MTP2030 Issue Papers: Road Expansion

The Current Road System and its Use

- Much of the region's road network was built in 1950s & 1960s, designed for 20 years of excess capacity.
  - Gas taxes, 2½ times larger in real terms than today's, supported the robust highway construction program of the 1950s & 1960s.
  - Since 1970, Vehicle Miles Traveled (VMT) have increased by 190%, while population increased by 110%, but lane-miles of road (space on the roadway system) increased only by 30%.
  - These trends inevitably lead to increased congestion: drivers faced daily congestion on 17% (27 out of 160 miles) of greater Sacramento urban freeways in 1993 during peak periods, but 38% (61 miles) of freeways are congested today.
- Currently more than 93% of all travel goes by vehicle on roads: driving alone, in carpools, or riding buses.
  - Out of 9 million daily trips, 4.2 million (47%) drive alone, 1.8 million (20%) drive w/passengers, 2.4 million (26%) ride in autos, 80,000 (1%) ride in transit, 100,000 (1%) ride bicycles, and 450,000 (5%) walk.
  - About 550,000 trips per hour take place during the morning and afternoon peak hours (6:00-9:00 AM and 3:30-6:30 PM), and drive alone and transit shares are highest in the peak hours.
- Road capacity varies with design and use: freeways carry 50% more people than arterials per lane, carpool lanes carry twice the people of mixed-flow lanes, and bus service at ten-minute intervals can carry up to six times what autos carry.
  - A typical freeway lane running at capacity carries 2,200 people per hour in autos, while a carpool lane running full carries 3,000-4,000 people per hour (and more if it includes express bus service).
  - Arterial street capacity varies but averages about 1500 people per lane per hour; a full bus carries 50 people seated (80 or more with standees) and uses less than ½% of one lane of an arterial's capacity.
  - State highways are the workhorse of the road system, carrying about 50% of Vehicle Miles of Travel (VMT) on only 7% of the system's lane-miles.
- Excess capacity from the 1970s has been filled up and road use continues to increase.
  - SACOG's Metropolitan Transportation Plan (MTP) forecasts 40% more trips by auto by 2025.
  - More compact Blueprint land uses shorten trips and change travel choices: 81% by auto, 3% by transit, and 16% by bicycle and walking – but population increases more than 40% and overall travel increases by 50% by 2030.

- Even with more compact Blueprint land uses the region expects 30% more trips by auto by 2030: 11.1 million auto trips per day versus 8.4 million today.
- Truck trips are growing three times faster than auto, and that rate seems likely to continue.

- As auto trips continue to increase, the location on the system drivers go, and whether people drive alone or travel in carpools will make a big difference. But clearly, at least in certain locations, road system expansion will be necessary.
  - Trip patterns will be different in 2030, using the road system differently than today, increasing traffic in some places while holding level in others.
  - The bus system - the backbone of transit service – loses operating efficiency and attractiveness to riders when bogged down in traffic congestion.
  - Carpools and transit become more attractive when given faster travel lanes compared to congested mixed-flow roadways.

Congestion

- Increasing traffic congestion is an inescapable result of robust economic activity and life in modern metropolitan areas, but it is not an economic benefit,
  - Good transit does not solve congestion: cities with the best transit systems – New York, Washington DC, Boston, San Francisco Bay Area – also have some of the nation's worst traffic congestion.
  - Extensive roadway capacity does not solve congestion: cities with the largest highway systems – Los Angeles, Houston, San Diego, Atlanta - also have some of the nation's worst traffic congestion.
  - Congestion is much worse in most large cities around the world than in the US
  - Excessive congestion delay due to lack of road capacity irritates the public, wastes time, drives up neighborhood cut-through traffic, impedes business interactions (especially for trucking), can undermine property values, and reduces choice of where to live and work.
  - The Texas Transportation Institute reports the average loss to congestion delay at $520 per person per year in the 75 largest urban areas, with Sacramento coming in at a loss of $374 per person per year.
- The statement "We cannot build our way out of congestion" is essentially correct, because large metropolitan regions lack the resources, community will, and ultimately the space to provide for uncongested travel by auto.
  - Roads designed for peak period traffic cost too much, take too much land, are underused too much of the day, and cause unacceptable community and environmental impacts.
  - The fact that a parking space is 20% larger than a typical office space illustrates space limitations on drive-alone auto commuting in larger, denser metropolitan areas.

- Once an urban road network becomes extensively congested, new road capacity attracts traffic from other congested routes, often attracting new growth to the nearby area, and may reduce excessive localized congestion delay, and shorten the length of the peak congested period somewhat; but it does not substantially lessen overall congestion levels on the road system.

- Sacramento, with a population greater than 2 million, has reached the size and activity level where congested auto travel would be the expected norm, and accessibility replaces mobility as a transportation objective.
  - US 50 east of downtown Sacramento now carries more traffic outbound in the morning peak than inbound, and has become the region's first section of freeway with two-way congestion both morning and afternoon.
  - Some of Sacramento's worst congestion occurs on crosstown suburban arterials: Watt Avenue, Sunrise Boulevard, Florin Road, and Douglas Boulevard.
- Congestion and delay can be triggered on a regular basis by peak auto demand that exceeds capacity, and on an ad hoc basis by traffic incidents or distractions.
  - About 50% of congestion delay comes from areas where demand has reached or exceeded capacity, usually due to system features that constrict capacity: on ramps, slow vehicles, hills or grades, limited sight distance, and signals, bus stops, driveways, turn movements, pedestrians and bicycles on arterials.
  - About 50% of congestion delay occurs from incidents where capacity is compromised: accidents, stalled vehicles, spilled loads, roadside distractions, police stops, work zones, weather.
  - Although traffic may increase gradually over time, and the roads may seem more full, congestion appears at about 85% of road capacity and worsens dramatically with an increase of only a few hundred autos in the peak period.
- When corridors become congested, modes all complement each other, serving specific types of trips, instead of competing.
  - Autos and bus transit both depend on roads; bicycling and walking typically also use road corridors, so when a corridor becomes congested it is important to accommodate all modes effectively so travelers have a real choice.
  - Carpooling, various forms of transit, and bicycling each offer certain time, cost, convenience, and personal comfort advantages as an alternative choice to driving, and can become more attractive for certain drivers and certain trips.
  - In the downtowns of major cities such as San Francisco and Chicago, pedestrian congestion often exceeds vehicle congestion.
- Strategic road expansion yields benefits, even if it does not reduce or eliminate congestion, but land use and travel effects become critical decision factors.

Road Expansion and Land Use

- New road capacity may relieve local congestion directly but also indirectly exerts strong effects on growth in the corridor or area.
  - Correlations among road capacity, development patterns, congestion, and travel behavior may not always represent cause and effect.
  - Adding capacity has different effects in the urban interior and near the suburban edge: the dominant effect from strategic improvements to interior road capacity tends to support infill development, whereas the dominant effect from added capacity nearer the urban edge tends to enable sprawl.
  - Radial freeway expansion in suburban areas since the 1950s has drawn development outward along those corridors.
  - Road access is essential for greenfields development, and unused capacity serving greenfields areas acts as a subsidy to development there.
  - Recognizing the essential nature of road capacity to every development, developers increasingly accept the need to pay for improvements to arterials, interchanges, and freeways to ensure access off-site.
  - Expanded capacity for interregional travel, including trucking, can also be used for commuting, thereby working at cross purposes to enable sprawl development to the edge of the region and beyond.
- Congestion may affect economic development: too much congestion can be a factor in shifting development from one area of the region to another (or more rarely to other regions).
  - The economy has decentralized, and limited access to the central business district helps drive jobs to suburban locations with better access.
  - There is an optimum amount of road capacity: too much yields low return on investment of scarce funds, too little is an economic drag on productivity.
- With Blueprint as a key regional goal, road expansion policy and investments can become tools to shape land use objectives, rather than a reaction to the spread of congestion.
  - Road expansion policy in the 2002 MTP primarily reacted to projections of current traffic and recent land development patterns.
  - Blueprint focus on infill and compact development leads toward a different transportation investment policy, tending more toward strategic operational improvements for roads, improved transit service, and more emphasis on facilities for walk access.
- Sacramento faces a chicken-and-egg dilemma: it must go through a transition in development patterns to achieve a transition in travel choices, and both transitions will proceed incrementally.

- The region must design road and transit capacity investments strategically in both timing and place, to keep infill communities accessible during a transition time, and away from edge sprawl dominated by auto travel, to more compact infill where walk, bike, and transit become preferable.
- A 1 million population increase will require both strategic improvements for interior road access and transit expansion to match infill redevelopment as it proceeds, given today's starting point with 95% auto ownership and prevailing residential and office park densities in auto-oriented suburban areas.
- Transit expansion must rely substantially on buses, given the cost of rail and the gradual evolution in employment and residential densities to support rail transit. And, good bus service depends on an ability to bypass or avoid major congestion.

Road Expansion and Travel

- The willingness of people to continue driving under extreme congestion in Los Angeles, the Bay Area, and other large metropolitan areas shows that lack of road capacity and congestion are not primary factors in travel behavior.
  - People make individual travel choices for personal convenience, not for better transportation system performance, hence the public grumbling about worsening congestion, ramp meters, carpool lanes, traffic calming.
  - People in urban areas today expect and accept congestion to some degree, and readily tolerate a 20-40 minute commute.
  - Commuters place a high value on predictable and reliable travel time, a significant cause of diversion to neighborhood streets to bypass congestion.
  - Congestion adds delay cost on top of the higher cost of driving; when carpooling, transit, or bicycling can become competitive in travel time, some drivers switch-- particularly higher income drivers who tend to be more sensitive to time delays.
  - High parking or fuel costs also add to the cost of driving; some drivers switch to carpools to share cost, or to transit, or to bicycling to avoid cost-- particularly lower income drivers who tend to be more sensitive to out-of-pocket costs.
  - More than 90% of the total costs of auto travel are private costs - to own, fuel, insure, and maintain vehicles - totaling more than $8000 per year on average, with the remaining 10% being the costs of the roads and public impacts.
- Road expansion can be targeted to foster certain kinds of travel patterns and auto use, recognizing that dependence on auto travel fundamentally comes from suburban development patterns and densities.
  - The combination of low density, separation of residential, commercial and employment areas, and the common 8-to-5 workday are the real causes of high vehicle miles traveled and congestion.
  - Only Downtown Sacramento and limited, scattered locations elsewhere have high enough densities to support transit as an effective and efficient alternative to driving.

- Today's transportation system as a whole benefits equally whether a person driving alone switches to fill an empty seat in a carpool or on transit.
- Capacity improvements shift traffic patterns, which may or may not yield higher vehicle miles traveled. But lack of capacity may also increase vehicle miles traveled as drivers go out of direction to escape congestion.
- Urban centers depend on street capacity for access just as much as suburbs: Manhattan has as high a street density as any city in the U.S. but it is used differently - by transit, taxis, and pedestrians rather than single-auto drivers.

- Public polls show support for increased investment in transit but, by increasing percentages, the public continues to favor driving alone.
  - Polling around the state has consistently shown about 75% support more investment in transit, but 75% of those say transit is "for the other guy."
  - Polling for Sacrament Measure A yielded similar results, and indicated that the measure would not pass without some road expansion in the program.
  - National Travel Census shows a gradual decline in transit and carpooling for commuting from 1990 to 2000, consistently all over the U.S.

Carpool Lanes

- Urban freeway expansion today almost always involves carpool lanes, and carpool lanes are never created by converting existing lanes to carpool-only.
  - Federal highway and environmental regulations essentially requires any new freeway lanes in urban nonattainment areas to include carpool lanes.
  - Urban sales tax programs add carpool lanes when widening freeways, not because they must, but because carpool lanes move people more effectively.
  - Only one major urban freeway widening has been built without carpool lanes since 1980 in California: on Route 101 Ventura Freeway in Los Angeles in the mid-1980s, done with no federal participation.
  - Caltrans once converted an existing mixed-flow lane to a carpool-only lane, on Route 10 Santa Monica Freeway in Los Angeles in the mid-1970s, and it was so unpopular with the public that no agency has dared to try it again since.
- Carpool lanes do work, both to increase capacity and yield more carpooling.
  - Carpool lanes typically change behavior gradually over 3-5 years, as drivers switch into carpools to take advantage of shorter travel time.
  - Caltrans reports that one carpool lane on Route 99 in Sacramento carries twice as many people in a peak hour than any other lane.
  - Carpools offer wider choices than transit: during the peak hour in Sacramento, there are at most a few thousand empty seats in transit (serving about 200 trip patterns) versus more than 1 million empty seats in autos (serving hundreds of thousands of trip patterns).

- Carpool lane corridors in a wide range of cities - Houston, Washington DC, Seattle, Minneapolis - run counter to the general trend around the country since 1990 which shows a declining percentage of carpooling to work and a decline in direct home-to-work trips in favor of stops for errands.
- Most carpool lanes in the Bay Area – on the Bay Bridge, on Route 101 in Marin and San Mateo Counties, even on arterials in San Jose - are so heavily used that 3+ people are required in the car to use the lane.
- Caltrans has begun to examine how to shift carpool lanes requiring 2+ people to 3+, since after 10-15 years the 2+ carpool lanes prevalent in Southern California are becoming too congested.
- The Legislature required Caltrans to test opening up the Route 10 El Monte carpool lanes east of Los Angeles (which required 3+ carpools) to 2+ carpools in 2002. The resulting congestion was so chaotic in both the carpool lanes and mixed-flow lanes that public pressure terminated the test after five months.

- Express bus is an important factor in getting maximum productivity out of carpool lanes.
  - AC Transit buses carry more than 20% of passengers riding in the carpool lane across the Bay Bridge.
  - Carpool lanes in Houston, with extensive express bus service, carries 118,000 people each weekday (in 36,000 vehicles). If they all drove alone, Houston would need 24 additional lanes for capacity on its freeway network.
  - The I-66 corridor between Virginia and Washington DC carries more daily riders on express buses in carpool lanes than on the Washington Metro rail line running in the median.
- HOT (High Occupancy Toll) lanes, which allow free access to carpools and use by single drivers who pay a toll, can be another option in certain cases.
  - The Route 91 toll road in Orange County has proven popular, with a broad range of drivers owning a toll pass and using the toll lanes on days when fast and reliable travel time is worth a toll of up to $5.
  - The I-15 managed lanes in San Diego have also proven popular, with variable toll rates used to optimize traffic flow and toll revenues used to improve transit service in the corridor.

Approaches and Funding for Road Capacity

- A spectrum of options, with a wide range of costs, is available to expand or open up road capacity, from adding lanes to making operational improvements to shifting travel away from driving alone to changing travel patterns.
  - Adding lanes to a roadway – on the main line, through freeway interchanges, at local interchanges, or across barriers such as rivers or railroads - comes with the highest cost: $4 million or more per mile on arterials and $15 million per mile or higher on freeways.

- Operational improvements – such as ramp meters, weave lanes, auxiliary lanes, motorist information on freeways and signal timing, turn lanes, intersection widening, bus turnouts, fewer driveways, smart corridors on arterials – typically cost between $500,000 to $3 million per mile.
- Programs to shift travel away from drive-alone may affect travel over a wide area at modest cost; for example SACOG's 5-1-1 and rideshare programs cost less than $1 million per year regionwide to foster carpooling, transit ridership, and bicycling in all corridors and areas.
- Programs that lead to travel pattern changes - for example the Blueprint's compact development which shifts longer trips to local trips, or demand management to foster telecommuting and alternative work schedules – can take traffic off the road at peak hours for very little direct cost.

- Road programs are so underfunded today that funding for road expansion must compete against funding for road maintenance, rehabilitation, and operations.
  - Cost effective investments become more critical.
  - Strategically targeted investments, such as widening at interchanges or coordinated signals that allow free flow along the length of an arterial street, often provide larger benefit at smaller cost than general road expansion.
  - Targeted improvements at specific bottleneck points (found at the head of the line of congested traffic, even though drivers perceive congested traffic from the back of the line) can sometimes open up capacity all along a corridor.

- System capacity built in 1950s and 1960s was backed by a robust gas tax. Now sales taxes and development-based funds have become the main sources to pay for road expansion.
  - One-half% of sales tax revenues exceeds the STIP in all urban counties.
  - Funding for road expansion increasingly comes from development-based sources, which provided 8% in 1985, 14% in 1995, and now 25% in 2005.
  - Caltrans actively pursues developer funding for state highway improvements, since it can use only 10% of STIP funding for state highways in urban areas; this should intensify now that the State uses 100% of its shares of gas taxes and federal funds for highway maintenance and rehabilitation.

- Toll roads may be the only option for very large projects in today's funding climate.
  - The public has not shown willingness to tax itself at 1960s levels, when fuel taxes comprised 30% of the cost of gasoline, so private funding and financing must be brought to bear if very high cost projects are to be built.
  - Tax increment bonds, developer bonds, toll bonds, and other revenue-backed borrowing can advance private funds that get repaid over the life of a project.