

MTP2035 Issue Papers: Transit Expansion



This paper explores the issues and choices that underlie the expansion of transit services through the life of the Metropolitan Transportation Plan (MTP) 2035. Who will demand transit services? Should transit's primary role be to serve the transit dependent, or should it be to provide another choice to those who currently choose to drive? What mix of transit services and connections would make transit effective enough to attract more ridership? How should the expansion of transit service relate to urban density and growth? How much will a significant expansion of transit cost, and how will we pay for it?

Transit Capacity and Use

- Thirteen public transit operators currently provide transit service in the region and two private non-profit Consolidated Transportation Services agencies offering varied size and types of service.
 - ▶ Sacramento Regional Transit District (RT) operates peak service with 250 buses in local service and 40 rail cars on 40 miles of track, comprising about two-thirds of the region's service.
 - ▶ The other systems range in size from Yolo County, Roseville, and Yuba-Sutter Transit, operating about 30 buses each in peak service, to the City of Auburn with a fleet of only three vehicles.
 - ▶ ParaTransit Inc. operates a fleet of 125 lift-equipped vans serving primarily riders needing assistance in greater Sacramento, and four operators offer the same service in the other counties.
- Transit in this region is primarily a lifeline service for the transit-dependent, with frequency lower than the 15 minutes considered the minimum to attract those who can choose between auto and transit .
 - ▶ Of about 160 transit routes run by all the region's operators, fewer than 10% run as often as 15-minute frequency, even in the peak period.
 - ▶ No bus routes or light rail lines run lower than 30-minute frequency in the evenings.
- Transit currently carries less than 1% of all daily trips in the region, about 4% of commute trips, and 20% of commute trips into downtown Sacramento.
- At least half of transit ridership in the Sacramento region today comes from transit-dependent passengers: youth, elderly, disabled, low income, or those who do not have access to an automobile.
 - ▶ Surveys show that at least 25% of transit riders do not own an automobile, and almost 20% have incomes below the federal poverty line.
 - ▶ The transit dependent female disproportionately includes female heads of households and immigrants.
 - ▶ Older Americans, particularly those over 75 (who drive little or not at all), are more likely to rely on transit, typically with a reduced fare. Among non-drivers age 75 and

older, 14% use transit as their primary mode of travel, and nearly 20% say they use transit on a monthly basis.

- ▶ An increasing number of school students use transit, and in Sacramento they ride at a discounted fare, as tight school district budgets force cuts in school bus transportation.
- The remaining riders are choice riders, who choose transit over other available transportation options, mainly for commuting to work
 - ▶ Most choice riders tend to be commuters with higher incomes; 54% of transit trips in U.S. cities, and a somewhat smaller share in Sacramento, are commute trips.
 - ▶ Persons with incomes over \$50,000 per year comprise 17% of the nation's transit users.
- Anecdotal evidence indicates that the region's transit system has perhaps 30% unused peak capacity, little of it found on routes attractive to choice commute riders, and plenty of off-peak capacity.
 - ▶ The transit system carries more than 30,000 riders in a two-hour peak period in both morning and afternoon, and a bus and rail fleet with a maximum of 20,000 seats per hour in peak hour service.
 - ▶ Many peak hour runs operate full, some with standees, particularly those oriented for commuting to and from downtown Sacramento, but some others run less than half full at all times.
- A comparison of Sacramento with ten urban areas of mostly similar population shows Sacramento with a relatively small fleet (8th out of 11 cities) that proportionally carries more passengers overall (6th out of 11) but fewer commuters (10th out of 11).
 - ▶ The study done in 2003 compared Sacramento (28th largest urban area in U.S.) with the next five larger metropolitan areas (Portland, San Jose, Riverside, Cincinnati, and Norfolk) and the next five smaller areas (Kansas City, San Antonio, Las Vegas, Milwaukee, and Indianapolis) for vehicles in peak service and daily and commuter ridership in relation to population and density.
 - ▶ Portland provides a model of superior transit service, ranking 1st in all the performance measures, carrying more than three times the ridership on a peak fleet nearly three times larger than in Sacramento. The service area has 40% lower population density but has a fifteen-year history of transit-supportive development policies.
 - ▶ San Jose and Riverside provide interesting contrasts in service approach for suburban settings in California of comparable size and population density: San Jose favors effectiveness over efficiency, ranking 3rd in peak vehicles and ridership and 6th in commuter ridership but with the lowest farebox return (12%) of any large operator in the state, while Riverside favors efficiency over effectiveness, ranking 11th (lowest) in peak vehicles and overall and commuter ridership but with one of the higher farebox returns (29%) statewide.
 - ▶ Overall and commuter riderships are generally proportional to peak vehicle fleet size, with Las Vegas and Sacramento showing larger than average overall ridership per vehicle in service and Cincinnati and Kansas City showing larger than average commuter ridership.

- Strategic transit expansion will be necessary to increase peak period choice ridership, and becomes increasingly critical to complement and serve more compact Blueprint development patterns.

Transit Expansion and Land Use

- Land use density matters for efficient transit service.
 - ▶ Traditional fixed route transit is inherently either ineffective or inefficient in low-density suburban residential and employment settings; the performance of San Jose and Riverside systems noted above illustrates this point.
 - ▶ Comparing downtown Sacramento and Rancho Cordova, one a dense and the other a sprawling employment center of comparable size, Sacramento RT's bus and rail lines carry an average of about 450 riders per line in the peak periods to and from downtown Sacramento versus about 300 riders per line to and from Rancho Cordova.
 - ▶ San Francisco Muni, operating in the densest residential and employment environment in California, carries 720,000 riders daily on a fleet of 900 buses and 160 rail cars (680/vehicle).
 - ▶ Los Angeles MTA, operating in a relatively high density urban/suburban metropolitan area, carries 1,375,000 riders daily on a fleet of 2550 buses and 180 rail cars (500/vehicle).
 - ▶ Sacramento RT, operating primarily in a low density suburban environment, carries 100,000 riders daily on a fleet of 250 buses and 40 rail cars (350/vehicle).
 - ▶ Riverside Transit, operating in a medium-density suburban area, carries 25,000 riders daily on a small fleet of 85 buses (300/vehicle), nearly as high as Sacramento despite minimal service.
 - ▶ Residential and employment density, as well as the presence of major trip attractions, such as educational facilities, are significant factors in cost efficiency of new transit services.
 - ▶ Transit cannot efficiently serve typical low suburban residential or employment densities at reasonable cost, but must be brought into play as more compact infill redevelopment takes place.
- Close proximity to transit, close enough to walk, dramatically increases transit use.
 - ▶ Research in suburban Maryland found that those within walking distance to high quality transit service were 10% to 45% more likely to use transit than those who had to drive for access.
 - ▶ San Jose built about 4,500 housing units and 9 million square feet of commercial-office space within walking distance of the Tasman West light rail line between 1997 and 1999, and saw daily ridership on its 2-line light rail system increase from 20,000 in 1996 to more than 25,000 by 2000.
 - ▶ Base Case land development would yield only 5% of jobs and 2% of housing within ¼ mile of high level transit service, whereas the Blueprint would place 41% of jobs and 38% of housing within the same closeness to a high level transit service.

- Urban form and transit service must be interrelated at a fundamental level: as the population of an urban area grows beyond 2 million, transit and walking become more suitable, highway congestion becomes the expected norm, driving costs increase (delay and parking), and accessibility patterns change.
 - ▶ More compact urban design and mixed land uses favor more travel choices, including transit, as the cost in dollars and congestion make driving alone less attractive and affordable.
 - ▶ In larger and more compact urban areas, the roadway and parking space needed for autos becomes a limiting factor for auto use, because of congested conditions and cost.
 - ▶ A workplace parking space is 20% larger than the typical office workspace, so free parking cannot be an option at higher employment densities.
 - ▶ A garage comprises about 10% of the cost of a typical suburban house. In the denser setting of downtown Chicago a common garage space adds about 20% to the cost of a condominium; and in Manhattan garage rents amount to as much as 50% of apartment rents.
- With Blueprint as a key regional goal, transit expansion policy and investments can become tools to shape land use objectives, rather than simply to increase service in an attempt to lure more riders.
 - ▶ The lion's share of growth in transit ridership must come from more choice riders, and must include both commute trips and some local travel for other purposes.
 - ▶ Modeling of the Preferred Blueprint Scenario compared to Base Case for 2050 showed an increase from 135,000 transit trips to 550,000 transit trips daily, an increased share of all commute trips from 2.3% to 7.8%, and an increased share of commute trips to downtown Sacramento from 20% to 44%.
 - ▶ As existing services in Sacramento illustrate, local transit services aimed for the transit-dependent does not attract choice riders in large numbers, so new transit service aimed for choice riders must include additional kinds of services tailored to provide travel competitive with the auto.
 - ▶ Commuters value service with reasonable travel speed compared to congested roadways, minimal stops, good frequency over an extended peak period, and minimal waiting at transfer points.
 - ▶ Communities with strong activity centers and jobs/housing balance need transit services tailored to more localized travel patterns, for choice riders and trips other than commuting.
 - ▶ Employment centers, both downtown Sacramento and suburban areas, need to cultivate high office density, buildings close to sidewalks, and appropriate parking prices to enable efficient transit access.
- The transition from lifeline transit service for the transit-dependent to transit as a mode of choice is a challenging one, because infill and compact development at some point requires high levels transit services, but that level of service does not operate efficiently until compact development is in place.

- ▶ Compact infill development needs good transit service, which requires more funding, but infill development becomes less feasible with higher fees.
- ▶ Development fees to some extent can be used more creatively for transit-supportive features or directly for transit equipment and facilities, with an eye to the impact on transit operating cost.

Transit Expansion and Travel

- Transit fares are a key factor for most transit-dependent riders, who tend to have lower incomes.
 - ▶ The poorest fifth of American households spend 36% of their budgets on transportation, while the richest fifth spend only 14%.
- For the choice rider, transit must compete with auto on travel time, convenience, out-of-pocket cost, and perceived comfort.
 - ▶ Travel time, often two to three times longer than by auto, tends to be the key consideration for many choice riders.
 - ▶ Transit service frequency competes with the auto, which offers the ability to travel at any time; choice riders typically regard transit frequencies greater than 15 minutes as inconvenient or unacceptable.
 - ▶ Sacramento RT's pass at \$80/month or \$960/year compares with the \$960/year cost of fuel (at \$2.75 per gallon) for the average commuter; parking costs that vary from zero to \$8 per day (\$2400/year) can provide a real economic advantage for transit.
 - ▶ In certain areas, such as downtown Sacramento and the UC Davis campus, limited availability (which translates to high cost) of parking is also an important consideration.
 - ▶ Transit's true economic advantage comes when transit service becomes good enough that a household can dispense with an auto, saving an average \$8000 annual cost of auto ownership.
 - ▶ Many choice riders are able and willing to pay premium fares for premium service, such as express commute service or amenities such as wireless access or airline-type seats.
- Without express service competitive in travel time with driving, few drivers are willing to park and switch to slower transit services once they get behind the wheel.
 - ▶ Walk or bicycle access to transit can increase share of choice riders.
 - ▶ Bus service that can bypass or avoid traffic congestion gains attractiveness for choice riders.
 - ▶ Express bus running in carpool lanes, with signal control on arterials, or with transit-only lanes at congested points can attract more suburban park-and-ride transit users.
 - ▶ Wait time deters ridership more than slow run time, due to anxiety and the perception of no progress, so routes with reliable timed transfers or no transfers are more attractive for commuters.

- Significant growth in the senior population, as the baby boom generation ages, points to increased transit services for seniors as well as a restructuring of the way these services are provided.
 - ▶ The population over age 65, most of whom no longer commute to work daily, is expected to grow from 11% of the population today (225,000) to 21% by 2030 (625,000).
 - ▶ The population over age 75, with travel patterns amenable to community transit service, is expected to nearly triple in 25 years, from 100,000 today to 275,000 in 2030 (11% of population).
 - ▶ The population over age 85, of whom many are likely to be transit users, is expected to more than triple in 25 years, from 20,000 today to 75,000 in 2030.
 - ▶ Universal design features, including low-floor vehicles, automatic doorways, flatter walkways, curb ramps, and handrails become increasingly important for an aging population of riders.

Service Expansion

- For a given amount of dollars, bus service allows broader area coverage, whereas rail transit provides high capacity in limited areas along corridors.
 - ▶ Rail costs about four times as much as a bus to operate, which means buses could operate more frequently or to a wider area, but if density right along a corridor is high enough, the ridership potential of rail may be high enough to justify a rail investment.
 - ▶ Good bus transit service with heavy established ridership makes sense as a precursor to investment in a rail line along a corridor.
 - ▶ The high capital cost of rail transit requires strong justification to support that choice: 20% of the rock bottom cost for ten miles of rail line could buy and replace 80 buses for 30 years of service, at the same annual operating cost.
- Two primary considerations in provision of transit service – service coverage and service frequency – often directly conflict when assessing how to spend the limited dollars available to expand service.
 - ▶ Service coverage provides the ability to get more people to their desired location, as long as the trip does not include an inordinate amount of out-of-direction travel or transfers.
 - ▶ Service frequency meets traveler preferences for reliability, shorter waiting times, and comfort, particularly in peak periods when higher frequencies reduce overcrowding.
 - ▶ Wider service coverage does reach more potential choice riders, but if service frequency is too low those customers will rarely use transit.
- Both increased service frequency and increased service coverage will be necessary to reach Blueprint objectives for 4% transit mode share, with service improvements tailored to attract choice riders.
 - ▶ Suburban operators have shown effectiveness with limited-stop express service between high population and high employment areas, with minimal or no transfers.
 - ▶ Minimal transfers.

- ▶ Reducing out-of-direction travel, particularly in lower density areas, shortens overall travel time.
- ▶ Improved transit transfer facilities in downtown Sacramento, with common stops serving different operators and routes, provide shelter and good information for those who must transfer, as well as parking for bus layovers. It will offer more connection choices and convenience for commuters and better efficiency for the operators.
- Modeling of the Preferred Blueprint Scenario shows peak transit demand of 140,000 for morning and afternoon in 2030, four times larger than today.
 - ▶ Just to keep pace with the growth in population, the current level of transit service would have to increase 50% over the next 25 years, to about 450 buses in peak service.
 - ▶ At same efficiency the transit system has today, the region would need a fleet of about 1,400 vehicles to carry 140,000 peak hour trips.
 - ▶ With very high efficiency - most buses deployed on commuter routes, nearly all buses running full, and 50% turnover of passenger load along the route - a transit fleet of about 1000 buses and the current light rail system with 7½ minute headways could handle 140,000 peak hour trips.
- Public funds from local sources to support operations is the most critical component of service expansion, and presently limits the amount of transit service that can be deployed in the region.
 - ▶ Every bus that Sacramento RT puts in service on average costs about \$300,000 annually, which requires \$240,000 from public funding to supplement fare revenues; some of the smaller operators can operate buses for one-third less
 - ▶ The MTP2025 assumed 15% greater efficiency, which meant more riders per vehicle and thus more fare revenues, but that enabled only a 50% increase in service level, far from enough to support the fleet of 1000 or 1400 buses needed to serve Blueprint travel objectives.
 - ▶ Sacramento's Measure A sales tax extension provides funding to operate light rail including the South Line extension plus expand the current 250 buses in peak service gradually to about 300 by 2025, but not enough to operate the DNA Line or significantly greater bus service.

Environmental Effects of Transit

- Public transportation, while a large user of energy, can contribute strongly to energy conservation, since multiple-occupancy vehicles use less energy than driving alone in an auto.
 - ▶ Diesel buses get about 3 miles per gallon, versus an average of 20 miles per gallon for automobiles, so a bus carrying seven or more riders becomes more efficient than driving alone.
 - ▶ Sacramento RT's light rail uses only 22% as much fuel per passenger mile as autos at current ridership.

- Electric rail transit vehicles and trolleybuses emit little or no pollution at the point of operation; diesel buses, with innovations such as clean diesel fuel, are becoming less polluting.
- Many newer buses are being fueled by alternate fuels such as compressed natural gas (CNG) to improve air quality and comply with federal and state pollution-reduction requirements.
 - ▶ 100% of the bus fleets operated by Sacramento RT and YoloBus are powered by CNG.
 - ▶ About 90% of the service provided by Davis Unitrans is fueled by CNG, and it operates one even-cleaner prototype Hydrogen-Natural Gas blend bus.
 - ▶ City of Elk Grove operates a fleet of 21 gasoline-electric hybrid very low emission buses.

Transit Service Options

- Transit encompasses a wide spectrum of services; each best suited to particular travel markets. Only some are currently offered in Sacramento, including (but perhaps not limited to) urban rail/light rail, commuter rail, streetcar, express bus, Bus Rapid Transit, local service bus, neighborhood shuttle bus, dial-a-ride, assisted paratransit for the disabled, subscription bus, and jitney.
 - ▶ Different services come with a wide range of costs, both for equipment and operations, and with cost such a critical factor the various services must be considered carefully for each situation.
 - ▶ Various service options must be considered in comparison to auto travel, since that is where most choice riders must come from.
 - ▶ Streetcars, express busses, and Bus Rapid Transit merit particular attention in Sacramento, since all offer services well-suited to the compact development that Blueprint is trying to foster.
 - ▶ Mixes of services, such as express bus, light rail, and local shuttles working together in the same corridor, can build overall ridership.
- More service is not necessarily the only ingredient.
 - ▶ Better intermodal connections, such as on-board bike racks, park and ride locations, safe and pleasant walk access routes, and improved transit transfers, can enhance the appeal of transit.
 - ▶ Other conditions can attract choice riders: fewer stops, faster boarding times, automated or proof-of-payment fare collections, enhanced personal security at stops and on board, and accessibility for the disabled.

Funding for Transit Expansion

- Transit, like other transportation modes, cannot operate in a funding vacuum, and fares typically provide only 20-30% of the revenues needed to fund transit service.
 - ▶ Sacramento RT gets about 20% of its operating cost from fares, while smaller operators range from about 7% to 30%, to a high of 60% for Davis Unitrans which receives a transit fee approved from UC Davis students that permits unlimited use.
- There is limited financial capacity within the Sacramento region for transit operators to expand service without additional financial support, much of which must come from local sources.
 - ▶ The MTP 2025 directs \$1.5 billion in federal and state funds that flow through the region to transit over 23 years, an average of \$50 million per year for capital improvements and expansion (40% of total capital investment) and \$25 million per year to support operations (10% of total 23-year operating costs).
 - ▶ Funding usable for operations becomes a premium, because, unlike for roads where only 30% of the public life cycle cost goes to maintenance and operations, for buses 90% of life cycle cost goes into operations, and for light rail the operations component exceeds 50%.
 - ▶ Given state and federal reluctance to fund transit operations, it is likely that local transportation funding must be found to meet the financial needs of an expanded transit system for the region.
 - ▶ With 75-85% of operating costs going to labor, the region and its operators must seek services and service arrangements that can minimize labor cost.
 - ▶ More riders mean more fares to defray operating costs, so higher ridership becomes a critical part of the service expansion equation. But realistically no operator statewide, except BART with its all-rail system, covers as much as 40% of operating cost from fares.
 - ▶ An efficiently-used 1000-bus fleet carrying six times today's daily ridership might cover 40% of operating costs from fares, but would still require 2.25 times today's total funding from public sources (an additional \$100 million per year).
- Capital and operating costs vary widely, and matter considerably for choice of transit service.
 - ▶ New light rail vehicles cost \$3 million apiece with a 30-year service life, a full-size bus coach costs \$380,000 with an average 12-year service life, and a shuttle bus costs about \$80,000 with an average 5-year service life.
 - ▶ The typical bus in the Sacramento RT system costs about \$300,000 per year to operate and light rail vehicles cost \$1.3 million per year to operate, while smaller operators can run buses for as little as \$200,000 per year.