CONGESTION, GROWTH, AND PUBLIC CHOICES

Robert Cervero

Within a fairly short period of time, traffic congestion has eclipsed virtually every other concern -- be it crime, unemployment, or air pollution -- as America's number one urban problem. Public opinion polls in San Francisco, Atlanta, Phoenix, Washington, D.C., and at least a dozen other urbanized areas show citizens are more fed up with congestion than with anything else. In the Bay Area, congestion has been pegged by areawide residents as the number one public menace for four years straight, outdistancing its closest rival -- air pollution -- by more than two-to-one.

Such widespread dissatisfaction reflects, in part, the fact that congestion now afflicts nearly all commuters to some degree, whether headed downtown, reverse-commuting, or traveling on a secondary road. While only a decade ago congestion was the scourge of downtown commuters, today it pervades the freeway networks of most large and medium-sized cities.

Within limits, congestion is desirable -- a sign that a region is socially and economically vibrant and has not overinvested in highways. Recent public outcries, however, suggest that congestion has exceeded acceptable limits and may be approaching the intolerable. Just how bad have things gotten? In 1975, 41 percent of rush-hour freeway traffic in the nation's urbanized areas flowed under 35 mph, what traffic engineers define as congested; by 1984, the share had catapulted to over 56 percent.[1] Houston had the worst congestion in 1984 when expressed in delay per mile of travel, followed by New Orleans, New York, Detroit, and San Francisco (see Table 1). Los Angeles experienced the most overall delay on its freeways, 78.3 million hours, which translates into roughly one-half billion dollars of lost time, or about $67 per capita per year. Statistics aside, perhaps as good a barometer of just how serious congestion has become has been the wide media attention it has received: one observer documented over a twofold increase in the amount of newspaper space devoted to traffic congestion just in the last three years.[2] Citizens are also lashing out against congestion, underscored by this letter-to-the-editor of the *Washington Post* from a reader who no doubt had reached wit's end, warning others that "if they must travel to Tysons Corner (in Northern Virginia) in the near future, they should carry adequate food and water to last until rescue parties can reach them".[3]

Table 1

Ranking of Twenty Urban Areas with the Worst Congestion in 1984

Rank	Urban Area	Congestion Severity Index	Annual Recurring Vehicle-Hours of Delay (Millions)
1	Houston	11,112	39.5
2	New Orleans	10,576	7.7
3	New York	8,168	62.7
4	Detroit	7,757	16.2
5	San Francisco	7,634	72.9
6	Seattle	7,406	18.5
7	Los Angeles	6,376	78.3
8	Boston	5,538	10.0
9	Charlotte	5,263	1.3
10	Atlanta	5,034	15.8
11	Minneapolis	4,704	11.2
12	Dallas	4,630	16.3
13	Norfolk	4,505	5.0
14	Chicago	4,501	19.7
15	Denver	4,454	7.5
16	Washington, D.C.	4,188	16.3
17	Hartford	4,111	1.9
18	San Antonio	3,938	5.2
19	Pittsburgh	3,216	6.5
20	San Diego	2,823	8.6

Congestion Severity Index = Total hours of delay/million vehicle-miles of travel; reflects roadway segments where there is recurring congested conditions.

Sources: Jeffrey A. Lindley, "Urban Freeway Congestion: Quantification of the Problem and Effectiveness of Potential Solutions," *ITE Journal* 57, no. 1 (1987): tables 2 and 3; Federal Highway Administration, "The Status of the Nation's Highways: Conditions and Performance," Report of the Secretary of Transportation to the United States Congress, June 1985.

The costs of traffic congestion are indeed mounting, not only in the way of lost travel and leisure time, but also in terms of increased day-to-day stress, declining worker productivity, and a deteriorating quality-of-life. Because of this perception that quality-of-life is slipping, more and more communities are passing draconian no-growth or slow-growth measures. In California, the cities of Walnut Creek, Pleasant Hill, Corte Madera, and nearly a dozen other largely suburban communities have in the past few years restricted building heights, downzoned commercial areas, or frozen building permits in reaction to worsening congestion. In most cases, citizens put these initiatives on the ballot themselves and voted them into law, often with the opposition outspending them ten-to-one. This new wave of initiatives differs in kind from the celebrated growth controls of the 1970s in Petaluma (California), Ramapo (New York), and Boulder (Colorado); whereas these earlier initiatives sought to limit new housing construction and thus to ease the burden placed on local treasuries, today we are seeing steps aimed squarely at banning new commercial and office growth -- that is, the number of shoppers, workers, and other "outsiders" driving their cars into established communities. As more and more suburbs seek to preserve their cultural hegemony by banning new development, overall levels of congestion could get even worse as long as regions continue to grow and prosper. By forcing new commercial development away from established residential areas, growth moratoria widen the wedge between where people live and work, resulting in longer commutes and thus greater dependency on the automobile.

To deal effectively with congestion, we must first understand its causes. Four major factors that have fueled today's congestion problems are examined in this article: (1) continued population and employment growth during a period when highway systems are reaching maturity; (2) powerful demographic shifts, in particular the trend toward smaller, dual-wage-earner households; (3) the decentralization of jobs brought on by post-industrialization; and (4) widening jobs/housing imbalances. All of these forces have caused people to become more reliant on their automobiles and at the same time have hurt public transit. Some are more within our sphere of policy influence than others. Particular attention is given in this article to the potential mobility dividends of responding to those that are.

Regional Growth and Mature Highways

In most urbanized areas around the country, growth itself, coupled with a slowdown in new road construction, has contributed to congestion. Between 1975 and 1985, population and employment grew by around 18 percent and 30 percent, respectively, in the 32 largest metropolitan areas in the U.S.[4] Over the same period, traffic volumes in

these areas increased 12 percent, while highway mileage grew by a little over one percent.[5] However one works the mathematics, increased demand combined with a stagnant supply of road facilities adds up to more congestion.

The slowdown in new highway construction stems from the fact that we have a fairly mature highway system. Nearly 98 percent of the nation's interstate system is complete, and in most metropolitan areas the basic road net is in place. In general, only minor extensions are being made to the core system. Nor do any major technological advances appear on the immediate horizon. Experts agree that the traditional gasoline-fueled, piston-engine automobile will remain the mobility standard for at least the next thirty years.[6] Fiscal pressures have also taken a toll. Inflation has devalued the construction dollar, and eroding gas tax revenues and government-imposed spending limits have drastically curtailed spending.

Demographic Shifts

Growth alone is not responsible for more traffic and congestion. Powerful demographic trends are spawning an urban society that is more reliant on the private automobile than ever. Notably, the ascent of middle-age, dual-worker households with few children has dramatically increased automobile usage.

Take the San Francisco Bay Area, for example. Over the period 1981 to 1985, the area's population grew 1.4 percent annually, compared to annual growth rates of 2.4 percent and 2.1 percent for employment and households respectively (see Table 2). During the same period, the number of vehicles, drivers, and miles of travel increased between 2.8 percent and 4.5 percent annually. Thus, the number of autos, drivers, and miles of travel grew roughly 50 to 100 percent faster than the number of residents and workers over the first half of the eighties.

Why have licensed drivers outpaced population? Primarily because of the jump in the number of people between the ages of 21 and 35, the "baby boomers." Why has automobile growth outstripped population growth? Largely because more Americans can afford cars, so much so that today there's over one vehicle per licensed driver, compared to 0.7 in 1970. And why are more miles being logged on highways? In part because of more vehicles and drivers, and in part because of longer average trips. Nationwide, the average journey-to-work increased from 9.2 miles in 1977 to 10.1 miles in 1983. The baby boomers, the fastest growing cohort, have also contributed to vehicle-mileage: in 1983, they averaged 3.5 trips per day, more than any other age group.[7]

Table 2

Growth Rates in the San Francisco Bay Area, 1981-1985

Growth Factors	Average Annual Rate of Growth (percent)
General Growth Indicators:	
Employment	2.4
Households	2.0
Population	1.4
Travel Indicators:	
Vehicle Miles of Travel	4.5
Licensed Drivers	2.9
Automobiles in Use	2.8
Transit Ridership	-0.8

Sources: Bay Area Council, "Transportation-Land Use Conditions in the San Francisco Bay Area," Agency Report (San Francisco: Bay Area Council, 1986); California Department of Finance, "Population Estimates of California Cities and Counties," Agency Report 86 E-1 (Sacramento: California Department of Finance, 1986); and California Department of Transportation, "Travel and Related Factors," Agency Report (Sacramento: California Department of Transportation, 1985).

The fact that new households have outpaced population growth in the San Francisco region (Table 2) as well as elsewhere around the country means that family sizes have been shrinking, in the case of the Bay Area from an average of 2.57 to 2.50 persons just in the 1981-1985 period.[8] While smaller families generate fewer total vehicle trips, they almost always produce more trips per household member, for several reasons. One, with fewer children per household, more women are entering the labor force. Working women tend to make more triangulated trips (e.g., between work, a child-care center, and a store), the sort of trips which are most reliant upon the private automobile. Additionally, more and more families are living in between the workplaces of both spouses, often making both husband and wife

dependent on their own cars to get to work. Second, the growth in non-traditional households, in particular those with two or more unrelated adults and single parents, has increased trip rates since such households are more independent and atomistic, and accordingly auto-reliant. Overall, the shift to smaller, middle-age, dual-worker households has increased the need for automobility and, consequently, produced more traffic.

Decentralization of Employment

Regional growth and demographic shifts have mainly increased ambient, or background, levels of congestion. Along specific corridors and in subareas, traffic tie-ups can be traced to other factors as well. In the suburbs, the migration of office and high technology jobs out of traditional downtowns, what some call the "second wave" of suburbanization, has been largely responsible for the explosive growth in traffic. Nationwide, the share of office floorspace outside of central cities rocketed from 25 percent in 1970 to over 60 percent today.[9] While the suburban office boom has been most pronounced in thriving sunbelt areas like Dallas-Ft. Worth and Atlanta, the trend has been nationwide in scope, occurring even in older industrial cities. In greater Philadelphia and St. Louis, for instance, suburban jobs grew 8 and 17 percent respectively between 1982 and 1986, contrasted with a loss in central city employment over the same period.[10] Many expect this trend, if anything, to accelerate as our economy continues to shift from a smokestack base to a service emphasis, enabling more and more firms to relocate to the lower-cost suburbs.

Job dispersal has had a profound effect on commuting patterns. For most regions, the once-dominant downtown-focused commute has been replaced by a patchwork of criss-cross, multi-directional movement streams. National journey-to-work statistics confirm this. Between 1960 and 1980, the share of work trips which began and ended in the suburbs increased from 30 percent to nearly 42 percent within large metropolitan areas (Table 3). In greater Boston, Detroit, St. Louis, and Pittsburgh, nearly two-thirds of work trips presently take place wholly within suburbs.

This trend, of course, does not square well with our urban highway networks, most of which are star-shaped, designed to funnel commuters downtown. Those making lateral and cross-town journeys are all too often forced onto secondary arteries and ring roads that were never designed or oriented to serve large volumes of traffic. Circuitous trip-making and clotted arteries have been the consequence. This trend bodes unfavorably for mass transit as well, since buses and trains

Table 3

Changes in Geographic Setting of Journey-to-Work Trip, for U.S. Metropolitan Areas with Populations of 250,000 or More

	Percent of Trips			Percentage Point Change	
Work Trip	1960	1970	1980	1960-70	1970-80
Within Central City	47.2	37.6	31.7	-9.6	-5.9
Central City to Suburbs	5.2	7.5	6.6	2.3	-0.9
Suburbs to Central City	17.1	18.6	19.8	1.5	1.2
Within the Suburbs	30.5	36.3	41.9	5.8	5.6

Note: Metropolitan areas defined at the time of each census; 1970 and 1980 data are for workers 16 years and older, while 1960 data are for workers 14 years and older; data are only for workers who both lived and worked in metropolitan area.

Source: Philip Fulton, "Changing Journey-to-Work Patterns: The Increasing Prevalence of Commuting within the Suburbs in Metropolitan America," paper presented at the Annual Meeting of the Transportation Research Board, National Research Council, Washington, D.C., January 1986.

are poor substitutes for the automobile when trip ends are widely dispersed. National statistics reflect this -- in 1980, only 1.6 percent of all suburb-to-suburb work trips were via public transit.[11]

It is important to recognize the variety of suburban employment settings that have evolved, for each setting poses unique mobility challenges and calls for a unique set of policy responses. Most suburban jobs have ended up in one of three built environments. Some have situated along *suburban corridors* -- loosely organized strips of free-standing office buildings and retail complexes, usually aligned along axial freeways and arteries. Boston's Route 128 and central New Jersey's Route 1 "Zip Strip" are classic examples of this pattern. While the traffic impact of any one project tends to be modest, the cumulative effects of numerous unrelated projects frequently clog up areawide thoroughfares. A second type of suburban workplace has been

master-planned business parks. Many resemble college campuses, designed to provide a premium, rural-like work environment for high-skilled, professional employees. Most are characterized by nicely groomed landscapes, plentiful parking, employment densities that are a fraction of those found downtown, and a single predominant use (with offices typically taking up 90 percent or more of building space). For all intents and purposes, business parks are designed at the outset almost exclusively for automobile circulation.

A third built form has been varyingly referred to as *suburban downtowns* and *urban villages.* These are clusters of commercial development that resemble the downtowns of many medium-sized cities in both scale and density. The archetype is City Post Oak, some six miles west of downtown Houston, where 30 million square feet of office, retail, hotel, and other mixed-use floorspace is nearing completion. While traditional downtowns have evolved gradually, allowing a build-up of roadway improvements over time, suburban downtowns have sprouted in as few as five years, often overloading the local infrastructure. As a result, "instant downtowns" have often meant "instant congestion".

It is around suburban downtowns that anti-growth sentiments are stirring. Take, for instance, the case of Walnut Creek, in the heart of the San Francisco Bay Area's booming Interstate 680 corridor. In late 1985, citizens approved a referendum which halts all future commercial development over 10,000 square feet until peak-hour traffic falls below 85 percent of capacity at 75 key intersections. Because nearly all of these intersections currently operate at or near capacity during rush hour, this measure has effectively brought growth in Walnut Creek to a screeching halt. What makes Walnut Creek so unusual is that the citizen backlash was in reaction to the recent completion of mid-rise office towers around the city's Bay Area Rapid Transit (BART) station, something that planners have long sought. In fact, the original justifications for building the Walnut Creek station over a decade ago was that it would function as a magnet for commercial growth. Unfortunately, fewer than 4 percent of the workers at nearby offices currently ride BART, partly because most have free parking and partly because BART goes nowhere near where most live. Thus, rather than filling up rail cars, Walnut Creek's suburban downtown has instead flooded local streets with additional traffic. As long as people live in low-density settings removed from satellite centers, they will continue to commute via private automobile, and suburban downtowns like Walnut Creek will spawn suburban congestion. The knee-jerk reaction will be to demand wholesale bans on growth, with residents using either the ballot box to enforce their will or voting into office those most sympathetic to their concerns.

From a regional standpoint, however, such growth moratoria are doomed to failure. Because employment is driven by regional forces, if new offices are not allowed in Walnut Creek, they simply will end up elsewhere, most likely in sprawling, automobile-oriented office parks rather than efficiently stacked in towers near the rail station. Growth controls also fail to recognize the role of regional traffic flows on congestion. In the case of Walnut Creek, 48 percent of traffic on its busiest boulevard is made of through trips, ones which both begin and end outside of the community. Regardless of whether Walnut Creek increases its employment base or not, as long as other fringe communities continue to grow, it will be besieged with more traffic over time. A more likely scenario for suburban communities that shut off growth is that they will be strapped with fewer funds for coping with escalating traffic problems. Obviously, as long as traffic flows are blind to municipal boundaries, growth management will only work if approached on a countywide or subregional level.

Jobs-Housing Imbalances

Part of the blame for worsening congestion can also be placed on the growing imbalance between where people live and work. While one might expect that more people would reside closer to their jobs as offices migrated to the suburbs, evidence suggests that this may not always be the case. Today, suburbanites are commuting longer than ever. From 1977 to 1983, for instance, the mean journey-to-work for Americans residing outside of a central city (but within an urbanized area) increased from 10.6 miles in length to 11.1 miles.[12] Figure 1 provides additional evidence comparing the lengths of 1980 work trips for 4,200 employees of the largest suburban employment centers in the San Francisco Bay Area with those for the region at large. In general, those working in large suburban centers, which in 1980 were concentrated primarily in the Silicon Valley, averaged longer trips. In particular, there were larger shares in the 8-18 mile range, a distance that is most conducive to auto-commuting -- i.e., it's a distance that is too long to walk or bike, yet too short to efficiently carpool or vanpool (since the time spent picking up others is viewed by many as too burdensome for moderate-length trips).

Jobs-housing imbalances are an outgrowth of the increasing bifurcation of suburbia -- some suburbs have evolved into bedroom communities while others have become mainly corporate enclaves. Planners use a rule of thumb that communities are "balanced" when the ratio of jobs to housing units falls within the range of .75 to 1.25.[13] By this standard, many American cities are "unbalanced," including the majority of the San Francisco Bay Area's very largest. Of the Bay Area's 22

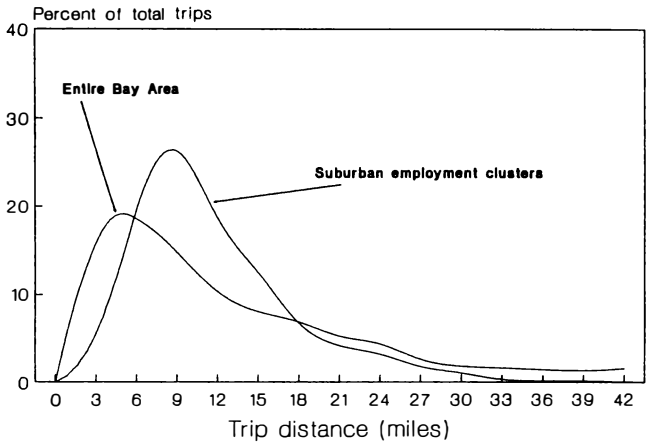

Figure 1. Trip Distance Distributions for Suburban Employment Centers and the Entire San Francisco Bay Area

Source: Robert Cervero, "Jobs-Housing Imbalances as a Transportation Problem," Research Report 86-9 (Berkeley: Institute of Transportation Studies, University of California, 1986).

most populous cities, six fall below and seven fall above this range -- i.e., over half are "unbalanced."

A shorthand reason for jobs-housing mismatches is that ad hoc market forces have largely shaped regional growth in the absence of any coordinated land use planning. This, however, is only a partial explanation. Part of the blame can also be placed on the practice of fiscal zoning, wherein more and more communities are zoning primarily for commercial and office development while at the same time underzoning for housing, generally because new residences often cost far more to serve than the tax dollars they generate. A prime example of this is Santa Clara County, California, where the General Plan calls for 250,000 new jobs yet only 78,500 new housing units.[14] In the competition for high-tech development and the tax dollars they generate, "winners" of the competition have frequently become corporate communities, while the "losers" been left with housing the workers of these well-to-do places.

High housing costs have also displaced workers. Since 1980, around two-thirds of new suburban jobs have been in the clerical and service-industry sectors. Yet housing near office parks and suburban centers is usually not within the reach of these workers. In Contra Costa County, California's fastest growing county, the average home costs around $150,000, which requires approximately $50,000 in annual income to qualify for. Yet with a predominantly back-office labor force, the average worker in the county earns around $27,000. Consequently, nearly one-quarter of the county's workforce resides in neighboring counties, and regional projections call for this figure to steadily increase if affordable housing isn't provided.[15]

Socioeconomic forces have also widened the gap between workplace and residence. As noted, with two wage-earner households, families are apt to live somewhere in between the workplaces of both spouses. If a household locates close to the primary wage-earner's job site, it won't necessarily be the case that the secondary wage-earner also works nearby. Increases in job turnovers have also complicated matters. Today's workers change jobs and careers more frequently than in years past, for a host of reasons, including the destabilizing employment effects of corporate mergers, plant closures, and swings in the business cycle. A person may buy a home within walking distance of his office but end up commuting long distances if he switches jobs, particularly given today's high cost of mortgage financing.

The mobility implications of jobs-housing imbalances are inescapable. As people live farther and farther from their jobs, the likelihood increases that they will drive to work alone along roads that were never designed to handle heavy volumes, in large part because no other reasonable commuting alternative will be available.

Prospects and Choices

All of these trends clearly favor greater automobile usage in the future. Unless more road capacity is provided or cities are redesigned so as to encourage more foot travel, transit-riding, and carpooling, congestion can only be expected to worsen in coming years. Recent statistics confirm the automobile's growing popularity. Nationwide, public transit's share of total trips fell from 3.4 to 2.5 percent between 1977 and 1983.[16] Although buses and trains carry over one-quarter of all workers to their jobs in greater New York and Chicago, for the nation as a whole, transit today claims fewer than 7 percent of all work trips. Interest in carpooling and vanpooling is also waning. Work trips averaged 1.3 persons per vehicle in 1983, down from 1.4 in 1977.[17] Falling gasoline prices and fading memories of the energy problems of the 1970s no doubt account for most of this slippage.

Whether these trends suggest we're heading toward regional gridlock is debatable. Congestion itself, one might argue, will give rise to both behavioral and institutional changes that help mediate the problem. Those with the lowest tolerance for traffic jams will eventually move to quieter environs. Others will move closer to their jobs. More and more businesses will stagger work hours and purchase vans to guarantee their employees a hassle-free commute. Some firms will retreat to small towns. Advances in telecommunications might enable increasing numbers of data processors, clerical staff, and others chiefly involved in handling information to work at home. In the true American tradition, the argument goes, the market itself will work for change and innovation.

But there is also a need for public intervention. Time losses, the true cost of congestion, are irretrievable; unlike money, once time is lost, it cannot be recaptured. Thus, while people and markets might eventually respond and adapt to congestion, in the near term, public initiatives which save commuters time need to be aggressively pursued.

As with any negative externality, many economists would argue that congestion can best be corrected through price signals. To the extent motorists pay the true cost of the time delays they impose on others when they enter a freeway stream, people would travel at a socially optimal level and overall travel conditions would markedly improve. Over the long haul, developers would build job centers and housing in close proximity to one another as long as their tenants had to pay the true social cost of commuting by automobile. While congestion pricing makes sense in theory, in practice it has met with little success. In the early 1980s, Hong Kong launched the most ambitious congestion-pricing pilot program to date, installing sensor loops in roadbeds throughout the colony which electronically read the passage of test vehicles equipped with transponders. Motorists received monthly bills with charges based on how frequently they traveled in congested locations and at congested times. Despite the fact that the program was a technological success, it was scuttled at the end of its demonstration period because of complaints over invasion of privacy and vocal grassroots opposition.[18] If congestion pricing doesn't work in a politically centralized, self-contained setting like Hong Kong, its chances for success in the U.S. seem slim indeed.

What other viable options are available for heading off a congestion crisis? In general, our choices boil down to reducing or altering demand for vehicular travel, expanding road capacity, or some combination thereof. Options which offer the most promise for improving mobility are discussed next.

Better Land Use Planning and Integration

The most enduring basis for arresting traffic congestion is through sound land use planning. The land use environment sets the stage for all commuting behavior, influencing the distances people travel and the modes they choose. Calling for better land use planning by itself, however, is vacuous. Two specific actions need to be pursued: (1) jobs-housing integration, and (2) mixed-use zoning and development.

It is axiomatic that if people live and work close by, they will more likely walk, bike, or take a shuttle to work. While in the industrial era there was a logic to separating homes from smokestacks, slaughterhouses, and other nuisances, in today's work environment of pollution-free offices the rationale for separating homes and residences by ribbons of highways must be called into question. Particularly in the suburbs, we need to be designing workplaces more like commercial centers of yesteryear when walking was the primary mode of travel -- ones with higher densities, well-defined cores, and a lively mixture of activities. Offices, shops, banks, and restaurants need to be built side-by-side, along with plentiful housing targeted to the incomes and taste preferences of the local workforce. Given the option of living far from one's workplace and commuting in bumper-to-bumper traffic or living close enough to stroll to work along a nicely groomed pathway, most breadwinners would surely opt for the latter.

Besides encouraging more walk and bike trips, mixed-use development would also be a boon to ridesharing. One of the biggest deterrents to carpooling and vanpooling in many business and industrial parks today is the fear of being stranded without a car, unable to meet a business associate for lunch or take care of personal errands. A survey of 3,500 suburban office employees in southern California, for instance, found that nearly half of the workers needed their personal cars at least three times a week, and a full two-thirds needed them at least once a week.[19] Contrary to popular opinion, adding shops, restaurants, and banks into business parks would not overload road facilities since such uses normally attract trips during the off-peak when capacity is readily available. If anything, mixed-use projects would result in a more efficient use of available infrastructure throughout the day.

Among the instruments available for encouraging more mixed-use development, those which produce zoning and tax incentives should be most aggressively pursued. Inclusionary zoning, for instance, might be introduced to encourage the joint development of offices and tenant support services like retail stores and restaurants within all master-planned projects. Multi-family and moderate-income housing could also be promoted by allowing developers to increase their densi-

ties, granting tax concessions to mixed-use projects, or issuing tax-exempt municipal bonds to finance housing additions.

Several noteworthy steps have been taken by California communities which directly promote jobs-housing linkages. The cities of Costa Mesa and Santa Ana have passed ordinances which require developers of large office and commercial projects to provide housing, either on-site or within city limits, to accommodate at least 20 percent of their tenants' workers, or else to contribute to an in-lieu fund. Both cities, moreover, phase in commercial and industrial growth by annually gauging the amount of floorspace for which building permits will be issued according to how much housing was built the previous year. In addition, the cities of Burlingame and Menlo Park routinely ask employers to give hiring preference to local residents as part of the permit approval and environmental impact review process, both to cut down on commuting and to increase local employment.

Higher levels of government also have important roles to play in balancing jobs and housing. Regional governance is an oft-cited prescription for dealing with problems like traffic congestion which spill over municipal boundaries. Stiff resistance to any form of governance which weakens local autonomy, however, renders most regionalism arguments academic. Metropolitan sharing of tax revenues and fair-share housing programs, however, are second-best alternatives to regional governance that deserve serious consideration. Regional sharing of municipal tax revenues could help remove the fiscal incentive to zone only for retail and office functions, since municipalities that did so would have to reimburse the localities that housed their workers. Although no place in the United States presently practices tax-base sharing in its pure form, Minneapolis-St. Paul has perhaps come the closest through extraterritorial sharing of selected income sources, such as local sales tax receipts.

The model for affordable housing programs is the program in the state of New Jersey. There, a Council of Affordable Housing was formed in response to the Mount Laurel II court decision, which found that most municipal zoning ordinances discriminated against low- and moderate-income families, de facto, by precluding affordable housing. The Council has set an affordable housing quota for each municipality, based on a formula that fairly distributes the responsibility of meeting the state's need of 145,000 new affordable units by 1993. Any significant step towards balancing jobs and housing at the subregional level must clearly begin in our state capitals, be it through the passage of enabling legislation supportive of programs like regional tax-base sharing and fair-share housing, or through bold leadership.

In summary, initiatives which link jobs and housing and encourage mixed-use development will yield the most lasting mobility dividends. Land use actions are long-term propositions, however, and thus are at odds with a political system which demands short-term payoffs. If congestion is to be curbed in the near term, we must grapple with the fundamentals of demand and supply – that is, strike a balance between peak-hour traffic and highway capacity.

Managing Travel Demand

There is generally enough highway capacity in American cities to comfortably handle traffic volumes on any given day. The problem, of course, is that everyone tends to travel at roughly the same time and along the same corridors. Our challenge, then, is to make better use of capacity that is already in place by redistributing demand -- either by mode, by time, or over space.

Empty automobile seats are the most wasteful resource in the transportation sector today. Any steps which fill empty automobile seats would help ease congestion. In fact, if the nation's current average occupancy rate could be increased a mere 30 percent, from 1.3 to 1.7 persons per vehicle, congestion would disappear in virtually every U.S. city. In the absence of another energy crisis, however, it is unlikely that carpooling and vanpooling will be able to dramatically increase their 20 percent share of nationwide work trips -- too many Americans live in low-density neighborhoods far removed from their workplaces and too many enjoy free parking for market shares to increase appreciably. Some employers, such as Rockwell International of Golden, Colorado, and Fluor Corporation of Irvine, California, have managed to lure nearly half of their workers into vanpools and carpools, but only after offering generous travel allowances, lottery prizes, and similar perquisites. Few companies have emulated these programs, however, chiefly because transportation usually lies far down the list of corporate priorities.

Conventional bus transit's chances for success in the suburbs and other areas of job growth are even slimmer. Very simply, there's not enough "mass" for mass transit to survive in these settings. What might draw people out of cars, however, are more spacious, comfortable, and convenient forms of group transit, such as private buspools. Buspools presently thrive in Los Angeles County and Tidewater, Virginia, providing premium service to tens of thousands of customers who pay one-way fares upwards of $4 for door-to-door delivery – a testament to the fact that people will ride buses as long as service is on a par with the private automobile.[20]

Programs which spread out worker arrival and departure times, such as flex-time and staggered work hours, perhaps offer the greatest mobility payoff in the near term, primarily because it is easier to shift travel demand over time than by mode or over space. A case in point is the booming suburb of Pleasanton, California, which passed an ordinance in 1984 stipulating that no company with 50 or more employees can have over 55 percent of its workforce driving alone to work during peak hours in 1988. Threatened with fines of $250 per day for failing to comply with the ordinance, over half of Pleasanton's forty largest employers achieved the 1988 target in 1986, chiefly through staggering employee work schedules. Around half of Pleasanton's 18,000 affected workers currently miss the 7:30-8:30 morning peak and 4:30-5:30 evening peak, up from 28 percent prior to the ordinance. Employers, left to their own initiative, are unlikely to adjust work schedules simply because there is no compelling reason to do so; however, given mandatory trip reduction ordinances with teeth, such as Pleasanton's, flex-time and staggered work hours become attractive, low-cost alternatives to programs such as company vanpools.

Last, the practice of zoning for roughly one parking space per employee at most suburban workplaces is a significant obstacle toward making ridesharing, transit, flex-time, and other commute alternatives work. Zoning for one space per worker is a self-fulfilling prophecy -- to no surprise, most workers fill their allotted parking spot by driving. Today's parking standards need to be relaxed to give developers greater flexibility in gauging how much parking they provide. The cities of Seattle and Bellevue, Washington, recently overhauled their parking ordinances, switching from a minimum requirement of parking to a maximum ceiling under the premise that developers won't cut their own throats by supplying too few spaces. New office and commercial projects in both cities are now averaging 20 percent fewer parking spaces than five years ago.[21] Several developers of multi-stage projects, moreover, have limited parking in the initial phases of their projects to the bare minimum, with plans to adjust the number of spaces added over time depending on how successful vanpools and other "parking substitution" efforts are in winning over commuters.

Transportation planners often point out that "auto disincentives," like parking controls and mandatory trip reduction ordinances, are more effective at relieving congestion than "transit and ridesharing" incentives. Calling these programs "auto disincentives" is a misnomer, however. More accurately, they are "auto equalizers" -- they aim to remove many of the built-in biases that favor solo commuting, thereby placing vanpools, buspools, and other travel options on more equal footing.

Expanding Highway Capacity

In the absence of any major technological breakthroughs, new road construction and widenings will continue to be our chief supply-side weapon against congestion. Finding enough funds to pay for road improvements remains the biggest hurdle. Budget cuts, statutory limits on government spending, and voter rejections of bond referenda have forced most municipalities to turn to the private sector for new road financing.

The use of private funds for highway improvements is nothing new. Developers have for years paid for streets, sidewalks, curbs, and gutters within new subdivisions. What is new is private financing of off-site improvements. Municipalities in California, Colorado, Florida, and several other states are employing a variety of mechanisms, such as impact fees, special assessments, and public-private negotiations, to exact contributions from developers for areawide road improvements, normally as a precondition to issuing discretionary building permits. Despite stiff legal challenges, courts have generally upheld the constitutionality of exactions as long as it can be demonstrated that certain property owners uniquely benefit from an improvement or contribute to specific infrastructure needs. While some critics equate exactions with extortion, as long as costs are fairly apportioned, developers have generally supported them since most well realize that the marketability and long-term success of their projects hinge on good accessibility.

Of the private-sector funding options, impact fees offer the most promise for harnessing congestion because they operate on the sound economic principle that those responsible for additional traffic should pay the cost of accommodating that traffic. Importantly, they impose a market discipline. If developers overbuild or erect projects prematurely, they have to pay the consequences. There is an incentive to infill urban spaces where road capacity is already in place and to build offices and homes close-by to reduce travel. Additionally, impact-fee programs normally pool funds from developers for financing areawide, not just near-site, road improvements. This allows large-scale highway and interchange projects to be built, and holds developers responsible for correcting the upstream and downstream impacts of their projects, not just the near-site ones. Indeed, a major drawback of more informal case-by-case negotiations between developers and public officials is that private contributions usually end up going toward improving signals and widening interchanges in the immediate vicinity of a site, often on a piecemeal basis. In California, more than 75 percent ($135 million) of $180 million in private contributions negotiated between 1984 and 1986 has gone toward improving or building new freeway interchanges serving specific developments. However, interchanges

don't really augment capacity that much, and may actually reduce it since they detract from the limited-access, through-movement function of freeways.

The most ambitious impact fee program to date was recently formed in the booming international airport area of western Los Angeles. There, a one-time fee of $2,010 is being collected for each evening rush-hour auto trip generated by new commercial and office developments (on an average weekday). Receipts are being pooled to cover an estimated $235 million in needed road improvements for a 14-square-mile area. Developers can receive credits against their fee obligations by subsidizing vanpools, building pedestrian paths, dedicating land for future transit centers, and providing housing on-site. Faced with fees as high as $4 million, several large real estate interests have opted to promote ridesharing aggressively and build mixed-use projects in order to lower their payments.

In addition to impact fees, gasoline taxes should be increased and tolls should be collected to help finance new road construction. If today's gasoline taxes were equivalent to those of the 1950s in value, they would be over a dollar per gallon in most states, similar to the tax rates of most European countries. There is a trend, however, toward financing highway improvements through funds generated by dedicated sales taxes as opposed to fuel taxes, in part because sales taxes are politically more palatable. In California, for instance, voters of Alameda and Santa Clara Counties recently opted to raise sales taxes by one-half cent to finance 10-year construction programs, and nearly a dozen other counties have similar initiatives in the works. Logically, people should be contributing to new road building based on how much they drive, not by how much they spend on furniture, clothes, and other consumer goods. Fuel taxes help temper demand, since people drive less when gasoline costs more. We should seize the opportunity to increase gasoline taxes while pump prices are under one dollar per gallon, for as soon as prices rise again, there will no doubt be a chorus of opposition to anything which further raises prices.

Finally, after years of languishing in semiobscurity, toll roads seem to be staging a comeback. Compared to highways financed by general revenues, toll roads tend to be more cost-effective since they have to pass a self-sufficiency test to compete for funds in municipal bond markets. In the last five years, bonds backed by toll revenues have been used to finance the Dulles Toll Road in Northern Virginia, the Hardy Toll Road in Houston, the Dallas North Tollway extension, the Jacksonville Expressway, and the North Atlanta Toll Road. Because of higher interest rates and maintenance costs, daily traffic volumes of at least 50,000 per day are currently needed to justify toll financing, com-

pared to a requirement of only 12,000 vehicles per day in the 1950s. Because most fast-growing suburban corridors have precious few thoroughfares and those that do exist tend to be oversubscribed, attracting 50,000 vehicles per day on a new expressway no longer seems unattainable. A case in point is the Dulles Toll Road, which recorded volumes of 63,000 vehicles per day a scant six months after opening.[22]

Dual Challenge: Gridlock and Mindlock

Any serious assault on traffic congestion will require a blend of strategies that work on both the demand and the supply sides of the problem. In tandem, the right mix of land use, traffic management, and road expansion efforts can shave volumes by ten to fifteen percent and augment capacity enough to restore circulation to the clogged arteries of America's cities.

The salvation of transportation is that people and their environments are adaptable. Commuters demonstrated their adaptability during the 1984 Olympics in Los Angeles when, to the surprise of many alarmists, traffic glided smoothly along freeways. A combination of staggered work hours, self-initiated carpooling, and stepped-up transit services turned what was to be a miserable week of commuting into a pleasurable one. A good example of just how adaptable built environments can be is the Denver Technological Center, eight miles southeast of downtown Denver. When opened in the early 1960s, the Tech Center was a classic low-density business park built almost exclusively for automobile access. Over time, it has been transformed into an integrated urban village with some buildings reaching fifteen stories. The payoff has been an increase in the share of workers who walk, cycle, carpool, or ride buses to work from 5 percent two decades ago to over 30 percent today.

Our biggest obstacle ahead may very well be less one of gridlock and more one of mindlock. Securing enabling legislation for tax-base sharing or garnering public support for higher gasoline taxes are far more difficult hurdles than the retiming of traffic signals or the widening of intersections along a corridor. Institutional inertia, in particular, stands in the way of most meaningful reforms in the urban transportation sector. Only by building coalitions, organizations, and institutions that approach traffic problems on a regional level (and that have the purse-string powers to effectively coordinate transportation and land use decisions) can significant progress be made in improving mobility. Our biggest challenge, then, is to find new institutional forums that can break the mindlock that is so pervasive today and that have the wherewithal to capitalize on the demonstrated ability of people and places to adapt and change.

NOTES

[1]U.S. Department of Transportation, "The Status of the Nation's Highways: Conditions and Performance." *Report of the Secretary of Transportation to the United States Congress* (Washington, D.C.: June 1985).

[2]C. Kenneth Orski, "Suburban Mobility: The Coming Transportation Crisis?" *Proceedings of the National Conference on Suburban Expressways*. (Boston: Commonwealth of Massachusetts, Executive Office of Transportation and Construction, June 1986).

[3]*The Washington Post*, November 10, 1985. Quoted in C. Kenneth Orski, "Toward a Policy for Suburban Mobility," in *Urban Traffic Congestion: What Does the Future Hold?* (Washington, D.C.: Institute of Traffic Engineers, 1986).

[4]Daniel Garnick, "Local Area Economic Growth Patterns: A Comparison of the 1980s and Previous Decades." Paper presented at the Workshop on Contemporary Urban Conditions, Committee on National Urban Policy, National Academy of Sciences, Washington, D.C., July 1986.

[5]Robert Dunphy, "Urban Traffic Congestion: A National Crisis?" *Urban Land* 44, no. 10 (1985): 2-7; and U.S. Department of Transportation, "Status of the Nation's Highways: Conditions and Performance."

[6]Emmett J. Horton and W. Dale Compton, "Technological Trends in Automobiles," *Science* 225, no. 4662 (1984): 587-93.

[7]Dieter Klinger and J. Richard Kusmyak, *1983-1984 National Personal Transportation Study*, vol. 1 (Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1986).

[8]California Department of Finance, *Population Estimates of California Cities and Counties*, Report 86 E-1 (Sacramento: California Department of Finance, 1986).

[9]Urban Land Institute, *National Office Market Report* (Washington, D.C.: Urban Land Institute, 1985); and Urban Land Institute, *Development Trends 1986* (Washington, D.C.: Urban Land Institute, 1986).

[10]Ibid.

[11]Philip Fulton, "Changing Journey-to-Work Patterns: The Increasing Prevalence of Commuting within the Suburbs in Metropolitan America," Paper presented at the Annual Meeting of the Transportation Research Board, National Research Council, Washington, D.C., January 1986.

[12]Klinger and Kusmyak, *1983-1984 National Personal Transportation Study*.

[13]Julius Margolis, "Municipal Fiscal Structure in a Metropolitan Region," in *Urban Economics: Readings and Analysis*, ed. Ronald E. Grieson, 379-95 (Boston: Little Brown, 1973).

[14]David E. Dowall, *The Suburban Squeeze* (Berkeley: University of California Press, 1984).

[15]Association of Bay Area Governments, "Jobs-Housing Balance for Traffic Mitigation" (Oakland: Association of Bay Area Governments, 1985); and Robert Cervero, "Jobs-Housing Imbalances as a Transportation Problem," Research Report 86-9 (Berkeley: Institute of Transportation Studies, 1986).

[16]Klinger and Kusmyak, *1983-1984 National Personal Transportation Study*, vol. 1.

[17]Ibid.

[18]Peter K.W. Fong, "Issues of the Electronic Road Pricing System in Hong Kong," *Transportation Planning and Technology* 10, no. 1 (1985): 29-41.

[19]Robert Cervero, *Suburban Gridlock* (New Brunswick, N.J.: Center for Urban Policy Research, Rutgers University, 1986), 169-71.

[20]Genevieve Giuliano and Roger F. Teal, "Privately Provided Commuter Bus Services: Experiences, Problems, and Prospects," in *Urban Transit: Private Challenge to Public Transportation*, ed. Charles A. Lave (San Francisco: Pacific Institute for Public Policy Research, 1985), 168-70.

[21]Thomas J. Higgins, "Flexible Parking Requirements for Office Developments: New Support for Public Parking and Ridesharing," *Transportation* 12 (1985): 343-59; and Melody McCutcheon and Jeffrey Hamm, "Land Use Regulations to Promote Ridesharing: An Evaluation of the Seattle Approach," *Transportation Quarterly* 37, no. 4 (1983): 479-91.

[22]Orski, "Toward a Policy for Suburban Mobility," 12-13.