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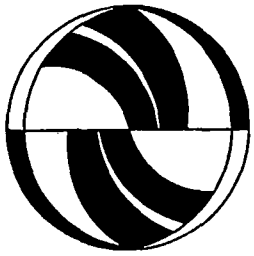

Land Use and Transportation Planning in Response to Congestion: The California Experience

Elizabeth Deakin

Working Paper
UCTC No. 54

The University of California
Transportation Center

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Land Use and Transportation Planning in Response to Congestion: The California Experience

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Abstract

This paper reviews land use and transportation planning policies and practices in California and assesses issues raised by various strategies being utilized to address congestion problems.

Shrinking revenues, escalating costs, and concerns about social and environmental impacts have combined to constrain state highway building; financial problems and difficulties in attracting riders have deterred transit expansion. Consequently, local governments are having to shoulder greater responsibility for transportation. Three approaches are increasingly being used: developer exactions and impact fees; transportation systems management programs and ordinances which encourage trip reduction and the use of alternative modes; and general plan, subdivision control, and zoning revisions.

Few local governments are well equipped to carry out these new tasks. Planning departments have few staff members with training in transportation planning and analysis, and have left these matters largely to engineering departments. But engineering departments also lack expertise in the areas of demand management and land use-transportation coordination. Methodological and data shortcomings further limit the ability of local planners and engineers to tackle land use and transportation planning issues. Finally, the highly politicized circumstances under which many traffic mitigation efforts take place thrust planners into roles for which many have little training or experience: developing compromises between pro- and anti-growth interests, carrying out negotiations with developers and community groups, and preparing development revenue forecasts and financing plans.

These findings suggest a need for additional research on methods to coordinate transportation and land use; more rigorous requirements and incentives for local transportation-land use coordination; greater cross-training of planners and engineers; and greater exposure of planning and engineering students to the techniques and issues of project evaluation, negotiation, and the political process.

A. Introduction

Traffic congestion has become an important public issue in the United States in recent years, as problems once largely restricted to peak hours and trips downtown have spread throughout the day and into the suburbs. California, as the most populous state in the U.S. and one of the fastest growing, has particularly felt the effects of congestion. Once famous for its freeway-based mobility, the state now leads in the percentage of vehicle-miles of travel taking place under stop-and-go conditions. Traffic also clogs many local arterials and spills over into residential neighborhoods.

Not all the increase in traffic is due to population growth, locational shifts, and related land development. Per capita trip-making also is up, reflecting the combined effects of the maturation of the "baby boom" population bulge, a vast increase in the percentage of women in the work force, and somewhat higher disposable incomes. In addition, shrinking public revenues and escalating costs have constrained government's ability to respond by delivering new transportation facilities and services--a response which is sometimes questioned, in any event, on environmental and efficiency grounds. (1,2,4,7) Thus congestion is the product of a complex web of demographic, social, economic, and financial factors. Nevertheless, growth-related traffic impacts are particularly visible to both citizens and their elected officials. In response, there has been an upsurge of interest in strategies for coordinating land use and transportation planning, and a search has been underway for strategies that might offer congestion relief or at least avoid a worsening of conditions.

Local governments have explored a number of such strategies (Table 1). Specific measures being tried out include methods to increase capacity and improve traffic flow (including strategies for funding such projects), strategies for encouraging the use of alternatives to the automobile, especially for commute trips, and strategies for reducing overall trip-making. Because many of these local government efforts are triggered by analyses of the likely impacts of proposed developments (and occasionally, by the actual impacts of recently approved developments), there has been an upsurge of interest in transportation/land use relationships and in methods for coordinating land development and transportation.

This paper reviews the state of the practice in land use and transportation planning in California and assesses planning and policy issues raised by the various strategies being utilized to address congestion problems. The paper focuses primarily on local government activities, since it is at that level of government that most land use decisions, and many transportation planning and investment decisions, are made in California (and indeed, in most of the U.S.)

The paper is based on the findings of two related studies. The first study examined public-private partnerships and development exactions for traffic mitigation in major metropolitan areas across the U.S. It focused on transportation requirements imposed as a condition of development approval but also collected information on other traffic mitigation policies, as well as on other types of exactions in use. Policies in 62 cities and counties were examined in some detail, and case studies were carried out in 20 jurisdictions.(7, 8, 9, 10; 14) The second study examined traffic mitigation practices in California. Telephone interviews with city and county planners and engineers in over 100 jurisdictions were used to identify the scope of traffic mitigation activities, and 15 jurisdictions representing a wide range of experiences were selected for detailed investigations. (11, 12, 13, 14)

In the section that follows, the practice of land use and transportation planning at the local government level is reviewed briefly. Then, three approaches that are being used by local governments to respond to congestion concerns--transportation exactions and impact fees, transportation system management programs and ordinances, and general plan, subdivision control, and zoning revisions--are discussed, and issues they raise are considered. The paper concludes with a discussion of the implications for planning practice.

B. Local Transportation and Land Use Planning

In the United States, land use planning and regulation traditionally has been an activity of local governments: cities and counties. In contrast, transportation planning (as distinct from traffic engineering) until very recently has been less visible--sometimes, nearly invisible--at the local level. The reasons for local governments' relative inattention to transportation planning are deeply rooted in government organization, staffing practices, and assignments of responsibility.

Several factors have contributed to transportation's secondary role in local planning efforts. First, governmental responsibilities for land use and transportation generally have been divided, with land use assigned to the planning department and transportation assigned to engineering. Most planners have had little training in transportation and have been satisfied to leave what they view as a technically based matter to another department. Most engineers are similarly untrained in land use planning and lack interest in the policy issues it entails. Land use and transportation activities thus have tended to proceed along separate paths, reflecting differences in the training of the respective staffs as well as differences in scope of responsibility. Often there is little coordination between the two (14)

The tendency to not coordinate transportation and land use is exacerbated by low levels of local government staffing for transportation. Table 2 presents findings from telephone interviews conducted in the mid-1980s with planning and engineering departments in California cities and towns. Staffing levels, staff training and experience, and assignments of responsibility for land use and transportation planning were explored. The interviews clearly revealed that transportation planning receives relatively little attention in city planning departments--and also indicated that perhaps less transportation planning is done in engineering departments than the planners assume.

Among the planning departments, only about 17 percent overall had assigned one or more staff members to work primarily on transportation. As one might expect, very few of the small cities (those with a population in the 10,000 -50,000 range) had a transportation planner, while about 21 percent of those in the 50,000 -120,000 population, mid-size category and about 45 percent of the larger cities (120,000 +) had at least one such staff member. A somewhat larger number assigned at least half a person-year of effort each year to transportation-related activities; this was the case for 18 percent of the jurisdictions in the 10,000-50,000 population category, 38 percent of the mid-sized cities, and 64 percent of the larger cities. Overall, most departments estimated that transportation activities accounted for 10-15 percent or less of the total planning staff's level of effort.

Many planning departments reported that they simply could not afford to devote as much as half a position to transportation, although several also said that a transportation planner position was among their unfunded requests. For those that did have transportation planning expertise on staff, the assignments given to this person (or persons) tended to be short-range and project-oriented, with responsibility for EIR analyses, residential street design, bike programs, transportation systems management programs, and parking requirements and programs the most common. The planning departments without special expertise in transportation commonly stated that they depended on the city's engineering staff to carry out the more general, longer-range transportation planning and analyses, and indeed even those with in-department transportation planners reported that they relied on engineering for much of the jurisdiction's transportation planning work.

In view of these latter comments it is noteworthy that engineering departments also tended to lack staff with specific training or experience in transportation. Among the cities with populations under 50,000, for example, most obtained transportation engineering services via consultant contract rather

than direct staffing. In the 50,000 -120,000 population category, under half (43%) had one or more in-house traffic engineers; nearly as many (39%) used consultant contracts for transportation services and the rest relied on civil engineers without specialized training in transportation. Only among the largest cities was it common to find one or more transportation engineers on staff.

Many engineering departments reported that it was barely possible to keep up with immediate transportation safety and enforcement needs (signal repairs, signing, curb painting, accident investigation, etc.) with their available transportation engineering staff; except in the handful of cities with more than two transportation engineers, there was a broad consensus that engineering divisions were falling behind on their transportation responsibilities. To cope with the workload, many jurisdictions reported that they had cut back on once-routine data gathering efforts and increasingly relied on studies conducted for development applications to obtain updated traffic counts and parking surveys. Only a handful reported that they had staff with training or experience in such matters as ridesharing or parking management strategies, and a number of engineering managers stated that such skills would have to come from the planning department. Also, a number reported that they now conducted work on such matters as circulation plan updates only when specifically directed (and funded) to do so.

The general picture in California, then, is that at the local government level, transportation is literally falling between the cracks: neither planning departments nor engineering departments are staffed to carry out more than a minimal level of transportation planning. Most of the work that is being done is aimed at specific projects and programs, and no one is taking the lead on comprehensive planning for transportation. While the situation in California clearly worsened following the passage of Proposition 13, anecdotal evidence from other states suggests that conditions elsewhere are not significantly better (9; 10.)

One result of not planning for transportation comprehensively has been that the amount of development that could be permitted under adopted land use plans and zoning may not be consistent with available and planned transportation capacity, or may never been checked for consistency in any detail (despite formal requirements under California planning law for consistency among plan elements). Of course, whether permitted development levels would ever materialize may be in doubt. Most land use plans and regulations set forth the community's aspirations for physical development and the housing opportunities, jobs, and tax revenues that development would imply; relatively few are strongly tied to forecasts of trends in the real estate market. But because land development is overwhelmingly a private sector initiative, communities have relatively little ability to assure that their plans will be realized. Many have plans and zoning that would permit development far in excess of what market forces are likely to generate, at least over a 10-20 year planning horizon. Others, in contrast, operate with relatively conservative plans and zoning but repeatedly approve developers' requests for plan and zoning amendments, permitting larger projects than were anticipated in the planning and zoning documents. Coordinating transportation plans with such land use plans would, in the first example, lead to massive overestimation of transport needs.(13) In the second case, coordination of transportation capacity with planned land uses would lead to an underestimation of transportation needs.

Another consideration working against consistency between land use and transportation plans is the impermanence of land use plans and regulations. Indeed, much of the activity of the typical planning department involves dealing with requests for plan amendments, rezonings, and other exceptions to or modifications of the community's plans and regulations, in order to permit development that differs from that envisioned in the planning instruments. Because land use plans and regulations change so often, continual revisions to transportation plans also would be needed to maintain consistency. Major transportation facilities can take 10 years or more to plan and implement, however, making such revisions impractical and difficult to accomplish.

Second, whereas land use planning is almost entirely a local responsibility, state and regional agencies are major actors in transportation planning and implementation. State agencies have traditionally played dominant roles in the provision of inter-jurisdictional roads (arterials and freeways), while regional transit agencies have been the providers of transit services. There has been a strong tendency to rely on these other organizations for planning and implementation of all but relatively small scale road facilities. Thus local engineers' transportation responsibilities have been focused on only a limited subset of transportation, primarily traffic engineering and operations for the streets and parking under local control.

Sometimes local plans as approved would create the need for major investments in state highways, in transit, or both; without these improvements levels of service would deteriorate to "F" (sometimes, for many hours a day.) Local governments in California face a requirement that their circulation elements be consistent with their land use elements, but many get around this requirement by adding language to their plans calling for "cooperation with state and regional transportation agencies" to obtain improvements on the impacted facilities--even when the state and regional agencies have made it clear that there are no funds available for the needed improvements. Others set no standards for level of service; with no defined measure of acceptability, "consistency" loses much of its meaning.

Finally, widely held views of public responsibilities for transportation have served to limit the scope of local transportation planning activities even further. Transportation has been viewed as a public utility to be provided on demand, not something to which access should be restricted or conditioned. While it has commonly been agreed that local government has a legitimate role in guiding private development decisions (or at least, in deciding whether or not to accommodate private sector development requests), local government's role in transportation, in contrast, has been seen as providing the public facilities needed to assure safe, fast, efficient movement. Particularly among the engineering profession, there has been concern about the legitimacy of managing demand or denying requests for service. This concern has been shared by legislators (and in some states, though not California, by the courts) who have restricted local government attempts to limit growth by refusing to provide public services.(14)

Together, the separation of land use planning and transportation functions, the reliance on state and regional agencies for implementation of major highway and arterial facilities and transit services, and concerns about the legitimacy of managing transportation demand or limiting access have meant that many local governments have played partial and limited roles in guiding transportation development or coordinating it with land development.

The lack of coordination between transportation and land use plans was perhaps of less consequence when the funds were available to deliver transport facilities and services to meet, or even anticipate, demand. Then, land use plans and zoning might permit development at levels that would swamp available transportation facilities, but there was a reasonable expectation that capacity expansions would soon be forthcoming to correct the shortfalls. Land developments could even be approved that exceeded planned transportation capacity; the prevailing attitude was that transportation officials would simply revise their plans to assure that adequate facilities would be provided. With both highway departments and transit agencies adopting a "can do" posture, these expectations and attitudes were not as unreasonable as they might seem at first glance.

Today, however, traffic volumes are growing much faster than state and regional transportation agencies can deliver projects. Moreover, public concerns about the impacts of large-scale transportation projects have led many to question the advisability of continual expansion. Thus the ability of state and regional agencies to "build their way out" of congestion problems has come into question,

and local governments are finding it necessary to shoulder an increasing share of the responsibility for transportation.

At the same time, local governments have had their own difficulties in delivering local transport facilities, particularly in newly developing areas. In the 60s and 70s, many of these areas found that growth was occurring faster than their budgets could absorb the costs of needed infrastructure (including sewers, water, and schools, as well as local roads). A common response was to adopt an adequate public facilities ordinance or other growth-pacing device, in order to tie the rate of subdivisions and subsequent development to the availability of capital improvements. These ordinances provided the impetus for site impact studies, which were used to determine the effects of the proposed development on community facilities and services.

For transportation, the usual procedure was to estimate a proposed project's trip generation, adjusting for anticipated mode shares, then to load the estimated auto traffic onto nearby roads and intersections and calculate capacity effects. The approach almost always was done on a project by project basis and usually considered only those facilities most directly affected, i.e., adjacent roadways and intersections. When capacity problems were anticipated, the developer could help fund needed improvements, or face a delay in approvals until such time as the community was able to deliver the facilities.

Meanwhile, concerns about air pollution, energy dependence, urban quality of life, and transport finance produced major initiatives to increase the efficiency of the transportation system and encourage the use of alternative modes of travel (transit, ridesharing, bicycles, walking.) Gradually these transportation systems management (TSM) options came to be considered in site impact analyses as well. Developers sometimes proposed TSM as a way of reducing the need for costly infrastructure. Citizen pressures to minimize traffic impacts, coupled with resistance to new highway building, also made TSM an attractive option to many local governments.

Impact analyses of new developments thus became the main mechanism for resolving incompatibilities between land use and transportation plans, through a combination of developer financing and TSM. This analysis approach is the state-of-the-practice in most communities today; it is used in analyzing subdivision requests, in reviews when a rezoning or other exception to local regulations is sought, as well as in meeting the relatively recent requirements for environmental review of proposed projects. But the analysis approach has a number of shortcomings. Local data are rarely available for many of the analysis steps, leaving the analyst dependent on "default values" or data borrowed from another area. Numerous assumptions about future travel behavior, origin-destination patterns, and facility operations must be made. The results necessarily are highly approximate. Furthermore, the project-by-project focus of these analyses omits many important concerns. Cumulative impacts, for example, are not easily addressed via project level analyses. In addition, most site impact analyses focus only on local infrastructure; there usually is no parallel set of requirements for the facilities under state and regional control.

Environmental impact reporting requirements in force in some states do call for the examination of cumulative impacts, including impacts on state and regional transportation facilities. However, this remains a weak link in most analyses, especially where an overall analysis of land use and transportation has not been done. In addition, most environmental regulations call for a transportation analysis but are silent about standards for the acceptability of the predicted impacts. Thus, in most cases a city can approve a plan that produces gridlock on state highways and requires millions of dollars of unfunded transit services; it only is obligated to conduct an adequate analysis of how bad conditions will be, not to correct those conditions or fund the needed facilities and services.

Today, an increasing number of local governments are recognizing the problems raised by the separation of land use and transportation planning, and the deficiencies inherent in project level analysis. There has been growing use of subarea planning approaches to overcome some of these problems. Usually, the land use plan for the area at buildout (or estimated development in some planning year, 10-20 years in the future) is analyzed with respect to a set of alternative transportation facilities and services. Perhaps not surprisingly, many such analyses have shown that the kinds of transportation projects that could be implemented under current financing could not handle the amount of development proposed (14). Thus many local governments are now struggling to deal with transportation needs through a combination of financing, demand management, and coordinated land use/transportation strategies, including revised land use plans.

C. Approaches in Response to Traffic Congestion

As the above discussion suggests, traffic congestion has been variously diagnosed as the result of insufficient funds to deliver needed projects, insufficient attention to travel demand management and the provision of alternatives to the solo-occupant auto mode of travel, and insufficient attention to coordinating transportation and land use. Local governments have subscribed to each of these views (and sometimes, to all of them). Consequently, planning approaches in response to traffic congestion concerns emphasize funding, demand management, and/or transportation/land use planning. Approaches receiving considerable attention at the present time include:

- Requirements that developers and/or employers help provide or pay for the transportation facilities and services they necessitate, via exactions and impact fees and, occasionally, benefit assessment districts. This approach puts emphasis on financing from other-than-traditional sources for continued capacity improvements to meet expected demand.

- Policies that call for the implementation of transportation system management (TSM) measures, especially demand-modifying measures such as ridesharing, flextime, and transit user subsidies, either through incorporation into the conditions of approval for new development projects or through special purpose TSM ordinances. This approach emphasizes reductions in auto travel, especially peak hour auto travel, rather than its continued accommodation.

- Policies that coordinate development location, density, and/or site requirements with transportation capacity and mode choices, through general plan provisions, subdivision regulations, and zoning. This approach may emphasize reducing activity levels to those that can be accommodated by existing and planned transportation capacity; or alternatively may focus on site designs and development concentrations that would create environments conducive to travel by transit, bicycles, and walking.

Each of these approaches is discussed below.

1. Exactions and Impact Fees

Exactions and impact fees can help address traffic congestion problems by providing for the expansion of transportation facilities and services. Local governments are increasingly imposing requirements on developers to help provide or pay for a wide variety of programs and projects, both on-site and off. Today, exactions are being imposed on downtown office buildings and suburban office parks, as well as residential subdivisions and high rise condominium projects; and in addition to the streets, sewer and water facilities, and sites for schools, parks, and fire and police stations required for some years, developers are now being asked as well for traffic mitigation programs, housing for

low and moderate income households, job training and local hiring agreements, child care centers, and public art.(9)

Transportation facilities are one of the most common types of exaction in use in the United States. Land dedications for roadways, intersection improvements and road widenings, traffic signals, and even freeway interchanges are frequently required. There also has been a growing trend toward the use of traffic impact fees either as an in-lieu option or instead of specific performance.(5, 6)

Exactions must be consistent with the legal authority granted to local jurisdictions by the various states, so it is not surprising that considerable variation from state to state is exhibited. Even after accounting for differences in legal context, however, a remarkable variety of formulations are in use. Some local jurisdictions impose exactions only when a variance, rezoning, or other exception or deviation from local land use plans is requested; some tie exactions to incentives (e.g., density bonuses); others routinely apply exactions to all projects. Still others use all three approaches, depending on the development proposal and the type of exaction being considered. Exactions may apply to all types of development, or only housing, or only commercial development. Exemptions of certain uses (e.g., neighborhood retail, low income housing) or of developments under a certain size are permitted in some communities but not others. The developer may be held responsible for 100 percent of needed facilities and services (or full impact mitigation), or may be permitted cost-sharing with the local government or credits for future tax payments. Implementation procedures also vary considerably: the timing and form of required action (or payment) can range from up-front investments to contractual performance agreements or bonds, and sometimes are even contingent on future occurrences, such as exceedances of traffic volume or level of service thresholds. (15, 19)

Some states do not permit exactions per se. However, this does not mean that exactions are not in use there. A representative story is related by a planner from a state that officially bans exactions: he tells of local planning commissions that routinely ask the developer-applicant if he will agree to "voluntarily contribute" the list of exaction-like items proposed by the local planners. The developers usually do agree. (The reader should note that recent court decisions, particularly the U.S. Supreme Court's 1987 decision in Nollan v. California Coastal Commission, are likely to substantially alter local governments' approaches to exactions, principally by requiring a clearer relationship between the exaction and the project impact. Whether local governments restrict their use of exactions or turn increasingly to point systems and other mechanisms for obtaining desired items from developers remains to be seen.)

At least three objectives have motivated the rapid growth in the use of development exactions for transportation. The most common reason for using transportation exactions is the need for money: exactions provide the facilities and services necessitated by new development while permitting local governments to avoid (or at least minimize) public outlays. Increasingly, however, transportation exactions are also being used as a way of obtaining traffic mitigations. Ridesharing promotion, flextime programs, transit pass sales, and bicycle and pedestrian facilities are being required as conditions of project approval in such places as San Francisco, Los Angeles, Berkeley, and Orange County. The cost of these programs is less at issue than the desire for a commitment to their implementation. Finally, transportation exactions are sometimes used to obtain amenities that otherwise could not be provided, especially when the project proponents are seeking a variance, rezoning, or other special treatment. Pedestrian plazas, transit kiosks, and showers and lockers for cyclists are among the measures that have been obtained in this fashion.(7, 9, 21)

Many of these exactions are determined through case-by-case negotiations, although sometimes (especially when an impact fee is used) the basic requirements are set forth in an ordinance or regulation. (5, 6, 20, 22) Negotiations are often a sore point for both developers and city officials, and both groups report that they feel themselves at a disadvantage in the negotiation process. Developers

complain that local governments sometimes impose excessive requirements, knowing that the developer's only recourse is a series of time-consuming and costly appeals that could put their projects at risk. Another developer concern is that because of the vagaries of negotiations, similar projects (often the later ones to come along) end up with considerably different requirements. For example, developers tell of cases in which a series of projects were approved without exactions; then, because those projects have used up available capacity, the next application is subjected to requirements for extensive impact mitigations. Local officials, on the other hand, report that they are often "outgunned" by developers, who can hire well known experts to plead their cases and can afford to spend much more time and money on analyses than can staff. They also charge that some developers use "economic blackmail" -- threats to develop elsewhere, taking existing as well as future jobs with them -- in an attempt to avoid paying their fair share of the costs they impose. (9, 16, 17, 18, 23)

The growing interest in impact fees reflects in part the desire to reduce complaints about inequitable treatment, lack of predictability, and excessive costliness of negotiated exactions. It is not always clear, however, that the fee approach succeeds on these counts. For example, developers sometimes complain that the methods used to determine costs and assess fee responsibility are unsupported by hard data, contain flaws in logic, and/or that the fees' timing or payment mechanisms put an undue burden on their projects. (18, 23) In contrast, city officials report that the fees tend to be set too low, cover only obvious and uncontestable costs, and require significant investments in collection and accounting procedures. And both developers and city officials note that the impact fee approach makes it much more difficult to adjust requirements to meet the particulars of a project, something that on occasion raises its own equity questions.

Because exactions apply only to new development (only occasionally are major renovations or significant changes of use covered), they are much more effective in addressing future transportation needs than in helping to restructure the transportation system or alleviate current problems. Thus the sufficiency of exactions is a concern. Developers may be held responsible for interchanges or traffic signals needed because of their projects, for example, but they rarely can be required to help pay for the impacts of widespread congestion problems due to cumulative traffic growth. For this reason, some jurisdictions are utilizing benefit assessment districts as a way to address the broader, less project-specific issues; exactions are used to obtain the facilities and services that can clearly be tied to particular projects. (4)

2. Transportation System Management Approaches

Over the past decade a variety of transportation system management (TSM) measures have been utilized to combat air pollution, energy consumption, and congestion. Measures which increase capacity, such as improved traffic signal timing and supplementary transit services, have been pursued to the extent that budgets permit. Increasingly, however, emphasis has been given to demand-modifying measures such as ridesharing promotion and transit user subsidies, parking price increases aimed at solo drivers, parking supply restrictions, and work rescheduling programs.

In most cases, TSM efforts have produced positive results. On the whole, however, these results have been modest: increases in vehicle throughput or reductions in peak period auto use on the order of 5 percent are typical (8,13). For example, systematic retiming of traffic signals has improved average speeds and cut stops and delays by about 4-7 percent in a number of cities; aggressive institution of carpool and vanpool programs has produced shifts from drive-alone to shared-ride commuting on the order of 2-8 percent (with the higher percentage found principally when increases in parking fees also have been instituted.) It also should be noted that in areas where traffic is particularly severe, the TSM measures increase carrying capacity but do not result in noticeably less congestion--rather, more travel can be accommodated because of the measures.

In part, TSM's modest performance reflects the difficulty in changing travel behavior in an auto-oriented society; given today's land use patterns, activity systems, income levels and time constraints, the single-occupant auto is frequently the most rational travel mode choice for the individual, though it may not be so for the community as a whole. But three other factors are at least partially responsible for TSM's limited effectiveness:

- First, the tendency has been to implement TSM as a series of separate projects, with different agencies and offices handling rideshare matching, transit promotion, high occupancy vehicle lanes, and parking policy. This division of labor reflects the specialization of transportation professionals, but it also sharply increases the difficulty of coordination. As a result, the potential for cumulative and synergistic effects is often lost, and sometimes different projects even work at cross-purposes (as, for example, when carpool incentives draw riders away from transit.)

- Second, it has been difficult to obtain broad-based participation in TSM efforts, particularly among the private sector actors whose endorsement of TSM can make a major difference in its success rate. Projects to encourage commute alternatives do best when implemented with employers' support; flextime projects necessitate employer sponsorship; parking management, trip-shortening, and trip reduction strategies depend on both developer and employer involvement. But voluntary employer and developer participation has not been widespread, and even when it has been obtained it has not always been sustained over time (18).

- Third, financing and staffing of TSM programs has been problematic. Many ridesharing programs struggle for survival and spend a significant portion of their time securing next year's funding. Financial insecurities make it hard for TSM organizations to aggressively promote their services, and nearly impossible for them to experiment with innovative concepts.

Recently, however, there has been growing recognition of the need to implement TSM measures more systematically. Proposals to develop multi-faceted, integrated TSM programs, to put TSM activities on stable financial footing, to broaden their client base, and to target specific TSM measures to appropriate markets are being put forth. Also, local initiatives put together "packages" of TSM measures, combining mutually supportive supply enhancements with demand management strategies.

In most cases, the objective is to increase the range of travel options available to the public, and to provide incentives for using commute alternatives; disincentives to auto use such as higher parking prices or restrictions on parking supply are less frequently used. In addition, participation in many of these programs is voluntary, or required only for those developers or employers who elect to take advantage of incentives or quid pro quos such as density bonuses or government-backed financing. Some jurisdictions, however, are beginning to develop TSM programs with "sticks" as well as "carrots", particularly when TSM is tied to the approval of new development. In particular, increasing numbers of local governments are adopting policies that call for TSM measures to be incorporated into conditions of approval, and are enacting ordinances requiring the ongoing implementation of demand management programs such as ridesharing, flextime, and subsidies for users of commute alternatives. The ordinances are being implemented primarily because they offer a more uniform and certain approach to traffic management than the case-by-case approach commonly used for exactions, and because they can be used to establish procedures for ongoing program implementation and monitoring, including employer-sponsored program development, annual report requirements, and annual employee commute surveys.

Two different approaches are found in TSM ordinances today. Some TSM ordinances establish standard requirements or incentives for the support of transit use, ridesharing, bicycling, walking, and flexible or staggered work hours, and/or mandate supportive site design and parking management practices and low-cost operations improvements such as traffic signal retiming. Examples of this type of ordinance include those developed for Sacramento City and County and Seattle. Other TSM ordinances call for developers and employers to establish a traffic management program, leaving it up to the individual respondent to evaluate the options and put together a plan of action. The TSM ordinances in Pleasanton, CA, and Los Angeles are of this type. In either case, it is common for the ordinance to apply uniformly to broad groups (e.g., all employers of over 100 employees), although increasingly stringent requirements may be imposed on larger developments and employers and some exemptions by size or type of business may be available. (Implementing in-house TSM programs can be difficult for small developers and employers, and for businesses requiring numerous out-of-office trips or irregular, unpredictable work hours.)

At present, most TSM ordinances are of limited scope and applicability. Most address only peak-period travel, or commute trips; other trips, which constitute the greater part of the trips made daily, are unaffected (except, perhaps, indirectly, through linkages with peak period or commute trips). Perhaps more importantly, the majority of ordinances apply only to new development projects and employers, although application to existing developments and employers is becoming increasingly common.

The ordinances also tend to be quite weak on performance matters. Most mandate that certain TSM activities be carried out, but only a few set accomplishment targets (i.e., output objectives) for these activities -- the emphasis is on implementing programs rather than assuring specific results. For a number of programs that do set performance standards, the technical basis for the standards is weak. In some cases, the performance standards reflect calculations of the maximum traffic levels that the local street system can bear, rather than estimates of the feasibility of mode shifts, flextime use, etc. In addition, estimates of mode shift potential are often "borrowed" from successful programs elsewhere, without careful checking that the situations are analogous.

Finally, monitoring and enforcement are often problem areas. Some of the ordinances are silent on these matters; others establish extensive monitoring and reporting requirements, but omit enforcement provisions. In a number of cases the public administrative costs of the monitoring and enforcement are substantial --tabulating and evaluating employer surveys is a major task, for example--but no additional funds have been provided to support these activities. And how to handle cases of noncompliance or substandard performance is an issue even when enforcement provisions are in the ordinance: there is doubt that enforcement actions will ever be taken against recalcitrant developers or employers, given the city attorneys' workloads and the presence of numerous higher priority matters on their agendas. Sometimes, enforcement becomes a matter of jawboning, and is left to the planners and engineers in charge of the program to handle.

How effective are TSM ordinances likely to be? Evidence of their results is limited; most are too new for definitive conclusions to be drawn. Clearly the ordinance approach avoids some of the limitations inherent in case-by-case exactions, and when applied to existing as well as new developments the ordinances can address a much larger share of the trips made in congested conditions. Early results suggest that benefits are being produced; auto trips are being shifted out of peak periods, for example, and modest increases in ridesharing and transit use are occurring.

Nevertheless, questions about effectiveness remain. In many areas through traffic and spillover traffic from neighboring communities is a problem, but this traffic is beyond the reach of a local TSM ordinance. For some TSM measures cost-effectiveness has been questioned; for instance, showers and lockers for bike commuters, or shuttle services to remote transit stations may not be sufficiently

effective to justify the investments of time and money necessary to plan, implement, and maintain them.

In addition, the sustainability of desired effects is at issue. For some TSM measures, e.g., signal retiming and ridesharing, continuing efforts are necessary to maintain the programs' effects. In the signal retiming case, it appears that timing plans should be developed every three to five years in order to maintain benefits--a far cry from most local governments' usual practice, which tends to be to retime signals only when serious complaints develop. In the ridesharing case, ongoing efforts are needed to maintain pools, whose average "life" is less than two years absent concerted efforts to find replacement members.

Secondary impacts which could offset the benefits or cancel them out are another concern for certain TSM measures. For example, parking restrictions or high parking prices are often proposed as a way to reduce auto use; in some cases, however, drivers simply shift to unregulated spaces in residential neighborhoods. And carpooling incentives have led to reductions not in drive-alone commuting but in transit use in some corridors.

Finally, TSM's sufficiency is sometimes in doubt. Shifts to alternate modes on the order of 5-10 percent may be attainable through aggressive TSM programs, but this may not be enough to produce acceptable levels of service on freeways and arterials. In Orange County, CA, for example, the addition of an HOV lane to a congested freeway produced a substantial increase in average auto occupancy--but did nothing to reduce congestion in the peak period, since additional travellers quickly took up any slack.

Despite these limitations, TSM programs and ordinances are currently enjoying considerable popularity among local officials pressed for action in response to congestion. TSM is not only affordable, but is seen as a relatively painless approach to traffic management, one which is unlikely to arouse much voter hostility (at least as long as commuter participation in the programs is voluntary). It has become an important element of many politicians' plans for "doing something" about traffic.

An interesting new occurrence are the attempts to develop multi-jurisdictional TSM programs and ordinances, underway in such places as Santa Clara County, Marin County, and Orange County, CA. Interest in multi-jurisdictional approaches appears to have developed because local officials, pressed by citizen activists to take decisive action, fear that developers will simply move to communities without regulations unless there is consistent areawide policy on TSM; because it is feared that spillover effects would undermine the effectiveness of individual localities' TSM efforts; and (perhaps) because areawide planning efforts are seen as less subject to pressure by parochial interest groups. Reaching agreement on the need for areawide, consistent action and on the appropriate measures to undertake has proven difficult so far, but there appears to be a willingness to keep working on these joint efforts (impelled, in part, by the threat of citizen initiatives to stop development until traffic problems are under control.) Whether these efforts can succeed in the long run, in the absence of a reward structure for cooperation, remains to be seen.

3. General Plan, Subdivision Control, and Zoning Approaches

General plans, subdivision control regulations, and zoning ordinances play two different roles in congestion management. First, they are used to establish the basis for, or provide the means of implementing, transportation exaction and TSM policies such as those discussed earlier. For example, some jurisdictions have added policies to their general plans and subdivision regulations calling for private sector funding of transportation facilities needed to adequately serve new development; these policies

provide the basis for exactions. Other jurisdictions have added policies calling for the encouragement of developer and employer participation in ridesharing and transit programs. These policies support TSM requirements.

Another approach to congestion management is to revise general plans, subdivision regulations, and zoning to provide for development patterns and levels which will help reduce overall auto use. A variety of policies have been utilized, including focusing development in those areas where transportation capacity is available, clustering development and increasing densities to create an environment that makes good transit service feasible, restricting uses which generate large numbers of peak-period auto trips, and/or reducing the total amount of development that will be permitted. Among the many strategies being used are:

- o requirements for consistency between transportation capacity and land use plans and zoning
- o downzoning to reduce permitted densities to levels that can be accommodated with existing and planned transportation capacity
- o restrictions on uses that generate large numbers of trips
- o jobs/housing balance requirements
- o growth management approaches, e.g. caps on the number of housing permits that can be issued per year and/or the number of square feet of commercial development that can be approved per year, restrictions on annexations and/or public service expansions, etc.
- o adequate public facilities provisions requiring compliance with minimum performance and level of service standards
- o conditional zoning setting a range of permitted uses and densities but allowing the more intense uses if impacts are fully mitigated and/or sufficient points are earned for additional publicly desired uses, services and amenities
- o density increases and/or bonuses in areas well served by transit, or as an incentive for developer provision of transit and ridesharing
- o site design requirements for clustering of buildings to make walking, biking, and other commute alternatives more feasible and attractive
- o subdivision and site plan requirements for bike lanes, pedestrian pathways, transit turnouts and shelters, preferential parking areas for carpools and vanpools, etc.
- o requirements for the provision of on-site services, e.g., convenience stores in housing developments and restaurants, bank facilities, and child care facilities in office parks, to reduce the need for auto access to and on the site.

While each of these strategies has proponents, there remains considerable disagreement about whether they are useful in managing congestion. Most of the strategies are future-oriented; they

arguably could shape land use and transportation patterns in the long run, but (except when very large projects are at issue) will not necessarily produce an immediate benefit. Moreover, there is no consensus on which of these strategies are effective. For example, many of the strategies being pursued would restrain development to levels that permit relatively free-flow auto use. Critics argue, however, that the low-density development that would result practically guarantees that transit provision and rideshare matching will be difficult. In contrast, some experts advocate increasing densities so that transit and walking will be feasible.

Jobs-housing balance proposals illustrate the kinds of arguments that arise. Citing the lack of affordable housing as a cause of lengthy auto commuting, jobs-housing balance has been proposed as a way to shorten trips. But others question its effectiveness, noting that many factors in addition to commute distance influence housing location decisions. And still others point out that trips in the 3-10 mile category would increase under most jobs-housing balance schemes--trips that are too long for walking, but too short for most ridesharing schemes to be attractive.

Methodological problems constrain attempts investigate these issues through analysis and forecasting. The project-level impact analysis approaches most local governments utilize are not particularly useful in considering the kinds of long-term, cumulative effects many transportation/land use measures are intended to produce. While models of the sort used by regional agencies permit cumulative, areawide analysis, they too have serious limitations. Most require data that are not readily available in the detail needed for subarea analysis, and many represent both land uses and transportation systems at too aggregate a level to be useful for addressing local concerns. In addition, development and application of these models requires expertise that rarely is available in local planning and engineering departments. As a result, most jurisdictions must hire consultants to set up such a model for them, and often must rely on consultants to do the subsequent analyses of alternatives.

Political acceptability, however, is probably the most important issue concerning coordinated land use/transportation planning. Local officials tend to resist proposals to increase controls over land use, despite concerns about congestion; the issues are too controversial. Making land use and transportation plans consistent with each other often would mean either downzoning or developing considerably more transportation facilities and services. Downzoning could lead to conflicts with property owners over development rights, or be unattractive from an economic development/tax base perspective, while transportation expansions would raise financial and environmental issues -- all problems of the sort local officials try to avoid if at all possible.

Nevertheless, citizen agitation is increasingly forcing more and more communities to take a closer look at the land use strategies--and in some areas citizen initiatives are imposing these strategies. Consequently, local officials are beginning to talk seriously about managing land development and transportation as a system. Efforts are underway in several areas to review land use and transportation plans and programs for consistency, and a few multi-jurisdictional transportation/land use planning efforts are even being undertaken. How far these efforts will proceed, considering both the stakes involved and the uncertainties, remains to be seen.

D. Implications for Planning Practice

Transportation and land use planning in response to congestion raises a number of important issues for planning practice. First, it is apparent that there is a need for greater attention to transportation project and program development at the local level, coordinated with land use planning and zoning efforts. If in earlier days it was possible to rely on higher levels of government to provide the needed transportation facilities and services, those days are over. Local plans that exhort state and

regional agencies to provide transportation improvements for which there is no known source of funding do a disservice both to these other agencies and to the local citizenry. Transportation programs developed at the local level and capable of providing a reasonable level of mobility are needed. It must be recognized, however, that local governments will need clear incentives to take on this responsibility--in the first instance, funding will be needed. State action probably will be a prerequisite to more responsible transportation-land use coordination.

Second, it is clear that current methods of analysis are inadequate to the tasks at hand. Estimates of development levels and occupancies, trip generation rates, origin-destination patterns, mode shares, and route choices are needed to arrive at an estimate of congestion levels on particular facilities; but the fact is that local data are often unavailable, so that national data sources or regional averages must be used. Projections into the future involve a pyramid of assumptions that are critical to the outcome of the analysis but are difficult to test against real world experiences. Furthermore, project by project analyses are unable to adequately address many areawide and cumulative impacts. These facts suggest that additional case studies, analyses of effectiveness of various measures, and the like would be highly desirable. In the meantime, and at a minimum, professionals should be more explicit about the number of assumptions that have to be made in analyses of traffic, and should make more use of monitoring and feedback procedures both as a method of control for projects' as-implemented impacts, and to fine tune their assumptions and analysis procedures for future use.

A third finding is that lack of training in transportation analysis and land finance/project feasibility analysis limits the ability of local planners to tackle many land use and transportation planning issues; lack of training in planning similarly restricts the ability of engineers to contribute to the policy debates over growth and congestion. Differences in viewpoint between planners and traffic engineers exacerbate these problems. Broader training in transportation analysis methods and land use planning and policy matters would be advisable for both planners and engineers who intend to work at the local government level.

Finally, but equally importantly, the highly politicized circumstances under which many traffic mitigation efforts take place thrust planners and engineers into roles for which few have had preparation or experience. As the staff responsible for land use and transportation, planners and engineers increasingly find themselves being asked to advise on policy and to get involved in devising compromises between pro- and anti-growth interests, carrying out negotiations with developers and community groups, and developing revenue forecasts and financing plans. Currently, many planners and engineers are uncomfortable in these roles. Education and training in negotiation skills, greater knowledge of government and politics, and more exposure to the techniques of real estate finance and project feasibility analysis would be of considerable value.

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Table 1. Transportation/Land Use Strategies to Alleviate Congestion

A. Increase capacity

increase funding so that more facilities and services can be delivered
- increase state funding: bonds, sales tax, gas tax, tolls and fares, license fees
- develop local funding sources: special districts, fees, local taxes
- develop private sector funding sources (exactions, in-lieu fees, benefit assessments)
- improve methods of allocating available funds
- advocacy with federal, state and regional agencies for discretionary funds

faster delivery of new facilities
- accelerate construction of all "funded" projects (increase public agency staff capabilities; contract out; use more efficient construction management strategies, use new technologies)

B. Improve traffic flow

traffic engineering strategies
- preferential treatment for HOVs
- traffic signal timing
- on-street parking management
- corridor management and route guidance
- accident clearance

work rescheduling policies
- flextime
- staggered work hours

C. Encourage use of alternative commute modes/ auto trip reduction

provision, promotion, subsidy by public agencies, developers, employers
- transit
- ridesharing
- bicycling
- walking

improvements in transit level of service
- express services
- timed transfers
- more direct routes
- denser networks - reduced access time
- park-and-ride
- increased frequency
- preferential treatment: express lanes, signal preemption

parking management policies
- control of supply and location
- pricing policies to reduce/remove subsidies to SOVs
- preferential allocation, location, and price for HOVs

land use strategies
- match land development to transportation capacity
- restrict traffic-intensive uses
- conditional zoning and point systems
- jobs/housing balance
- annual development quotas, caps
- restrict annexations, public service expansions
- mixed use development
- on-site/near-site services
- clustering of buildings
- density increases/bonuses in areas served by transit
- exactions for transit, pedestrian, bike facilities
- on site convenience stores, banking facilities, etc.
- delivery services, automatic payroll deposits, etc.

other trip reduction strategies
- telecommunications substitutes for travel
- work-at-home options

Table 2. Staffing Levels for Transportation in California Planning and Engineering Departments

Percent of each population category:

	10-50K	50-120K	120-250K	>250K
1) planners:				
0	82	62	50	29
.5	12	17	25	14
1+	6	21	25	57
	100	100	100	100
# responses	34	24	4	7
2) engineers:				
contract out	66	39	--	--
CE, not TE	30	18	33	--
1	4	38	33	--
2+	--	5	33	100
	100	100	100	100
# responses	54	37	3	6
# cities in CA	179	65	10	7

Notes: Based on interviews conducted in 1985 and 1986 with 100 transportation engineering divisions and 69 planning departments in California cities. City sizes are as of 1980 Census.