Congestion Relief: The Land Use Alternative

Robert Cervero

SYMPOSIUM 2

■ Land Use and Transport

Not much has changed since Mitchell and Rapkin's seminal 1954 publication, *Urban Traffic: A Function of Land Use.* We are constantly reminded how interdependent transport and land use systems are. The spectacle of single-occupant automobiles inching along suburban highways every weekday morning owes much to the fact that low densities, the absence of shops and housing near workplaces, and design practices that favor parking stalls over paths give most commuters little choice but to drive alone. As Mitchell and Rapkin eloquently argued, traffic is a "derived demand" — it derives directly from how urban activities are organized on land. Residential densities, the degree of land use mixing, site designs, the location of housing with reference to job centers — all set the stage for travel behavior, affecting the volume and length of trips as well as the modes and routes travelers choose.

In this article, I argue that land use initiatives represent the most fundamental and potentially effective tools available for coping with the kinds of mobility problems that America's cities will face in the 1990s and, indeed, the coming century. Here, I use the term "land use" loosely, meant to convey more than how land is simply put to use. As used here, land use refers to the overall built environment — the size and density of projects, the degree to which uses are segregated or commingled, site design features, tenant mixes, and levels of jobs-housing balance. In that all of these attributes of the built environment influence travel behavior, this broader notion of land use is more compelling. Indeed, it is how land is used and organized that shapes how and along what corridors we commute.

The link between transportation and land use can best be appreciated by comparing cities. Mass transit works best where high densities are linearly aligned along corridors, much like pearls on a string. Ideally, major devel-

Abstract

Fundamental changes in traffic patterns in recent years suggest that a different arsenal will be needed in battling America's future congestion problems. This paper argues that in the absence of congestion pricing, coordinated land use planning can provide the most lasting mobility dividends over the long run. Land use planning needs to be resurrected as a bonafide approach to managing traffic. Shifts in the location of workplaces from downtowns served by transit to suburban settings where individuals are compelled to use their own cars are at the heart of today's congestion dilemma. Four land use initiatives are proposed that could make the suburban workplace of tomorrow more consonant with high levels of mobility: densification, mixed-use development, jobs-housing balance, and pedestrian-friendly site designs. Many of the institutional roadblocks to implementing such programs are discussed, including the difficulty of forging any regional consensus on land use matters and the institutional separation of land use and transportation planning functions among states and localities.

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opments such as office clusters and residential towers anchor both ends of the line. Concentrations of both residential and employment land uses are essential if balanced flows are to be achieved. Cities such as Stockholm, Copenhagen, and Toronto have such built environments and, as a result, boast world-class transit systems (Holmgren 1966; Dunn 1981; Goldsack 1982; Pill 1983; Smith 1984; Downey 1985). At the other extreme, in low-density, multi-centered settings, the private automobile has few competitors. Areas such as Los Angeles, Phoenix, and Orange County (California or Florida) are testaments to this.

Clearly, there are fundamental lifestyle tradeoffs associated with one built form versus another. While Stockholm's Tunnelbana transit system conserves energy, reduces pollution, and equalizes the opportunity of everyone to travel, it has given rise to a dense, mixed use urban form that restricts the ability of families to live in single family dwelling units and own cars. Thus, despite the high standard of living that most Stockholmers enjoy, a transit-oriented city has meant restraints to personal freedoms (Thomson 1978). The automobile city, on the other hand, tends to maximize personal freedom, at least for those who can afford to own cars (Schaeffer and Sclar 1980). Surveys show that 95 percent of Americans prefer living in single family homes (Altshuler 1981). As Elazar (1966) noted, most Americans want to combine as much of a rural lifestyle as possible with their urban occupational roles. They want to live like farmers but earn the wages of stockbrokers. Under our free market, pluralist system, such lifestyle preferences have, not surprisingly, produced low density, auto-reliant urban forms.

Thus, the notion of planning for a transit-oriented Stockholm-like city or an auto-oriented Phoenix-like city is subsumed by the large cultural question of lifestyle preferences. Given the opportunity, most Americans vote with their feet and opt for low density living. Of course, society at large bears the collective costs of these individual choices in the form of air pollution, energy depletion, and traffic snarls. The best solution would be to price low density living correctly through higher property taxes, fuel taxes, and congestion fees. Set high enough, such surcharges would certainly bring about the kinds of densities and mixed use environments that would support mass transit. It is no coincidence that where fuel prices are over $3 per gallon, as in most of Europe, transit modal splits tend to be four to five times higher than those found in American cities of comparable size (Pucher 1988, 1990). Because of equity concerns and political inertia, congestion charges and "sprawl" taxes have yet to materialize in the U.S. This, then, leaves land use practices as more or less a second-best solution to the problem. If they cannot price sprawl and congestion, then planners need to begin focusing on various regulatory, zoning, and design tools and incentives that might shape the kinds of built environments that are consonant with high levels of regional mobility.

The time is ripe for a renewed interest in coordinated transportation and land use planning. Numerous economic and demographic changes — the growth in service industries, the feminization of the work force, shrinking household sizes — are dramatically changing the landscape of America and, accordingly, travel behavior. All are macro-forces, or "megatrends," over which planners have little influence (Fisher 1984). Such is not the case with land use planning. Through the plan review and permitting process, land development is the one area where planners have some degree of leverage. Obviously, planners cannot directly influence how many cars families buy or household sizes; they can, however, influence what is built, at what density, and at what location. Planners must seize the opportunity to shape land development while powerful macro-changes continue to unfold. Otherwise, in this era of LULUs (locally unwanted land uses) and NIMBYs (not in my backyard), growth moratoria are apt to be the principal land use tools in dealing with such nuisances as traffic congestion. All too often, ad hoc responses such as growth controls exacerbate the very problem by pushing new development farther out on the urban fringes and driving up the cost of housing and the length of journeys. As long as congestion fees and sprawl taxes remain taboo, closer coordination of land use and transportation programs is the next best antidote.

In this article, I initially explore the connection between current urban development patterns and transportation problems. Next, four land use strategies are discussed that could enhance future mobility — densification, mixed use development, jobs-housing balance, and more pedestrian-friendly site designs. Last, I discuss some of the harsh realities of why it is difficult to coordinate transportation and land use planning and how we might overcome built-in resistance.

■ The New Face of Traffic Congestion

What is so alarming about traffic congestion in recent years is its pervasiveness. Today, it seems to affect all Americans to some degree. Spatially, it is no longer confined to downtowns; temporally it is no longer limited to 7 to 9 A.M. and 4 to 6 P.M. Statistics abound on the problem. The California Transportation Commission (1987) estimates that traffic congestion results in seventy-five million lost hours annually within the state, the equivalent of eight thousand Californians spending an entire year in a freeway standstill. On the other side of the continent, average speeds on Washington's beltway dropped from 54 MPH to 45 MPH between 1982 and 1987 (Kirby 1989). Perhaps the growing frustration over traffic is best reflected by public opinion polls; residents of San Diego, Washington, Houston, Phoenix, San Jose, and at least a dozen other cities have repeatedly

cited congestion as the worst problem facing their regions in recent years (Cervero 1989a). The cost of traffic congestion are indeed mounting, not only in the form of lost leisure time, but also increased day-to-day stress, declining worker productivity, and a rapidly eroding quality of life. Congestion is, of course, relative — perceived differently in Boise than Boston — and is not all bad — a sign that communities have a healthy, growing economy and have refrained from overinvesting in roads. Many older, industrializing cities would gladly trade their situation for some of the problems of California and Florida. All of this is little consolation to those habitually stuck in traffic queues. Somehow it seems that traffic congestion has qualitatively worsened in recent years, approaching the intolerable in many places.

Today, some of the worst traffic conditions can be found in the suburbs (Cervero 1984; Orski 1985; Cervero 1989a). By and large, the suburbanization of congestion has paralleled the suburbanization of jobs. Because of cheaper land, closer access to workers, telecommunication advances, and other factors, corporate America has moved en masse to the suburbs in recent years (Office of Technology Assessment 1987). Currently, over 60 percent of office floorspace in the U.S. is outside of downtown cores (Cervero 1989a). In metropolitan Phoenix and Houston, the share exceeds 80 percent (Urban Land Institute 1988). One outcome of this trend has been a dramatic increase in suburb to suburb commuting, which makes up over one-half of all journeys to work in U.S. metropolitan areas today (Pisarski 1987; Cervero 1989a). Increasingly, the "desire line" maps of today look like tens of thousands of pickup sticks dropped on the floor — like Brownian motion, trips flow from everywhere to everywhere.

This poses a fundamental mismatch problem, the first of several discussed in this paper. Increasingly, there is a mismatch between the *geography* of commuting and the *geometry* of regional highway networks. Spatially, while most commuters want to make lateral and criss-cross trips, many major thoroughfares have been designed to funnel commuters downtown. Consequently, more and more commuters are forced onto secondary roads and distributors that were never designed or oriented to accommodate large volumes of cross-haul trips. The suburbs, of course, are not mass transit's natural habitat. In 1980, only 1.6 percent of all journeys to work made within suburbs were via bus transit (Fulton, P. 1986). Clearly, changing travel patterns, combined with what some might call functionally obsolete roadway networks, are giving rise to unprecedented levels of suburban congestion. Surely other factors bear some of the blame as well: the slow-down in new highway construction, demographic trends that result in higher trip-making rates per capita and greater auto-dependency (e.g., maturation of baby-boomers, more working women), and the lack of affordable housing near employment centers. Still, the emergence of America's suburbs as the dominant workplace lies at the heart of changing regional commute patterns and, because of our inability to respond by building adequate highways, worsening suburban congestion.

■ Types of Suburban Workplaces

Land use initiatives that will yield the highest mobility dividends in coming years will be those that affect the suburban workplace of tomorrow. Many of today's mobility problems can be directly traced to the built environment of today's workplace. In general, three types of suburban work environments have emerged in recent years, each one of which suggests a different set of land use policy responses.

One type of suburban workplace is the business park. These are highly controlled, master planned environments, typically with coordinated building designs, a campus setting, and attractive landscaping, all geared for the upscale tenant. The hallmarks of business parks are (1) extremely low employment densities, often at a fraction of those found in most downtowns; (2) a single dominant land use, normally with 90 percent or more of all floorspace devoted to offices; and (3) abundant and free surface parking, usually zoned at more than one space per worker (which no doubt becomes a self-fulfilling prophecy — given a free parking slot, most suburban workers commute alone). With suburban parking lots averaging 350 square feet per space (including aisles and driveways) and with roughly four spaces provided per 1,000 gross square feet of floorspace, there is usually 1,400 square feet of parking for every 1,000 square feet of building space. For single story office projects, this means surface parking typically consumes 40 percent more land than the footprints of buildings. To pedestrians, such a built environment creates annoyingly long walking distances.

One of the largest business parks in the U.S. today is the Bishop Ranch development, a 650 acre project some thirty miles east of downtown San Francisco housing some four million square feet of office floorspace. One of the landmark buildings is three stories in height and stretches over one-half mile in length — a veritable "horizontal skyscraper." Many of the employees in this building were relocated from downtown San Francisco. Many previously commuted to work by the BART rail system or via commuter bus. Most have now switched to commuting alone. A recent survey of 340 employees in this building found that although, on average, these relocated workers commuted about the same distance to work before and after the change in workplace, their shares of mass transit work trips fell from 58 percent to 3 percent (Cervero 1989a). This has resulted in nearly a threefold increase in their total vehicle miles traveled (VMT). Clearly, the change in workplace has fundamentally changed the commuting behavior of these workers. Such massive suburban projects get built and jobs are

allowed to leave transit-serviceable settings because certain narrow yet powerful interests gain by doing so. Such projects fatten the tax coffers of the host city. The rest of us pay the spillover consequences — such as the additional traffic jams, air pollution, and energy consumption associated with thousands of commuters switching from trains and buses to cars.

By design, most business parks openly invited single occupant auto commuting, earning them such monikers as "pedestrian-hostile" environments. Moreover, while traffic flows freely once inside business parks, connecting roads are frequently jammed several miles upstream and downstream. Quite often, business parks with the best *on site* circulation have the worst *off site* congestion (Cervero 1989a).

At the other extreme is a second type of suburban workplace, referred to as suburban downtowns, megacenters, or urban villages. These are high rise clusters of office and commercial developments that resemble the downtowns of many medium sized cities in both scale and density (Orski 1986). Tysons Corner in the Virginia suburbs of Washington D.C. and Perimeter Center north of Atlanta are examples. While central business districts usually invite foot travel, some suburban downtowns are almost devoid of sidewalks and pedestrian amenities. Unlike traditional downtowns, moreover, suburban high rise centers have wide spaces between buildings, abundant and cheap parking, and modest levels of transit services. Most suburban downtowns have a schizophrenic personality — they are like traditional downtowns, but are designed for cars rather than pedestrians. And while traditional downtowns have evolved gradually, many suburban downtowns have witnessed the addition of five million or more square feet of new office and commercial floorspace in as few as three years. All too often, these "instant downtowns" have produced "instant congestion." Not surprisingly, it is around suburban downtowns where residents have been most vocal in their opposition to rapid growth, such as in Walnut Creek, a suburb of San Francisco, where citizens passed a no growth referendum several years ago in response to worsening congestion near several midrise office towers that were constructed around a BART rail transit station. While planners were hoping that many of the workers at these midrise towers would patronize BART, the availability of free parking and the lack of good transit connections to their residences resulted in most opting to drive alone to work everyday.

Perhaps the most common form of suburban commercial development is the "strip," ranging from "auto rows" and "fast food alleys" to "silicon strips," the latter referring to such high tech corridors as Route 1 near Princeton, New Jersey or the Katy Freeway, west of Houston (Fulton, W. 1986). As a work environment, strips consist of independent office buildings aligned along axial roadways, intermixed with an alphabet soup of retail plazas, hotels, theater triplexes, restaurants, and other uses. This is a land of curb cuts, disconnected sidewalks, vast spaces, and what traffic engineers call "platoons" of fast-moving vehicles whose movements are orchestrated by traffic lights. While the effect of any one building on traffic flows tends to be modest, the cumulative impacts of numerous autonomous, unrelated projects have frequently clogged the "strip" and roads leading to it. It is along strips where coordinated site designs (e.g., connected sidewalks, common curb cuts for multiple sites) could yield high mobility dividends.

■ Land Use Strategies for Preserving Mobility

Four land use initiatives offer promise for enhancing future mobility: (1) densification; (2) mixed use development; (3) jobs-housing balance; and (4) more pedestrian-friendly site designs.

Densification

Most suburban workplaces in the U.S. are being built at floor area ratios (FARs) of 0.3 to 0.4 — that is, total floorspace is 30 to 40 percent of total land area (Cervero 1986; 1989a). Such densities are intrinsically dysfunctional from a transportation standpoint. They are generally too low to support viable mass transit services, yet high enough to cause congestion problems along connecting roads (Orski 1988). Studies show that moderate levels of transit service (such as fifteen minute average headways between buses), which could achieve mode splits in the 15 to 20 percent range, can be supported at densities of fifty workers per acre or more (Pushkarev and Zupan 1977). This normally corresponds to FARs of 2.0 and above. Density is the single most important land use factor that affects mode choice in the suburbs (Cervero 1989a). Two of the densest suburban workplaces in the U.S. — Bellevue, Washington and Uptown, Texas — testify to this point. Bellevue averages an office FAR of 7.5. Presently, around 27 percent of its workers arrive at work by bus, carpool, or vanpool (Cervero 1989a; Hooper 1989). Density alone, however, has not produced these mode splits. Bellevue has also placed a cap on parking of two spaces per 1,000 gross square feet of building area, unprecedented for an American suburban community. It is also a major center within Seattle Metro's pioneering timed-transfer bus network; presently, seventeen regional bus routes converge on Bellevue's transit center in synchchronization and at regular fifteen to thirty minute intervals. Uptown, some six miles west of downtown Houston, averages an office FAR of 5.0. Presently, 22 percent of its workforce carpools or vanpools each weekday. In addition to the Uptown area's unusual high rise profile, the Houston region's extensive network of reserved, High Occupancy Vehicle (HOV) lanes has encouraged many workers to share rides. In both cases, the lesson appears to be that densification of suburban workplaces works best when combined with

other programs — in the case of Bellevue, constraints are placed on auto usage through parking caps, while in Houston, high-quality vanpool services are available.

Density must be achieved at both ends of the commute trip, the residential as well as the employment ends, if reasonably high shares of nonauto commuting are to be achieved in suburbia. In Scandinavian cities such as Stockholm and Copenhagen, where as many as two-thirds of suburban workers arrive to work by some means other than the private automobile, high transit ridership stems partly from the fact that high-rise towers house both residents and workers throughout the region (Thomson 1978; Goldsack 1982; Hall 1984). The placement of high-rise suburban apartment towers within walking distance of Toronto's transit line has likewise been a key to its success (Pill 1983). By contrast, one of the chief reasons why fewer than 5 percent of those who work at offices near suburban rail stations in greater Washington, D.C. and the San Francisco Bay Area patronize transit is because residential densities are low, suburban parking is abundant, and rail lines do not go anywhere close to where most suburban office workers live (Gannon and Dear 1975; Webber 1976; Baker 1983). Indeed, one of the major disappointments of recent rail systems in the U.S. has been their inability to shape suburban growth in general and attract new apartment construction to station areas in particular (Hall 1988).

Elected officials often view density quite narrowly in terms of how it will affect their own communities vis-à-vis the region at large. An example of this is the Golden Triangle Task Force of Santa Clara County, California. The Task Force consists of elected officials from five separate communities in the northern part of the County, better known as the Silicon Valley, to coordinate their respective transportation and land use planning efforts. In planning circles, the Task Force has been widely heralded as a real breakthrough in inter-municipal coordination of transportation and land use planning. Yet one of the Task Force's first actions was to get each community to agree to place a 0.25 FAR cap on all new commercial construction. This is despite the fact that a new light rail transit line connects downtown San Jose with several communities in the northern part of the county. Granted, a two story office building generates fewer trips than a six story building with the same footprint. However, the four additional stories have to go somewhere — if not in a midrise tower, perhaps near a rail station, then most likely in an auto-inviting, low-density business park. Although it might be advantageous for the five communities to restrict density, from the larger subregional perspective, such actions will likely create even greater auto-dependency. Such parochialism in land use planning is almost always to the detriment of the region at-large.

Zoning is the standard tool for increasing employment and residential densities. A market demand must exist as well, however, for high-density zoning to have any payoff. Congestion pricing (such as tolls and impact fees) and sprawl taxes would no doubt increase the demand for denser workplaces and apartments. Typically, impact fees and exactions charge developers of dense projects the most. While such projects often worsen traffic conditions on roads immediate to a site, in principle, they could be expected to exert less pressure on the regional network than a lower density project with comparable numbers of workers who exclusively drive to work. To the extent denser projects encourage transit commuting and ridesharing, the regional highway network will be better off. Thus, while a local impact fee program might charge developers of dense projects more, regional impact fee programs, if they existed, would charge them less. Thus, herein lies a second mismatch — a mismatch between the level at which land is controlled and impact fees are charged (the local level) and the level at which the overall traffic impacts of projects are felt (the regional level). If we charged impact fees based on how regions are affected by projects, denser living and working environments would no doubt evolve.

Mixed-Use Developments

The commingling of offices, shops, restaurants, banks, and other activities in America's suburbs would likewise help ease congestion. Mixed-use, it should be noted, is not the same as multi-use. Indeed, most highway strips feature multiple uses. Mixed-use places compatible activities side-by-side so that they mutually benefit from one another, such as creating a pleasant pedestrian milieu or allowing the sharing of parking. Multi-uses are just that — an assemblage of land uses that are not necessarily related to one another in any design or functional sense. While in the industrial era there was a logic to separating shops, homes, and other uses from smokestacks, rendering plants, and the like, in today's environment of clean, nonpolluting offices, the rationale for segregating suburban activities by miles of arterials is dubious. Traditional Euclidean zoning should be "turned on its head" to encourage the integration rather than segregation of uses. Today, one of suburbia's biggest nuisances is traffic congestion, suggesting that if zoning is to play its nuisance reducing role, it should promote fusion rather than exclusion.

In suburbia, mixed-use developments yield a number of tangible benefits (Cervero 1988):

1. *Walk trips increase.*
   More trips are "internalized," taking place on site rather than off site. Thus, what otherwise might be a midday auto trip to a bank or restaurant becomes a midday stroll a block away, or perhaps a simple elevator ride to the ground level bank or deli within the comforts of one's own office building.

2. *Trip-making is evenly distributed throughout the day and week.*
   With 90 or more percent of floorspace limited to office uses, the majority of trips often occur from 7 to 9 A.M. and 4 to 6 P.M., Monday through Friday. With a mixture of shops, restaurants, offices, and ancillary uses, trips are spread more evenly throughout the day and week. Thus, mixed uses reduce peaking and make fuller use of the roadway capacity already in place.
3. *Shared-use parking is possible.*
   When offices, shops, and theaters are side-by-side, parking spaces can be shared because the peak parking demands for these uses fall at different times. The same parking facilities used by office workers from 8 A.M. to 5 P.M., Mondays through Fridays, can serve restaurant and movie goers during evenings and on weekends. Shared parking, moreover, can shrink the scale of many suburban parking lots by as much as 20 percent, leading to a more compact, pedestrian-friendly environment (Barton Aschman, Inc., 1983; Cervero 1989a).
4. *Workers are more likely to share rides.*
   One of the major deterrents to carpooling and vanpooling in many business parks is the fear of being stranded without a car. A recent survey of suburban office workers from six major activity centers in the U.S., in fact, found that about one-half of workers need to take care of midday business out of their offices (Hooper 1989). In downtowns, office workers can patronize transit and still have a world of activities within easy reach. For suburban office workers, such is usually not the case. Thus, mixed uses not only cut down on midday motorized traffic, they free more workers from having to drive alone, thus relieving peak period congestion.

My own research found that every 20 percent increase in the share of floorspace that is devoted to retail and commercial uses in suburban office developments is associated with a 4.5 percent increase in the share of trips by carpool, vanpool, and transit (Cervero 1989a). Although this evidence is based on data that measure the short-term impacts of land use mixing, this percentage nonetheless suggests that there is a reasonable degree of elasticity between mixtures of uses and commuting choices in America's suburbs.

Tools that could bring about more mixed uses in suburbia include inclusionary zoning, conditional use zoning, and various financial incentives, such as granting of credits against impact fee obligations (since mixed-use developments reduce the need for additional road capacity). As practiced in suburbia today, traditional zoning is largely counterproductive from a mobility standpoint. One might even argue that no zoning would be preferable to the exclusionary practices that characterize suburbia. Witness Houston, Texas, which has no zoning and, partly as a consequence, the most mixed-use suburbs in the U.S. (Hazlett 1983; Cervero 1989a). While Houston's suburbs are still congested during peak hours, it is doubtful that major employment subcenters such as Uptown and Greenway Plaza could achieve vanpool mode splits of 20 percent or more without mixed-use developments. One could surmise that suburban congestion would be even worse in Houston today were it not for the prevalence of mixed-use projects that invite ridesharing.

Jobs-Housing Balance

Many urbanized regions around the country suffer a jobs-housing imbalance. This discordance between job and housing growth has perhaps been the most crippling of all mismatches in terms of mobility. Santa Clara County, California, home of the Silicon Valley, is a classic example of jobs-housing imbalance. Most communities at the northern end of the county, such as Santa Clara and Cupertino, have ratios of jobs-to-housing units of 2.0 to 4.0. Towns at the southern end of the county, on the other hand, are veritable bedroom communities, averaging four to five times as many homes as jobs or jobs to housing unit ratios of .25 to .20 (Cervero 1989b). Partly because of these mismatches, Santa Clara County experiences more hours of delay per capita than any county in the Bay Area, including San Francisco (Cervero 1989a).

While one might expect the suburbanization of jobs to shorten commuting distances, the evidence on this is mixed (Gordon et al. 1989; Cervero 1989b). Some evidence suggests that more Americans are finding it difficult to reside in the community where they work than ever before. In 1968, 36 percent of all Arlington, Virginia workers resided within the community; by 1988, only 19 percent did (Wickstrom 1989). Several factors, such as rising housing costs, fiscal zoning, and the increase in dual wage earner households, are reducing the opportunities of more and more Americans to reside as close to their workplace as they would like (Cervero 1989b). Besides shortening trips and encouraging cycling and walking, jobs-housing balance would help rationalize commuting patterns and reduce the clashes between through and local traffic. Traffic patterns generally represent scores of overlapping commutersheds between homes and major work centers. To the extent commutersheds can be shrunk through jobs-housing balance, and thus the amount of overlap reduced, congestion would decline. While those living in more balanced settings might still drive to work, fewer numbers would leave local and collector streets and pack onto freeways and major arterials.

Jobs-housing balance does not mean the ushering in of an era of cottage industries, apartments above shops, or master planned communities where everyone lives and works in the same vicinity. Rather, the spirit of jobs-

housing balancing is to provide opportunities to live reasonably close to workplaces for those who would like to by breaking down exclusionary barriers. Among the tools available to planners for doing so are inclusionary zoning; office and housing linkage programs (such as currently practiced in San Francisco, Boston, and Orange County, California); bonus programs (such as around the Ballston Station of Washington's Metrorail system where FARs of 6:0 are granted to commercial projects that contain housing versus 3:0 for all others); growth phasing; and regional initiatives (such as tax-base sharing and the enforcement of various fair-share housing and antidiscrimination laws). Both New Jersey and Minnesota have passed authorizing legislation that encourages regional jobs-housing balance through such fair-share programs. In California and Florida, state infrastructure funds are tied to coordinated transportation and land use planning. And in the greater Los Angeles basin, stringent air quality requirements have forced a plan that calls for shifting 12 percent of new jobs to job-poor areas while moving 6 percent of new housing to job-rich areas. Incentive strategies can also adopted. Bellevue, Washington, for instance, allows developers to increase their office floorspace by four square feet for every one square foot of housing built in the central core. Additionally, impact fee credits are granted to office developers who provide either on site or near-site housing opportunities.

Site Planning and Design Practices

More pedestrian-friendly work environments could attract larger numbers of suburban employees to vanpools, carpools, and transit. The idea is less one of encouraging people to walk or cycle to work and more one of creating the kind of pedestrian environment where workers no longer mind giving up their cars. At the extreme, workers might even prefer to vanpool if pedestrians were given clear priority over motorists. Design treatments that make walking and cycling more pleasurable include narrowing building setbacks; placing parking at the rear of buildings; providing sidewalks and paths with attractive landscaping and visually interesting surroundings (which might very well include adding mixed-use activities); building a grade-separated secondary walk and cycle network where necessary to avoid conflicts with motor vehicles; providing on-site shower and locker facilities for cyclists; and reducing parking. Transit-friendly designs likewise are needed, including such practices as providing front door loading and drop-off zones; avoiding branch roads and cul-de-sacs, which require buses to retrace their paths; and placing sheltered bus stops near building complexes. From a design standpoint all of these treatments aim to create "a level playing field" by providing nonmotorists with the same level of convenience enjoyed by motorists.

At least three west coast transit agencies have prepared reports that promote specific sets of design criteria. Metro in Seattle, Washington, AC Transit in Oakland, California, and the Orange County Transit District in southern California all have guidelines that are aggressively promoted whenever new developments are proposed within their respective districts (Institute of Traffic Engineers 1989). Normally, staff planners meet with developers to encourage the adoption of design standards that accommodate buses on site when plans are being reviewed.

Many of the regulatory and incentive tools previously discussed would also promote pedestrian-oriented designs, such as granting density bonuses or constraints on parking. All of the land use initiatives discussed in this section are mutually reinforcing. Higher densities invite more mixed-use developments and create pedestrian-friendly environments. Jobs-housing balance and improved walking conditions are likewise consonant. Accordingly, any particular strategy — be it densification or jobs-housing balance — stands the greatest chance for success, both politically and economically, when it is packaged with other compatible land use measures.

■ Overcoming Resistance

Considerable resistance stands in the way of implementing many of the ideas advanced in this essay. Gridlock within our institutions and political systems is every bit as imposing as gridlock on our streets.

1. *Institutional mismatches for dealing with the problem.* Almost universally, land use planning is the prerogative of local governments. Yet the traffic impacts of municipal land use decisions are felt regionally. One can no more plan for transportation on a local basis than for air quality. Like pollution, transportation transcends jurisdictional boundaries. As a consequence, most transportation planning is carried out by state agencies or regional planning authorities. Thus, there is a fundamental mismatch between the levels of government at which land use decisions are made and transportation planning is conducted. By and large, land use and transportation planning are carried out as separate functions. Because of the competitive, self-survival instincts of most institutions, each with separate boards, bureaus, and budgets, coordination is inherently difficult. The mismatch is even found within the transportation sector itself. Normally, the lion's share of public investment in highways is planned and programmed by state departments whereas mass transit falls within the purview of special-purpose regional authorities.

   Deakin (1987) argues that even the professional orientations of state and local staffers are vastly different. State departments of highways tend to be dominated by engineers where local planning offices are staffed primarily by social scientists and professional planners without engineering backgrounds.

Basic differences in how these disciplines look at the world make coordination difficult. Quite often, local and state officials view each other as competitors. Local planners frequently treat suburban highways as "Main Streets," allowing new development near interchanges to the point where traffic overwhelms capacity. All too often, the amount of new development permitted under local land use plans is inconsistent with state planned highway capacity (Deakin 1987). Even implementation mechanisms differ fundamentally at the local and state levels. Land use changes often occur through a series of amendments, rezonings, and approved variances. Thus, land uses evolve gradually in an ad hoc fashion. Once a transportation project enters a five year capital improvement program, however, it is usually there to stay, regardless of what land use changes have occurred. Thus, highway projects that are already programmed rarely adjust to land use changes.

Currently, then, localities play a limited role in guiding transportation development. And higher levels of government play a limited role in guiding land use development. In general, pressure to coordinate land use and transportation must come from the top — more in the form of sticks than carrots. In the few states where some degree of coordinated planning is taking place, notably Florida and New Jersey, it took strong leadership and legislative mandates at the state level to start the momentum. By linking state aid and infrastructure funds to coordinated planning and by enforcing federal laws regarding environmental protection and housing discrimination, these and other states are beginning to force a structure of coordinated planning upon localities, regional agencies, and their own state bureaus. The challenge is to build regional coalitions so that it is in the interest of local elected officials to think regionally as much as locally. Peremptory regulations and requirements appear necessary to start the process.

2. *Land use planning should proceed and guide transportation.*

Regions should be devising land use plans that reflect the kinds of living environments residents want. In response, transportation should be designed to accommodate and support planned growth. We consume transport not for its own sake, but rather to access places. Thus, it is places that matter most. All too often, regional planning authorities get this backwards. Lured by federal and state capital subsidies, dozens of metropolitan areas around the country have plans to build fixed-guideway rail systems. In many cases, once decisions are made to go with rail, land use plans are adjusted so they are consistent with rail investments. Logically, though, transportation should be designed to serve established land use policies, not vice versa. Proper pricing would certainly help rationalize the planning process. If the correct price for low-density living could be set, a socially optimal urban form would evolve. This would allow us to plan a transportation system that best serves that form. Higher commuting prices and sprawl taxes would no doubt produce higher density, mixed-use built forms over the long run; the logical transportation response would be to build a high quality mass transit system which well serves this built form.

Besides the fact that there is more federal funding support, another reason why transportation planning dominates land use planning is that it is often easier to build consensus around the former. Developing a comprehensive, long range land use plan is painstakingly difficult in any pluralist system. While some urbanites might prefer living in neotraditional communities that are dense and have a mosaic of activities, others value rural settings. In the absence of any unitary public interest, comprehensive planning has been supplanted by the marketplace in mediating the lifestyle preferences of Americans. Thus, while it is possible to forge a consensus on a regional transportation plan, given current institutional arrangements it is next to impossible to develop a detailed regional land use plan. Thus, almost by default, transportation guides land use. For better or worse, our democratic, free market approach places the transportation cart before the land use horse.

3. *Political competition impedes regional land use planning.*

Local competition for tax base has generally thwarted efforts to coordinate land use and transportation. The fiscalization of zoning has fractured the land use patterns of numerous regions around the country (Rolleston 1987; Cervero 1989b). Zoning for office and commercial development at the expense of housing worsens the jobs-housing gap and, consequently, traffic conditions. Left to fend for themselves because of federal and state cuts in local programs, municipalities are continually vying for attractive land developments. As long as such competition continues, few inroads will be made in linking land use and transportation. Should a particular municipality behave responsibly and revamp its zoning to allow dense, mixed-use work environments, a neighboring jurisdiction is likely to exploit the situation by allowing more highway oriented development than it otherwise would have, a classic tragedy of the commons. Short of regional governance, perhaps the most effective way of lessening fiscal competition would be through tax-base sharing, such as currently practiced in the Minneapolis-St. Paul region. In the Twin Cities area, the pooling of nearly 30 percent of property tax receipts into a regional tax base that is then redistributed mainly on the basis of residential population has certainly reduced the incentive to zone primarily for higher tax yielding commercial and office land uses. Clearly, any successful joint land use and transporta-

tion planning effort will hinge on finding ways of moderating the competitive and parochial instincts of local governments.

4. *Land use initiatives are long term propositions.* The benefits of careful land use planning are often not evident until five to ten years in the future, or even longer. Land use planning is inherently at odds with a political system that demands short-term payoffs. Naturally, local elected officials are more interested in a road project built within the next two years than a jobs-housing balance initiative that might relieve congestion along a major corridor some five or more years after they have left office. This suggests that land use strategies offering more immediately recognizable benefits should be emphasized. Viewed over the longer term, strategies should contribute toward a common set of regional land use objectives and help avoid unnecessary costs in the future, such as by providing rights-of-way far in advance of need. Institutional reforms are needed that reward politicians for thinking beyond the two to four year period in which they are normally re-elected.
5. *NIMBYs and LULUs.* Many of the land use initiatives discussed in this essay are eschewed by Americans. Many suburbanites moved to the outskirts to escape high densities and mixed use environment. Many fear their neighborhoods will be tarnished and their property values will plummet if apartments, midrise retail and office plazas, and other traditional urban edifices are allowed in. As long as society subsidizes low density, auto-reliant living, such hostile reactions to higher densities and mixed uses will continue. In an era of NIMBYs and LULUs, any measures that threaten to change traditional suburban living are apt to be squashed, either through the courts or the ballot box.

Besides congestion charges and sprawl taxes, the idea of higher density, mixed-use suburban living could profit from better design practices and marketing. Balanced suburban growth need not mean three story apartments abutting midrise office towers. Through the careful layering of densities and the juxtaposition of compatible uses, in tandem with some attention to landscaping, attractive, and moderately dense mixed-use suburban environments can be created (Bookout and Wentling 1988). Existing suburban communities can also be "retrofitted," such as in Reston, Virginia, one of America's first large-scale new towns, where a compact pedestrian-oriented town center is being built that will include twin office towers, a large hotel, midrise apartments, and several blocks of three story retail plazas (Langdon 1990). Clearly, we need better examples of dense, mixed-use suburban environments of a high quality. This is an area where federal demonstration grants might be money well spent.

■ Closing

The notion that transportation behavior can be changed through more effective land use planning smacks of environmental determinism — the idea that behavior can be changed through physical design. While I am indeed arguing that the built environment can shape travel choices, I am likewise embracing economic determinism — the idea that if the true social costs of building at low densities were passed onto dwellers and developers, the marketplace itself would give rise to a built form that respects the limits of natural environments and provides high levels of mobility. Indeed, if land use initiatives are to enhance mobility, it will be necessary to remove at least some of the built-in subsidies that encourage Americans to live at low densities and drive their cars to all places, at all times. Critics might warn that land use initiatives that call for higher densities and mixed-use settings are tantamount to "social engineering." Was it not social engineering, one might ask, when the federal government built a 42,000 mile national freeway system at the same time many U.S. transit systems were struggling to stay afloat? Clearly, our current transportation and land use arrangements are direct outcomes of past investment, regulatory, and pricing policies and decisions. In this essay, I am not arguing that a certain lifestyle or living environment be forced on Americans; rather I am arguing that they be provided with more living, working, and commuting choices. To the extent that exclusionary barriers can be lifted and prices can be introduced that more closely reflect the true social costs of low density and auto-dependent living and working environments, then many more land use and transportation choices would be available, to the betterment of all.

It should be pointed out that regardless of what pricing reforms and land use initiatives are introduced, one of the strengths of America's system is that the marketplace itself will eventually bring about behavioral and structural changes. Indeed, one of the saving graces of traffic congestion is that it is self-regulating. This is perhaps best supported by the fact that the average journey-to-work travel time in U.S. metropolitan areas has remained more or less constant throughout this century — in the range of 20 to 22 minutes each way (Altshuler 1981; Federal Highway Administration 1986; Hanson 1986; Pisarksi 1987). This suggests that there is, in general, a window of acceptable commuting times for most Americans. To the extent that average commuting speeds decrease and longer travel times are incurred, structural changes begin to occur — often in the form of locational shifts. Those with the least tolerance for congestion either move closer to their workplaces, switch jobs, or, at the extreme, move to a less crowded region. Where people relocate, so do businesses. Congestion also stimulates telecommunications advances, allowing increasing numbers of Americans to work at home or at neighborhood job centers. In general, such market

driven responses are likely to continue to shape metropolitan growth over the long term more than any concerted regional planning effort, barring the introduction of major institutional and pricing reforms.

One market driven response has been the trend toward increased densities and the addition of mixed-use projects at some of the nation's more established suburban office centers. The Denver Technological Center southeast of downtown Denver is a classic example. Because of market pressures, its FARs have increased by a factor of eight and its share of total floorspace that is devoted to offices has fallen from 90 percent to around 65 percent since 1970 (Galehouse 1984; Cervero 1986). Clearly, suburban environments are malleable. One of our challenges is to capitalize on the demonstrated ability of suburban workplaces to adapt and change.

All of this is not meant to imply that planners should sit idly while the market seeks out an equilibrium. Market changes will not always be within the broader public interest, thus there will always be a need for pricing policies and land use interventions that benefit society as a whole. Land use changes, moreover, occur gradually. Tremendous wastes of time and money are incurred while market driven adjustments slowly take place. Farsighted planning and regulatory initiatives will always be necessary to help guide growth along a more socially optimal path. Finding the right blend of planned versus market responses to today's congestion problems will remain a significant challenge to this and future generations of planners.

The coordination of transportation and land use efforts will be pivotal to good planning practice in the 1990s, perhaps more so than any time over the past several decades. The obstacles are considerable, but given the political will, some foresight, the right institutional environment, and money, the rewards can be considerable as well.

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