County Transportation District Draft Short Range Transit Plan, Nelson/Nygaard Associates, 2006

Alternative Fuels (Chapter 6)

Austin, Thomas C., Siona S. Delaney, Philip L. Heirigs, James M. Lyons. *A Comparative Analysis of the Feasibility and Cost of Compliance with Potential Future Emission Standards for Heavy-Duty Vehicles Using Diesel or Natural Gas*. (Sierra Research, Inc.: Californians for a Sound Fuel Strategy, Report No. SR00-02-02), 2000.

Ayala, Alberto, Norman Kado, Robert Okamoto, Michael Gebea, Paul Rieger, Reiko Kobayashi, and Paul Kuzmick, "CNG and Diesel Transit Bus Emissions in Review," Report for the Ninth Diesel Engine Emissions Reduction Conference, Newport, Rhode Island, 2003.

Bult, Brian, Kevin Bishop, Alan Bray, Greg Martin, Phil Morgan, and John Stanley. "Euro 2 and Beyond: Fuel for TransPerth's Bus Fleet," Report on the Findings of the Expert Reference Group, Australian Ministry of Transport, 1998.

Cannon, James S. and Chyi Sun. *Bus Futures: New Technologies for Cleaner Cities*, INFORM, Inc., 2000.

Graham, John, James K. Hammit, and Edmond Toy, "Risk in Perspective: Fueling Heavy Duty Trucks: Diesel or Natural Gas?" Harvard Center for Risk Analysis, 2000.

Kojima, Masami, "Breathing Clean: Considering the Switch to Natural Gas Buses," World Bank Technical Paper No. 516, 2001.

Lane, Ben, Ken Lillie, Joshua McCallum, and Jonathan Murray, "An Assessment of the Emissions Performance of Alternative and Conventional Fuels," Alternative Fuels Group, UK, 2000.

Petersen, Rudolf, "CNG Buses: An Assessment," InfoPool: Clean Technologies Information Pool (<http://www.cleanairnet.org/infopool>).

Miscellaneous Sources

California Environmental Protection Agency, Air Resources Board: Public Transit Agencies (<http://www.arb.ca.gov/msprog/bus/bus.htm>).

Federal Transit Administration National Transit Database (<http://www.ntdprogram.gov/ntdprogram/>).

Gray, George, Norman Kelley, and Tom Larwin. *Bus Rapid Transit: A Handbook for Partners*. (San Jose: Mineta Transportation Institute, 2006).

Todd Alexander Litman. *Transportation Cost and Benefit Analysis: Techniques, Estimates, and Implications*. (Victoria, British Columbia: Victoria Policy Institute, 2009).

Nelson/Nygaard, "Caltrans Park & Ride and HOV Transit Enhancement Project: The California BusPool Project," Caltrans Division of Mass Transportation and Caltrans Division of Traffic Operations, 2005.

The Public Transit Bus Fleet Rule and Emission Standards for New Urban Buses (Air Resources Board 1999, Air Resources Board 2000b).

Reconnecting America: Center for Transit-Oriented Development
(<http://www.reconnectingamerica.org>).

Kenneth Small, "Real Costs of Transportation and Influence of Pricing Policies," Working Paper No. 187, University of California Transportation Center, 1993.

Kenneth Small, "Road Pricing and Public Transit: Unnoticed Lessons from London," *Access*, University of California Transportation Center, No. 26, Spring 2005.

Turnbull, Katherine. *Effects of Changing HOV Lane Occupancy Requirements: El Monte Busway Case Study* (Washington DC: Federal Highway Administration, 2002).

United We Ride: Coordinating Human Services Transportation, Coordinating Council on Access and Mobility (<http://www.unitedweride.gov/>).