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An Assessment of Travel Demand Management Approaches at Suburban Activity Centers

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**Final Report
July 1989**

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A. CONGESTION PROBLEMS IN SUBURBAN AREAS

Over the past decade, suburban areas have experienced dramatic increases in congestion and air quality problems. Further, often the congestion problem at suburban activity centers have spilled over onto through traffic routes in the vicinity and affected mobility of those going to urban centers. In 1980, over forty percent (40%) of all metropolitan work trips in the U.S. were suburb-to-suburb compared to twenty percent (20%) between suburb and central city.

While the problems of suburban congestion have increased, the appropriate responses have not been easily identified. Certainly one problem is that many standard solutions developed for the urban cores appear to be less applicable in suburbs. Trip destinations are less dense than in urban cores, and trip origins are very diverse. Consequently, conventional transit or ridesharing may be less applicable to suburbs.

Furthermore, typical suburban activity centers often have few restaurants, day-care facilities, and shopping at work sites, thereby increasing employee automobile use.

Suburban communities are coping with increased traffic in several ways. Certainly one major approach is to improve and add to road facilities, often using private sector contributions to do so. However, there is growing interest in *Demand Management* as one tool to reduce traffic problems.

B. DEMAND MANAGEMENT APPROACHES FOR SUBURBAN CONGESTION

Demand management or *trip reduction strategies* are playing increasing roles in the attack on the congestion problems at suburban centers. The strategies generally fall into two important categories: *Transportation System Management (TSM)*, and *Parking Management (PM)*.

Generally, demand management approaches aim to reduce peak period automobile trips by encouraging the use of high occupancy modes. *TSM strategies* include: preferential parking for carpoolers; promotions for transit, carpooling, biking, walking, and flextime; designation of Transportation Coordinators at employment sites; and shuttle service to and from park-and-ride lots.

PM actions include: raising existing rates or imposing new surcharges or differential rates at public facilities; imposing parking taxes at commercial facilities; reducing employer subsidies for employee parking; revising the supply of long-term parking through new maximum requirements in zoning codes; allowing reduced supplies in return for in-lieu fees or implementation of TSM strategies; revising fines and enforcement; and other measures aimed at the provision and management of parking spaces.

Numerous localities have fashioned and adopted policy instruments to encourage implementation of TSM and PM strategies by the private sector at suburban developments. These include *ordinances, developer agreements, special permits* and *parking codes*.

Both the public and private sector play roles in the implementation of TSM and parking management strategies. As noted, localities set regulations requiring private developers and/or employers to carry out strategies, and/or meet trip reduction objectives. Often, requirements also provide for an annual employee survey or other forms of monitoring. Sometimes, *Transportation Management Associations (TMA)* play a role in implementing the programs.

C. TECHNICAL OBJECTIVES OF THE STUDY

The main goal of the proposed study is to provide a synthesis of recent experience with Transportation Systems Management and Parking Management *strategies* and supporting *policy instruments*. Such a synthesis is intended to help localities better evaluate and adopt these strategies to address their suburban congestion problems. Under this broad goal, the specific objectives are as follows:

- *Provide* a summary of recent suburban experience with TSM and PM strategies and enabling policies
- *Identify* the determinants of effectiveness
- *Draw* lessons for localities pursuing TSM and PM strategies and policies.

D. STRUCTURE OF THE FINAL REPORT

The body of the final report is divided into three sections:

- *Section I* following this overview provides a brief summary of the suburban mobility problem and the research methodology adopted. We also provide definitions of terms and strategies which are the focus of our research.
- *Section II* summarizes recent experience with suburban TSM programs. It includes brief coverage of major suburban programs in a descriptive form--for both strategies and instruments.

- *Section III* presents a synthesis of the experience, draws conclusions about effectiveness and develops recommendations for localities interested in pursuing such programs, and for federal policy makers. Drawing on samples with best information and most implication, we summarize determinants of effectiveness and identify implementation pitfalls. Conclusions include lessons for localities about effectiveness, administration, cost, finance, and monitoring. For the policies, we provide pros and cons of instruments, design and adoption considerations, enforcement and monitoring issues, and roles of key participants.

The last section also identifies research needs; local and federal policy lessons; and, evaluation suggestions.

Finally, a separate Appendix is provided consisting of selected policy instruments. It is entitled *Policy Instrument Appendix*.

I. INTRODUCTION

A. DEFINING TRANSPORTATION DEMAND MANAGEMENT APPROACHES

This research focuses on Transportation Systems Management (TSM) and Parking Management (PM) carried out at employment sites in suburban settings. In transportation research and policy making today, TSM and PM encompass a variety of actions many of which are outside the scope of this paper. We begin by indicating what is and is not TSM and PM for purposes of this study.

Because TSM and PM aim at getting the best use of existing transportation resources at least cost, strategies include actions as wide ranging as altering transit fares and parking prices; designating road lanes for transit and carpoolers; metering traffic onto freeways by signals ("ramp meters"); removing street parking to improve traffic flows. The many strategies can be arrayed as to the degree they manage travel demand compared to reducing demand:

- *Some strategies manage, accommodate or encourage travel demand.* For example, traffic engineering strategies such as street striping, channelization, signalization, and removal of street parking are aimed more at accommodating traffic rather than reducing traffic volumes. Likewise, vanpool programs, ridesharing services, transit and cycling encouragements aim at encouraging demand for these mode of travel.

- *Other strategies aimed at reducing travel demand, especially solo driving.* In the PM category, increased parking pricing for long term parkers, higher tolls for solo drivers, and restricted supplies of long term parking are examples. The primary focus is on discouraging solo driving rather than managing how solo drivers travel or enticing solo drivers toward ridesharing or transit.
- *Finally, some strategies combine both approaches.* Flextime not only manages when travel demand peaks, but may reduce solo driving to the extent it encourages more use of transit and ridesharing. Ramp metering for highways combined with bypasses for carpools not only manages the volume of highway traffic but provides an incentive for solo drivers to switch to carpooling. Allowing carpool and vanpool patrons to go to the top of a wait list in a garage not only encourages ridesharing, but discourages solo driving, presuming solo drivers must wait longer for parking as a result. Removing parking subsidies for solo drivers and substituting a travel allowance provides both an incentive for pooling and a disincentive to solo driving.

The focus of this study is on:

- *TSM and PM carried out primarily by employers and developers, not highway departments, or ridesharing agencies (though such agencies often play a role).*

- *TSM and PM aimed at encouraging demand for ridesharing, transit and cycling; discouraging solo driving; or doing both to some degree. Excluded are traffic engineering strategies such as High Occupancy Vehicle (HOV) lanes, channelization, signalization, and striping.*
- *TSM and PM strategies and programs in suburban rather than urban settings (though lessons from urban areas are provided when relevant).*

sample of current programs was not designed to represent the universe of suburban TSM and PM programs, every effort was made to locate programs in a wide range of states, company sizes and types.

"IN ALL APPROXIMATELY 40 CURRENT ... PROGRAMS WERE REVIEWED ..."

B. METHODOLOGY AND OBJECTIVES

The study methodology followed three steps:

- *A review of available published literature on suburban TSM and PM programs carried out at employment sites to uncover evidence of effectiveness and implementation lessons.*
- *A review of available local reports, evaluations and discussion papers on the topic. In some cases, local jurisdictions, research organizations, universities or other sources have reviewed suburban TSM and PM programs and issued reports and findings.*
- *Interviews and data gathering at case study sites across the country. We interviewed TSM and PM program coordinators and managers, staffs with localities, developers and transportation association staffs and managers at selected sites across the country. In all, approximately 40 current or recently developed programs were reviewed, though a lesser number were included in the final sample because some programs lacked any evaluation data. While the*

The objectives in carrying out these tasks were to determine the effectiveness of TSM and PM strategies, means of implementation, the role of policy instruments in encouraging TSM and PM strategies and to derive policy implications for both local and federal program managers and policy makers. Many local governments are seeking ways to reduce suburban traffic congestion in part through ordinances, zoning codes, developer agreements and other policy instruments.

At the Federal level, the Urban Mass Transportation Administration (UMTA) has initiated a Suburban Mobility Program, funded several planning and demonstration programs in suburban communities, and supported Transportation Management Associations (TMAs) with the purpose of reducing traffic problems. The Environmental Protection Agency (EPA) also is encouraging adoption of policies encouraging employer sponsored TSM and PM programs. In particular, the agency encourages attention to Transportation Control Measures (TCMs) including TSM and PM ordinances and programs. Thus, the study derives implications for local and federal policy. Finally, in line with the policy emphasis, we

have included samples of policy instruments as part of this report to assist localities in developing appropriate policy provisions.

C. THE SUBURBAN MOBILITY PROBLEM

Traffic has become a problem in suburban areas for several reasons. For one, job growth is very rapid, straining road capacity. The ENO Foundation for Transportation indicates 67 Percent of all new jobs are being created in the suburbs. With more suburban jobs comes more suburban travel. For the U.S. as a whole, work trips destined to central cities between 1970 and 1980 fell by 4.5 percent while those to suburban areas rose by nearly 15 percent.¹ Compounding the problem of rapid job growth is increasing auto ownership and use. Average auto ownership increased from 1.03 cars per household in 1960 to 1.61 in 1980. Over 85 percent of commuters travel to work by automobile and 83 percent drive alone.²

Some examples of growth and travel in selected suburban areas:

- In *Dallas County, Texas* suburban areas, employment inside I-635 grew by 17.3 percent between 1980 and 1986, while employment outside I-635 grew by 47.9 percent during the same period. Congestion is now a problem on not just radial facilities but peripheral freeways such as the LBJ Freeway. Growth rate for vehicle miles traveled in the suburbs of Dallas has been 25 percent higher than the rate of growth of population.³
- In *Houston, Texas* while employment inside Loop 610 declined slightly from 1980 to 1985, outside of Loop 610 in Harris County employment increased by

200,000. Suburb to suburb commuting outside Loop now makes up 52 percent of work trips, versus commuting from outside to inside the Loop of only 32 percent of trips, according to the 1980 census. In 1970, only 40 percent of the population was in the work force, in 1984 it is 50 percent. Autos per household increased from 0.7 in 1970 to 1.7 in 1980.⁴

- In *Denver, Colorado* development along the I-25 corridor southeast of downtown now has produced more office space than all of downtown Denver. Downtown share of total regional employment is expected to decline from 40 percent in 1975 to 25 percent by the year 2000.⁵
- In *Atlanta, Georgia* office space has grown 30 percent faster in the suburbs than in the downtown area since 1973. The share of regional office space in Atlanta's downtown has shrunk from 32 percent to 26 percent in the past five years.⁶

Finally, suburban employment sites often cater to auto users with ample free parking and little transit service. Many employment centers lack transit stops, shelters or turnouts. Streets with no sidewalks, low densities and large parking lots make walking between buildings and to transit inconvenient, even if transit service were more available. Zoning codes very often require parking to be provided at a rate of three or four spaces per thousand square feet,⁷ again catering to and encouraging auto use. In many cases, the resulting parking supply is in excess of demand by as much as 60 to 70 percent.⁸

Some suburban sites also offer no on-site or nearby shopping or eating places, further discouraging commuters from using transit.

"IT IS UNLIKELY ... TSM AND PM ... WILL SOLVE SUBURBAN TRAFFIC PROBLEMS ... THE QUESTION IS, HOW MUCH HELP CAN TSM AND PM RENDER?"

In short, growth patterns, household characteristics, facility design variables, zoning codes, and transportation service patterns explain the growth of traffic in suburban areas. Consequently, it is unlikely transportation strategies alone, TSM and PM and otherwise, will solve suburban traffic problems.

The research question is, how much help can TSM and PM render, and what are the best ways to implement promising TSM and PM strategies and programs?

II. EXPERIENCE WITH SUBURBAN TSM AND PM

A. LITERATURE ON SUBURBAN TSM AND PM PROGRAMS

Employer based TSM and PM programs have been reviewed in the literature for some time, though suburban programs have not received particular attention until recently.

Nevertheless, the literature is instructive in indicating ranges of effectiveness and determinants of TSM and PM effectiveness. Some of the most relevant studies and findings are summarized here:

Finding 1: Rideshare rates in suburban settings can be boosted by personalized services and possibly boosted by parking preference for rideshare patrons. There is ample evidence suggesting ridesharing can work in the suburbs:

- In an early review of employer based programs by R.H. Pratt Associates⁹ found a highly personalized carpool matching program at Hewlett Packard in Colorado Springs, Colorado achieved a 40 percent carpool rate, compared to ineffective programs at other sites without personalized service. The study did not report carpool rates before matching services or rates at other suburban companies, but the 40 percent rate undoubtedly was 10 to 20 percent higher than comparison rates. The same study showed preferential parking for poolers helped to boost carpool rates to 25 percent at Government Employees Insurance Company in Bethesda, Maryland.

- In a comparison study of suburban office sites around Seattle with and without matching programs, including sites with single and multiple tenants, researchers found intensive rideshare assistance and preferential parking reduced vehicle trips by 22 percent.¹⁰
- Finally, a very recent study of suburban employment centers across the United States finds Transportation Coordinators alone (not accounting for other TSM and PM program strategies) can be expected to reduce the share of solo commuting by about three percent compared to centers with no coordinators.¹¹

Finding 2: The relationship between flextime and ridesharing in suburban settings is not yet clear. In some cases, flextime is associated with increased ridesharing, but not in other cases:

- On the side of favorable results from flextime, RIDES, the regional rideshare agency in the San Francisco Bay Area, has found the placement rate among rideshare applicants on flextime to be 30 percent compared to 16 percent for applicants not on flextime.¹² The same study showed more suburban (with origins and destinations in the suburbs) drive alone applicants joined pools than did drive alones in the RIDES applicant data base taken as a whole (33 percent versus 24 percent). In short, ridesharing is not only feasible in suburban areas, but may bring more vehicle trip reduction than in other areas.

- On the side suggesting unfavorable results from flextime are findings from Pleasanton, California. Employees surveys in this suburban city suggest only 7.6 percent of Pleasanton workers under flextime used ridesharing, compared to 11.4 percent of the entire Pleasanton work force.¹³

Finding 3: While not yet common in suburban areas, tight and/or expensive parking combined with strong rideshare and transit incentives can reduce solo driving considerably:

- In Bellevue Washington, a suburb outside Seattle (more dense and with better transit service than some suburbs), Pacific Northwest Bell (PNB) has reduced solo driving to only 19 percent of the work force through a combination of scarce, expensive parking (\$3.00 per day at the time of the study), reduced parking rates for carpoolers and intensive ridesharing assistance.¹⁴
- Likewise, Commuter Computer outside the Los Angeles central business district dropped the drive alone share from 42 percent to 8 percent by eliminating free parking.¹⁵ While the location of Commuter Computer is perhaps more urban than suburban in character (located on Wilshire Boulevard with good transit service and increasingly dense office development), the result still underscores the importance of parking pricing in reducing solo driving and increasing transit and rideshare use.

Finding 4: All else equal, results of TSM and PM programs at multi-employer centers tend to be less successful than at single employers:

- One review of programs at multi-employer sites, including several in suburban settings, found the maximum drop in solo driving to be only three or four percent.¹⁶ Sites include El Segundo, California; Greenway Plaza, Houston, Texas; and Tysons Corner, Virginia.
- Another recent review of suburban TSM and PM programs suggests little success in ridematching at the Denver Technical Center due to the preponderance of small firms in the Center.¹⁷

Finding 5: TSM and PM programs tend to be more successful at larger companies with lesser proportions of professional staffs, but company size in and of itself may not be a strong determinant of program success. Some studies suggest TSM and PM success stories tend to be with large employers and large pools of clerical and data processing personnel, as apposed to small employers with professional workers. Yet other literature contradicts these findings:

- For example, among nine leading companies in the Santa Clara County Manufacturing Group (SCCMG) in California, the proportion of employees in alternative modes averages only 21.5 percent with employment under 5,000 persons. Only four firms have sustained rates of 25 percent or higher, and they tend to be larger firms.¹⁸
- Nationally, the picture is similar, with TSM and PM programs at larger companies showing the greatest success. For example, one survey shows alternative mode shares between 30 and 40 percent for companies with over 1,000 employees, but with companies under

1,000 the share is generally around 20 percent. Nevertheless, there are exceptions, such as Cenex, St. Paul, Minnesota with only 730 employees and 47 percent in alternative modes.¹⁹

Furthermore, early studies of company vanpool programs have found "no relationship between company size and ... (success of) ... ridesharing programs."²⁰

Finding 6: "Exogenous" variables are very important to program success including proximity of companies to transit service and preferential treatments for ridesharing and transit on nearby streets and highways; as well as parking availability and price surrounding the site.

- For example, in Walnut Creek, California one study shows the proportion of transit users varies in relation to proximity to transit, with twice as many BART users at offices close to the rail station compared to more distant offices.²¹
- Preferential treatments also help. HOV bypasses to ramp metering on Los Angeles (including some areas outside the central business district) freeways boosted weekly ramp usage by carpools from 125 to over 275. Transit use in the Minneapolis I-35W corridor showed a 6 percent increase after meter bypass systems were introduced.²²
- Finally, as the example of the PNB Building in Bellevue, Washington shows, the supply and regulation of parking around work sites also is important. Tight parking and high prices are encouraging considerable ridesharing at PNB, but some PNB employees are spilling over into uncontrolled parking on minor

arterials near the building. Bellevue is expanding on-street controls in areas major developments to guard against just such spillover.²³

"TIGHT PARKING AND HIGH PRICES ARE ENCOURAGING CONSIDERABLE RIDESHARING AT PNB ..."

Overall, the results of TSM and PM strategies vary depending on several variables. In the best case, these variable align to favor reductions in solo driving and increases in ridesharing and transit use. In the worst case, just the opposite pertains. Table 1 summarizes best and worst cases.

B. TSM AND PM POLICY INSTRUMENTS

Numerous localities have fashioned and adopted *policy instruments* to encourage implementation of TSM and PM in suburban settings. Instruments include:

- *Ordinances*
- *Developer Agreements*
- *Special Permits*
- *Parking Code Provisions*

From the review of TSM and PM policy instruments, we have selected several for discussion which illuminate alternative TSM and PM policy instruments and some key issues in development of the instruments. See *Policy Instrument Appendix* the full text of selected policy instruments:

TABLE 1: BEST AND WORST CASES
FOR TRANSPORTATION MANAGEMENT PROGRAM

VARIABLE	BEST CASE	WORST CASE
Program	Transportation Coordinator, personalized in-house carpool matching, priority carpool parking, transit encouragements, bicycle facilities and promotions, possibly flextime	No Coordinator or little commitment, carpool information, no matching, little if any transit information or pass sales, few bicycle facilities, little management support
Tenant	Large company, numerous clerical, or data processing staff	Small company, high proportion of professional staff
Parking	Tight supply, moderate to high prices, low level of parking cost subsidy, little on or off street parking nearby, good enforcement of carpool preferential parking	Ample supply, low or no prices, parking subsidies from employer, available nearby parking, no carpool stall enforcement
Transit	Frequent service, ample capacity, stable fares	Capacity constrained, service less frequent, fares increasing

1. TSM Ordinances With Broad Applicability:

Many localities have developed ordinances requiring employers and/or developers to implement TSM and PM programs. In many cases, such ordinances apply to new and existing employment centers, and in a few cases include residential development. Some jurisdictions also are attempting to form coordinated programs across jurisdictions. Some examples include:

- *Concord, California* requires TSM and PM programs of all new and existing non-residential development within the city, provided development generates at least 100 peak hour employee trips. Residential complexes over 100 dwelling units also are covered.
- Five cities in *San Mateo County, California* are collaborating through a joint powers agreement to develop and

adopt uniform ordinances and an intercity Transportation Management Authority. The draft ordinance would require employers to implement TSM and PM programs resulting in 25 percent of employees using alternatives to solo driving.

- *Pleasanton, California* applies its ordinance to the entire city, and gears it to employers of ten or more employees, with escalating requirements for larger employers. Multi-tenant buildings and business complexes are specifically included.

2. Developer Agreements: Some communities use instruments appropriate to requiring TSM and PM programs as a condition of development. Developer agreements backed by covenants written into property deeds bind owners and successors in interest.

**"SOME COMMUNITIES USE ...
DEVELOPER AGREEMENTS BACKED BY
COVENANTS."**

Examples attached include:

- In the case of *Montgomery County, Maryland* the sample development agreement (Costain Agreement) is for ten years, and upon expiration the TSM and PM program is to be incorporated into a County ridesharing program. Materials, software, supplies all transfer to the locality.
- In the case of *Bellevue, Washington*, the Bellevue Place Agreement requires a very broad set of TSM and PM actions, including limits on the parking supply, automatic vehicle counters for traffic monitoring and reporting, target maximum p.m. peak hour vehicle trips, required membership in the local Transportation Management Association (TMA), set aside carpool spaces, required parking charges for employees, increasing levels of required actions depending on project performance and an assurance bond guaranteeing the program terms are in force beginning with occupancy and continuing until "no longer required by the City."

3. *Special Permits*: Various public entities require special use permits for projects in suburban (and urban) areas, including binding commitments from project sponsors for TSM and PM actions, and other actions aimed at mitigating traffic and/or air quality problems:

- The *State of Minnesota, Pollution Control Agency* requires an indirect source permit for parking facilities, retail, commercial and industrial facilities, office buildings, large housing developments, airports, racetracks and other developments. TSM and PM requirements have included transportation coordinators, transit promotions, carpool incentives and other actions. Some of the projects regulated are within "fast developing suburbs."²⁴
- *Alexandria, Virginia* requires a special use permit for new developments over a certain size including a Transportation Management Plan for ridesharing, transit incentives, bicycle measures, flextime aimed at up to 30 percent use of alternatives to solo driving, or certain percent reductions in peak hour travel by solo drivers.

4. *Parking Code Requirements*: A few suburban localities have implemented parking code requirements aimed at encouraging TSM and PM. One approach is to establish a maximum rather than minimum parking requirement for certain developments. Another approach is to offer relaxations in minimum parking requirements in return for TSM and PM actions. Under relaxations, localities appear to reduce requirements by no more than 20 or 30 percent. Some require land set asides to be converted to parking if supply doesn't meet demand. Examples:

- *Bellevue, Washington* sets both a maximum and a minimum parking space requirement for office use in the downtown area. Specific requirements are negotiated by site and set in developer agreements. See the Bellevue Place Agreement referenced above for one

specific example. An early precedent agreement for ENI Companies also limits parking supply, and requires priced parking.

- *Fairfax County, Virginia* allows reduced parking in proximity to a mass transit station, based on projected reductions of automobile trips due to proximity to transit.
- *The County of Sacramento, California* allows reductions for TSM and PM measures, with showers and bike lockers rendering a two percent reduction, and one space reduction for every marked carpool space. See attached Ordinance 83-59.
- *Montgomery County, Maryland* requires land to be set aside sufficient to provide "parking spaces equal in number to the reduction granted." See Ordinance 10-32 attached.
- *Palo Alto, California*, has a similar contingency provision.

There are many design issues which localities must address in developing the policy instruments. Some of the key issues are:

1. Applicability of the Policy: A key issue is defining applicability. To what entities will the policy apply? Will all new and existing developments be included? What areas will be included, what uses, what size thresholds?

For developer agreements, policies apply to new and usually large office projects. Parking codes usually apply to core areas.

Applicability requires considerable attention in the design of ordinances.

"A KEY ISSUE IS DEFINING APPLICABILITY. TO WHAT ENTITIES WILL THE POLICY APPLY?"

Several ordinances reviewed apply to employers, and scale requirements by size:

- *Pleasanton, California*, stages requirements on employers by size as well as whether or not they are located in complexes. Notice "employee" requires careful definition, as well as "complex." The City intention is to include complexes or employment centers with several small employers, as opposed to isolated small employers.
- *Pleasant Hill, Contra Costa County and Concord, California* include residential uses in their ordinances, in contrast to many other localities excluding these uses.

2. Specificity of Requirements: How much should the locality specify in the way of strategies and programs, and how much should be left to the regulated entity to plan and carry out? Localities must decide how certain they are specific TSM and PM strategies will work in the developments and areas subject to regulation. Are designated carpools worth requiring in a particular developer agreement or areawide ordinance? What programmatic requirements should be set, such as designated Coordinators or resources devoted to the program?

Experience to date suggest the most common requirements in policy instruments is for distribution of information on car and vanpooling, transit, bicycling and other alternatives to solo driving. Designation of an on-site coordinator responsible for carrying out the program is another commonly prescribed strategy. A few localities do require more aggressive strategies, including priced parking, designated carpool stalls, rideshare matching services, sale of discount transit passes, even implementation of shuttles. For example:

- *In Bellevue, Washington*, requirements in some developer agreements specify the number of car and vanpool spaces, membership in a local transportation association, on-site Coordinator, as well as added actions (sale of transit passes and discount parking for carpools) if certain mode share or traffic level targets are not achieved.
- Fewer and more flexible requirements generally are specified in Ordinances. For example, attached is the model ordinance for *Contra Costa County, California* where owners and employers may pick among "any combination" of strategies and are free to design their own "information program." However, the ordinance does require an annual employee survey, designated Coordinator, reference to program requirements in lease agreements and specific annual report to the County.
- Recognizing the importance of charge parking to the outcomes of TSM and PM programs, some localities impose requirements for pay parking through developer agreements. Of course,

developers will be concerned with the marketability of projects where rates are imposed versus others where they are not. Nevertheless, *Fairfax County, Virginia* has required the applicant "to institute a parking policy with incentives for ride-sharing..." And, in the Agreement with Bellevue Place, *Bellevue, Washington* has specified parking charges no less than certain transit fares in the area. Bellevue also required fee parking in its agreement with ENI Company. See attached agreements.

3. Types, Uniformity and Stringency of Goals: Localities must decide what goals, if any, to set in their requirements. Localities can select from goals in terms of mode share or occupancy (e.g. percent of employees traveling alone or in "alternative transportation"); traffic performance (vehicle trips at certain times and places, levels of service at intersections); proportion of commuting in peak periods; or combinations of these and other approaches. Goals must be set which are reasonable to attain given experience with TSM and PM. Goals also might vary by area or proximity to transit.

Perhaps more important, localities must decide whether the goals are *good faith targets* which employers and/or developers are expected to try to meet, or are the goals *binding performance standards* which if not achieved trigger certain consequences. Before opting for performance standards, localities must consider the possibility that an employer may make every effort to implement the TSM and PM program but still not achieve the standard. In some cases the standard may be unreasonable, or gasoline prices may fall, or the economy may boom or imported car

prices may fall. These and other variables outside the TSM and PM program may encourage auto use.

**"PERHAPS MORE IMPORTANT,
LOCALITIES MUST DECIDE WHETHER
THE GOALS ARE GOOD FAITH TARGETS
... OR ARE THE GOALS BINDING
PERFORMANCE STANDARDS"**

Generally, it seems localities apply the most stringent goals to development agreements, and the less stringent goals to broad area ordinances. Examples of goals and stringency:

- *Pleasanton, California*, defines the goal in its ordinance as a 45 percent reduction of vehicle trips during a one hour peak period compared to the case where all employees commute by single-occupancy vehicle. If the goals are not met (goals are staged over time), the City may then require the employer to carry out a specific program.
- *Contra Costa County, California*, uses a binding primary and secondary goal. The primary goal is no more than 65 to 75 percent of employees commuting in single occupant vehicles, depending on the area. But if the project sponsors can demonstrate the goal is unfeasible, the secondary goal applies. It is 55 to 65 percent solo drivers in the a.m. and p.m. peaks. If the goal is not reached, the County is entitled to mandate implementation of a revised program.
- *Larkspur, California*, has set a very demanding goal in its Ordinance 737. Approved projects receiving a circulation permit - with or without TSM and PM actions - must not increase average daily traffic on any roadway segment or intersection of the city's principal circulation system by more than one percent or more than 100 vehicles, whichever is less.
- *Walnut Creek, California* varies its goals not only by uses (retail, non-retail) but by area, with sites closest to a rapid rail station (BART) slated for the highest goal, i.e. "no more than 60 percent of all employee commute trips in single-occupant vehicles." Elsewhere the goal varies up to no more than 75 percent drive alone.
- In *Montgomery County, Maryland*, the Costain Agreement goal is reduction of 180 vehicle trips during the peak period, in the peak direction. If the goal is not reached, the County can draw on a letter of credit posted by the project sponsor, or transfer the program to the County ridesharing agency. In an agreement governing the Rock Spring Park Center, the County has specified the Center must achieve an interim trip reduction goal of 179 peak hour trip reduction before building permits for final phases of the development are released.

4. *The Nature and Timing of Plan Requirements*: Often TSM and PM requirements specify development of a plan which spells out what TSM and PM strategies the developer and/or employer will carry out and how. The plan may be a one time requirement, often before development of

certain projects, or it may be a continuous (usually annual) requirement for reporting on the TSM and PM program and making modifications.

The advantage of plan requirements is they allow employers and/or developers to develop and propose strategies and programs tailored to particular sites, employee populations and parking or traffic conditions.

Of course, plans require time and expertise to review and negotiate. Small localities may not have the resources or experience to conduct reviews. There also is the question of which applicants should face the requirements, and what plan contents will be required. Another issue is how the first plan can be prepared for a proposed development without knowing exactly the tenant mix until occupancy begins. Examples:

- *The County of Sacramento, California*, requires applicants of major developments to prepare a trip reduction plan on rezones, use permits, special permits, development agreements or variances. The ordinance also specifies the contents of the plan. See Section 330-147.
- *Contra Costa County, California* requires a conceptual plan at time of application, and a final plan recorded as a covenant on the project in all cases where reductions in parking requirements are allowed for the promise of TSM and PM actions.
- *Concord, California* requires a final plan after occupancy to insure the plan reflects actual employees and tenants locating in the building. A preliminary

plan is submitted at the time of application. The contents of the plan are spelled out in the ordinance.

- *The South Coast Air Quality Management District, Los Angeles, California* requires a plan to achieve certain average vehicle ridership targets, and also requires annual updates to verify TSM and PM strategies in place and propose changes in strategies.

5. When and How to Enforce: All recently developed TSM and PM policy instruments contain provisions for monitoring and enforcement. Most commonly, localities require reporting from developers and employers, and reserve the right to impose fines or other sanctions for failure to carry out such required actions as submittal of annual reports, implementation of the TSM and PM program, or designation of a Coordinator.

Toward the end of insuring against lagging programs, some localities require performance contracts and bonds. A disadvantage of this approach is that it binds only signatories. Purchasers of the property are not contractually bound. Of course, covenants running with the land may accompany performance contracts, thereby insuring enforcement against new title holders.

Few jurisdictions impose fines or noncompliance sanctions on ineffective programs, provided all required strategies and program operations are carried out. Nevertheless, some localities reserve the right to take some action in the case of ineffective programs.

Actions include the locality assuming program operations or specifying how the program should operate, or delaying further stages of

"FEW JURISDICTIONS IMPOSE FINES OR NONCOMPLIANCE SANCTIONS ..."

building development until a program is effective.

Examples:

- *Bellevue, Washington and Montgomery County, Maryland* employ a performance bond in support of enforcement. Montgomery County requires posting of initial and subsequent replacement "letters of credit." The County may draw on the letter if the developer is not operating the program or achieving goals.
 - In *Pleasanton, California*, annual reports from employers are required. Failure to reach goals triggers a Task Force review. The Task Force can impose additional strategies. Failure to implement the program can result in a fee of \$250 per day until compliance is complete.
 - In *Concord, California*, the City again requires annual reports on program actions and proportions of employees using transit, carpools and driving alone. The City reserves the right to require a traffic impact report and added strategies or capital improvements to roads and signals in cases where goals are not met.
 - *Fairfax County, Virginia*, in its applicant agreement reserves the right not to issue building permits for development over a certain square footage if total peak hour trips exceed specific levels. The County provides for appeals to the Board of Supervisors, independent traffic engineering analysis and arbitration on the question of the traffic generation and impacts of the subject property. See unspecified Agreement, 5/20/82.
6. *Types of Exceptions, if Any:* Localities must consider if and how to exempt employers or developers from requirements. Exemptions can make allowances for unusual situations and cases. For example, an ordinance may go into effect in an area where employers already operate effective TSM and PM programs and are subject to agreements or ordinances. Here, exemptions may be warranted.
- Exemptions also help make a policy acceptable where otherwise it would not be. On the other hand, exemptions may invite abuse or create continuous demands for more exemptions. Localities also must craft exemption language to include only the desired cases, but exclude others. Examples:
- *Contra Costa County, California* exempts employers from TSM and PM requirements, provided the employer already meets the ordinance objectives in terms of the proportion of employees commuting alone and in alternative means of transportation. See Ordinance 87-95.
 - *The South Coast Air Quality Management District, Los Angeles, California*, exempts employers already subject to local

ordinances, provided the local ordinances are at least as stringent and effective as the District regulation (Regulation XV).

- *Maricopa County, Arizona*, exempts employers opening for business, relocating or otherwise adding employees so to become subject to ordinance within sixty days before the annual due date of the employee survey and plan. The County also exempts employers from ordinance requirements who can demonstrate effective programs already in place at least for twelve months prior to the date when the employer is subject to the ordinance.

7. *Types and Purposes of Fees and Financing:*

Localities sometimes build into their policy instruments provisions for fee collection in support of administering the policies, or in support of TSM and PM program operations. Localities must decide if and how to set fees or financing provisions in policy instruments. Many localities have not built fees or financing mechanisms into policy instruments.

"LOCALITIES MUST DECIDE IF AND HOW TO SET FEES OR FINANCING PROVISIONS IN POLICY INSTRUMENTS."

While not including finance and fee issues in policy instruments may ease passage or negotiation of the instrument, there remains the question of how plan review, monitoring and implementation will be supported where fees are not specified. Generally, it appears localities are more likely to impose fees in developer agreements and special permits

than in broad coverage ordinances, probably because it is politically more palatable to do so. Examples:

- In *Bellevue, Washington*, the developer agreement for Bellevue Place specifies "dues" based on employee vehicle trips generated by the project. Revenues go toward supporting the local Transportation Management Association (TMA), a public-private organization responsible for many mitigation efforts downtown.
- In *Montgomery County, Maryland*, fees are specified in support of the County ridesharing agency, Share-A-Ride. The basis of fees is per \$100 of real property value. See Bill No. 19-84. Additionally, the County reserves the right to draw on a letter of credit posted as security in developer agreements, and use proceeds to support the County's rideshare program (Share-A-Ride). See Costain Agreement. In Silver Spring, the County in order to support the TSM and PM program may transfer revenue from parking fees. See Bill Number 24-87.

C. IMPLEMENTATION EXPERIENCE

TSM and PM policies do not operate in a vacuum. Implementation of these policies brings management and organizational implications. National experience suggests important issues and lessons:

1. Management and Organization: In the management and organization of TSM and PM programs, locality staffs, building managers and/or employers and possibly a local committee are involved:

- In most localities, *planning departments* are responsible for reviewing and approving any TSM and PM plans and parking relaxations. In many jurisdictions, a *Transportation Coordinator* designated within the Planning Department reviews plans submitted with applications, as well as required annual plans and employee surveys.
- In many locals, the Coordinator acts as staff to a *special committee* responsible for overall review of TSM and PM programs and policies, and reporting to decision makers. For example, the roles of the Pleasanton, California Task Force are delineated in the enabling ordinance: establishing program and plan guidelines, monitoring, deciding if mandatory provisions are necessary and hearing disputes and appeals.
- *City Councils or County Supervisors* in most communities function as the point of last appeal on issues of noncompliance or non-performance.
- *Developers and/or employers* are responsible for setting up programs at the site. Often, ordinances or developer agreements specify that an *on-site Coordinator* will be designated to carry out the program. Table 2 spells out in more detail the possible roles of these various parties.
- Another important and emerging organizational entity in TSM and PM is the *Transportation Management Association (TMA)*. It is a private, non-profit corporation formed of developers, employers and representatives

of public jurisdictions working to alleviate transportation problems. In some localities the TMA has responsibilities in the management of TSM and PM programs. For example, in Bellevue, Washington, the city has required a developer to support the local TMA through dues base on vehicle trips generated by the Bellevue Place project.

2. Monitoring: TSM and PM policy instruments often specify surveys, regular reports and sometimes a form of traffic monitoring. As indicated in the previous section, a common requirement is some form of *annual report* from employers subject to requirements. Usually, the report is based in large part on *employee surveys*. Surveys are aimed at determining the proportion of employees solo driving, using transit, biking, walking and ridesharing.

The *City of Pleasanton City Council, California* receives an annual report and employee survey results. *Fairfax County, Virginia* requires a *traffic analysis* at different phases of the subject development. In case of dispute about results of the traffic analysis, the County provides for an arbitration board to resolve disputes.

Bellevue, Washington, requires traffic counters embedded in exits of the project and specifies the exact month and weekdays of counts. At the same time, the project occupancy is assessed to determine compliance with required limits on outbound employee vehicle trips in the p.m. peak. See Table 1, Exhibit B within the Agreement with Bellevue Place.

TABLE 2: ROLES OF TSM AND PM PROGRAM ENTITIES

LOCALITY COORDINATOR

- collect and analyze the annual employee surveys
- prepare annual report to city or county council
- develop central transit pass sales outlet
- organize promotional events across developments
- prepare, collect, develop promotional materials
- develop and carry out promotional seminars and meetings
- conduct overall monitoring
- lobby for transit, bike or other applicable services
- contract and direct TSM and PM consultant services
- conduct training of on-site employer coordinators

TSM/PM COMMITTEE

- adopt TSM and PM policy and intent statement
- review the annual plan, suggest directions, policies
- represent developers, employers to locality, transit
- evaluate proposals for new TSM and parking strategies
- help suggest and design all promotional materials
- facilitate monitoring of program effectiveness
- assist in special events, company seminars
- review literature, visit model programs
- act as information exchange on all strategies
- help provide access to employers for survey, promotions
- consider supportive tenant lease language
- review, respond to transit service proposals
- arrange space for seminars, promotion, training sessions

COMPANY COORDINATORS

- urge management support for employee participation
- distribute, collect employee and manager surveys
- post and update bulletin boards
- insert company newsletter articles
- distribute transit passes, carpool matching information
- insure new employee orientation

DEVELOPERS

- attend, support committee
 - install bike lockers, if warranted
 - implement carpool stalls, easy exits, if warranted
 - authorize and help set up lobby displays
 - inform tenant companies of program
 - add supportive lease terms
 - set up transit, van pool stops
-

3. *Program Costs: Costs of TSM and PM programs vary widely by the nature and size of the program.* For employer based programs, costs are borne primarily by developers and companies responsible for implementation. Of course, localities also bear costs, especially if they designate their own Coordinators to participate in and enforce programs. Some examples from employer based programs in the San Francisco Bay Area, California demonstrate cost ranges. At the high end of the cost range, a few programs provide an example:

- At Varian in Palo Alto, with about 5,000 employees, the program there costs \$72,000 per year, or \$14.40 per employee.²⁵
- At Lockheed, Sunnyvale, about 25 percent of the 25,000 employees are in alternative modes. Their program costs \$25 per employee per year.
- Probably one of the most extensive programs is Bishop Ranch in San Ramon serving 4,000 employees. It involves a full-time coordinator, transportation store, computer matching, and two luxury coach shuttles for an annual cost of about \$200,000, or about \$50.00 per employee.
- Chevron in San Ramon serves 2,000 employees and spends \$110,000 on a full time Coordinator, BART shuttle, flextime, demonstration vanpools and marketing materials. The annual cost per employee of the program is \$55.00.

Other programs serving fewer employees and/or not so comprehensive in scope cost less:

- AT&T, Pleasanton, serves 2,000 employees and spends \$27,000 with a nearly full time coordinator, monthly cash awards, carpool meetings, flextime promotion, transportation hotline and information center. Unit cost is \$13.50 per employee.
- Rolm Corporation in Santa Clara serves 4,000 employees and expends \$40,000 for a cost of \$10.00 per employee. The program entails a full time Coordinator, transit pass sales, bike lockers, semiannual drawings and transportation fair, and in house matching.
- A 1985 study of employer programs in Santa Clara County reveals an average annual budget per employee of \$6.15.²⁶

Overall, it appears basic costs of moderate size TSM and PM programs range from \$30,000 to \$50,000 per year, excluding such costs as office space, computers and software, furniture, training, insurance, and survey analysis. At larger employment centers, for example with as many as 5,000 employees, costs may reach \$100,000 to \$150,000. A shuttle operation might bring costs closer to \$225,000 or even more.

Table 3 summarizes the cost ranges for employer based programs. For small employers (e.g. <500 employees), costs might range from \$10,000 up to \$60,000 for extensive programs. For large employees (e.g.>1,000 employees), costs might range widely depending especially on the presence or absence of shuttle or van services, reaching as much as \$250,000.

TABLE 3: COST RANGES FOR TSM AND PM PROGRAMS
BY SIZE OF EMPLOYER AND PROGRAM EXTENT

LEVEL OF EFFORT	EMPLOYER SIZE	
	SMALL	LARGE
Modest	\$10,000 - \$20,000	\$30,000 - \$60,000
Extensive	\$30,000 - \$60,000	\$100,000 - \$250,000

4. *Program Financing: Both public and private financing arrangements are used to support employer based programs.* In some cases, programs are supported by private financing without enforceable commitments. These *voluntary private commitments* might include in-kind contributions of personnel, office space, computer facilities and the like. Or, some employer dues and fees might be contributed, again without legally binding commitment. In other cases, programs are financed by *legally binding public mechanisms* put in place by local government. These include impact fees, business license taxes, benefit assessment districts and others.

Examples of public mechanisms include:

- In the *Los Angeles, California* area, the Coastal Corridor and Westwood ordinances require trip fees. The fee per p.m. peak hour trip in the Coastal Corridor is \$2,010. In Westwood, it is \$5,600 per trip.
- The *City of Concord, California* has established a fund consisting of interest on the in-lieu parking fund, net income derived from any city-operated parking

facilities and other dedicated sources. The fund supports City Coordinator activities.

- The *City of Berkeley, California* while not a suburban example, imposes a one time fee of \$2.00 per square foot or an annual fee of \$.20 per square foot for 30 years. Fees enter the transportation services fund used to support ridesharing, transit, and bicycling.

Where TMAs are formed, they might employ *private commitments* to support the program. For example:

- A Transportation Management Association in *El Segundo, Los Angeles, California* area, levies an assessment of \$1.25 per employee.
- The North Bay TMA in *Marin and Sonoma counties in California* charges and annual fee of \$25 per employee up to a maximum of \$250 per employer.

5. *Enforcement and Legality: Thus far, enforcement and legality have not been large issues in the implementation of TSM and PM*

programs. As suggested under the sections on policy instruments and monitoring, many localities check compliance with mitigation regulations by requiring annual reports from employers on employee travel modes and program activities. Others require traffic reports. Few TSM and PM programs have operated long enough to provide examples of localities invoking sanctions for non-compliance. However, localities and employers have negotiated issues of compliance without resort to sanctions or court tests.

"... LOCALITIES AND EMPLOYERS HAVE NEGOTIATED ISSUES OF COMPLIANCE WITHOUT RESORT TO SANCTIONS ..."

For example:

- In 1986 and 1987 the Coordinator in *Pleasanton, California*, found it necessary to pressure several employers to submit annual reports and surveys. Finally, the reports and surveys came in without resort to notification from the city attorney or the need for other procedures.²⁷
- Likewise, *Montgomery County, Maryland* has never called in letters of credit in cases where employers are not achieving mode share or trip reduction standards. The County has reviewed such cases carefully and is satisfied best and good faith efforts are going forth.²⁸

- The *City of Novato, California* in an agreement with Fireman's Fund Insurance Company required the implementation of a flextime program to ease traffic burdens on nearby streets. After a few years of successful operation, the company abandoned the policy. Traffic worsened in the area. The City pressured the company to again start the program. The company complied without the city invoking sanctions.²⁹

In sum, whether and exactly how localities will invoke sanctions specified in various policy instruments remains to be seen. The main lesson at this point is various sanctions are specified in ordinances and agreements allowing for enforcement to proceed.

Concerning legality, courts have not yet tested the legality or reasonableness of ordinances, developer agreements or other instruments. Still, there is little question localities may impose reasonable traffic mitigation requirements through agreements and ordinances. Generally, courts have ruled that reasonable traffic mitigation requirements and regulations are a proper exercise of police power. State constitutions expressly confer on cities the power to make and enforce within their limits all local, police, sanitary and other ordinances and regulation not in conflict with general law.

"... COURTS HAVE NOT YET TESTED THE LEGALITY OR REASONABLENESS OF ORDINANCES, DEVELOPER AGREEMENTS OR OTHER INSTRUMENTS."

Most judicial authorities also appear to conclude that developing property is a privilege and that the dedication of land or payment of fees is voluntary in nature and developers must meet any reasonable condition imposed by local jurisdictions before issuance of building permits.

Consequently, even strict traffic performance standards specified in developer agreements may be found reasonable and binding should they be challenged and tested. Of course, the same provisions imposed on existing employers and developers after the fact of development may not be so interpreted.

6. Parking Pricing: Supportive public parking rates and policies can be developed and pricing requirements imposed: Experience suggests the effectiveness of TSM and PM strategies is strongly linked to parking pricing. Yet, implementing parking management strategies in suburban areas presents several issues. How can parking policies support program efforts? What is feasible and unfeasible to do?

Some localities attend to pricing policies in publicly owned and operated facilities as a way to buttress programs and requirements. Important considerations include insuring prices for long term parking are not under market rates, or far below transit fares; providing location and/or price preference to rideshare patrons; and avoiding employee parking subsidies wherever possible.

- *Montgomery County, Maryland* provides an example. The County maintains market rates for long term parking and offers discounts to carpoolers in facilities under its control. The County also

recently halted block sales of parking permits to employers to discourage employer subsidies of employee parking.

- *The City of Los Angeles, California* requires employers who subsidize employee parking (except for carpool and vanpool parking) to offer employees a \$15.00 per month transit subsidy (Ordinance No. 164483).

Additionally, developer agreements can impose parking pricing requirements, but certain implementation cautions apply.

"... DEVELOPER AGREEMENTS CAN IMPOSE PARKING PRICING REQUIREMENTS, BUT CERTAIN IMPLEMENTATION CAUTIONS APPLY."

As previously referenced, some localities use developer agreements to encourage charge parking for tenants and/or employees. Examples are provided in attached agreements from *Bellevue, Washington*. Of course, a policy of charge parking will not necessarily lead to employees paying for parking. In buildings with multiple tenants, an owner may agree to institute charge parking at the garage or surface lot. Employees may pay the charge, but be reimbursed for all or a portion of charges by employers. Employer subsidized parking is not uncommon in cities with charge parking.

Also, such an approach will quickly generate spillover parking onto streets, commercial facilities, retail parking areas, vacant properties and other areas not priced or

regulated. The TMA in *Bellevue, Washington* guards against such a possibility by contracting with employers to monitor and enforce short term parking regulations in retail lots.

7. *Preferential Parking: The key implementation issue with preferential parking for rideshare patrons is enforcement.* Many local ordinances, permit requirements and developer agreements encourage *preferential parking* for car and van poolers. The key implementation issue is how to enforce use. One approach appropriate to garages with attendants is simply not to allow any vehicle to park in designated stalls without two or three persons in the vehicle at the time of parking. In short, no drop-offs are allowed. Alta Bates Hospital in Berkeley, California, uses this approach.

8. *Flexible Parking Requirements: Where localities are using flexible parking requirements in codes to encourage developer sponsored TSM and PM programs, experience in mostly urban settings suggests flexible requirements may not attract developers or lenders.* It seems localities have a difficult time setting parking requirements in support of policy objectives. Several urban localities have provided for optional relaxations in parking requirements for various purposes (support of peripheral parking, ridesharing and transit encouragements, in-lieu funds) only to find developers not taking advantage of relaxations. Los Angeles, Hartford and Seattle all provide examples.³⁰

The difficulties of setting maximums, minimums or relaxations so to serve public purposes are understandable, whether in urban or suburban areas. Knowing what developers and lenders prefer to provide in

the way of parking supply and setting requirement policy accordingly is not a simple task.

"... LOCALITIES HAVE A DIFFICULT TIME SETTING PARKING REQUIREMENTS IN SUPPORT OF POLICY OBJECTIVES."

Even if planners are able to determine the market demand and supply levels at any one time and place, the demand supply equation is constantly varying due to everything from the state of the economy to the price of gasoline to the level of transit service. Thus, flexible parking requirements must be approached with caution.

D. CASE STUDIES

In order to analyze the effectiveness of employer based TSM and PM programs and probable reasons for effectiveness, the case study programs reviewed are grouped according to three categories:

- *Clearly Very Effective*
- *Probably and Somewhat Effective*
- *Ineffective or Uncertain Effect*

The *Clearly Very Effective Programs* are those showing the most reductions in solo driving. As Table 4 shows, in some cases the reductions were very substantial compared either to before the program started or to typical proportions of solo driving at other employers in the vicinity. In the category of

TABLE 4: CLEARLY VERY EFFECTIVE TSM AND PM PROGRAMS

Program	Components	Results	Source	Notes
Bellevue City Hall Bellevue, WA 450 Employees	Coordinator Rideshare Matching City Fleet Vehicles For Poolers Free Transit Passes Pay Parking (\$30/Month) Free Carpool Parking	Decrease In Solo Driving From About 75 To 58 Percent After Pay Parking	Interviews With City Staff	Tight Parking At Site
CH2MHill Bellevue, WA 400 Employees	Coordinator Rideshare Matching Subsidized Transit Passes Pay Parking (\$40/Month) Travel Allowance (\$40/Month) Free Carpool Parking	Decrease In Solo Driving From 85 To 60 Percent	Interview	Employer Did Not Charge For Parking Prior To The Program
Lawrence Livermore Labs, Livermore, CA 7,200 Employees	Coordinator Rideshare Matching Preferential Parking Express Buses Vanpools BART Feeder Bus Company Bicycles Showers/Repair Crew	Decrease Solo Driving From 85 Percent To 36 Percent Over Five Years, Though Solo Share Has Climbed Back To 51 Percent	Transportation Management Options For The Irvine Business Complex, Crain And Associates, June, 1987	Increasing Solo Probably Due To Reduced Program Staffing
Nuclear Regulatory Commission North Bethesda Montgomery County, MD 1,400 Employees	Coordinator Ridematching High Priced Parking Some Discount Carpool Parking Discount Transit Passes	Decrease In Solo Share From About 54 Percent To 42 Percent	Interviews With Transportation Coordinator Staff	Solo Shares In The Area Range From 70 To 80 Percent Drive Alone; Near Metro Rail Station; Second Year Results
Pacific Northwest Bell Bellevue, WA 1,150 Employees (1,000 Daytime)	Coordinator Rideshare Matching Flextime Priced Parking For Solos Three Carpool Free Park Two Carpool Discount Park	26 Percent Solo Driving 65 Percent Carpool Compared To 60 To 80 Percent Solo At Other Bellevue Employers	Interview With Company Coordinator	Very Tight Parking; Results Eroding Due To New Cheap Parking Nearby
Twentieth Century Corp Warner Center West San Fernando, CA 1,150 Employees	Coordinators Transit Passes Ridematching Priced Parking Free Carpool Parking	Decrease In Solo Driving From 90 To 65 Percent After Parking Pricing Started, Carpools Up From 6 To 31 Percent	Interview With TSM Coordinator And Warner Center Survey Results, Commuter Transportation Services, Inc., 1987	Results Contrast With Warner Center Average Of 84 Percent
Varian Palo Alto, CA 5,000 Employees	Coordinator Rideshare Matching Subsidized Transit Passes Bicycle Lockers/Showers Drawings And Prizes	Decreased Solo Driving From 82 Percent To 63 Percent In Six Months	Transportation Management Workshop Meeting Notes, March 4, 1987	Program Spurred By Tight Parking Supply. Results Maintained Since 1984

TABLE 4: PROBABLY AND SOMEWHAT EFFECTIVE TSM AND PM PROGRAMS

Program	Components	Results	Source	Notes
Allergan Company Irvine, CA 1,300 Employees	Coordinator Ridematching Vanpools Preferential Parking	80 Percent Solo Drivers 9 Percent Vanpool 10 Percent Carpool	Interview With TSM Coordinator	Results Contrast With 86 Percent Solo Countywide.
Bellevue CBD And I-90 Corridor, WA Guarantee Ride Home 1/2 Employees	Taxi Vouchers For Rideshare And Transit Patrons Needing Occasional Ride Home	11 Percent Decline In Solo Trips (From 15 Percent Of Trips To 4 Percent)	Guaranteed Ride Home Evaluation, E. Kadesh And L. Elder, 68th Transportation Research Board Meeting, Washington, D.C.	Results Based On Initial Six Month Evaluation
Bishop Ranch San Ramon, CA 12,500 Employees 100 - 6,900 Per Company	TMA And Coordinator Rideshare Matching Transportation Store Shuttle To BART Flextime And Staggered	Increase In Solo Driving 13 Percent From 1986 To 1987 (55 to 68 Percent); Solo Share Still 10 To 15 Percent Less Than Nearby Business Parks	1987 Bishop Ranch Transportation Survey, RIDES, 1987	Solo Shares Vary Greatly By Company Size, Employee Type; Carpools Decreased The Most.
Coors Company Golden, CO 6,000 Employees	Coordinator Ridematching Vanpools Preferential Parking Transit Information	84 Percent Solo Share Compared To 90 To 95 Percent For The Area	Interview With Transportation Coordinator And Regional Government	Results Have Declined Since 1984 When 50 Vans Operated Versus 18 Now
City of Pleasanton Pleasanton, CA 102 Employers 50 - 3,800 Per Company	Coordinators Rideshare Matching Transit And Shuttle Flextime Cycling	Small Change In Solo Shares, But 76 Percent Of Firms Meet Ordinance Goal (45 Percent Of Employees Use Non-Solo Modes Or Travel Off-Peak)	City Of Pleasanton Information Report, November 1988	Results Largely Due To Reduced Peak Travel Versus Mode Change; Large Employers Show Best Results.
Cobe Labs Lakewood, CO 1,300 Employees	Coordinator Ridematching Shuttle Between Buildings Flextime Preferential Parking	80 Percent Drive Alone Compared To 90 To 95 Percent For The Area	Interview With Transportation Coordinator And Regional Government	
Employees Reassurance Corporation Overland Park, KA 575 Employees	Coordinator Vanpools	83 Percent Solo Share Compared To 90 To 95 Percent Solo In The Area	Interview With Transportation Coordinator And City Staff	Operating Since Late 70's

TABLE 4: PROBABLY AND SOMEWHAT EFFECTIVE TSM AND PM PROGRAMS (CONTINUED)

Program	Components	Results	Source	Notes
FMC Corporation Princeton Area, NJ 700 Employees	Coordinator Ridematching Flexitime Vanpools	Solo Share Uncertain, Vanpools Failed, But 70 Percent Arrive Before A.M. Peak (8 A.M.)	Interview With Coordinator	Early Arrivals Due Largely To Flexitime
FMC Corporation San Jose, CA 5,000 Employees	Coordinator Rideshare Matching Preferential Parking Subsidized Bus Passes Shuttle To Caltrain	Decrease Solo Driving From 85 To 79 Percent Over Two Years	Interview With Coordinator	Results Due Largely To Carpooling
Germantown Share Ride Germantown, MD 14,000 Dwelling Units	Transportation Coordinator Promotional Events Mass Mailings, Newsletter Discount Transit Passes Vanpool Subsidy Rideshare "Finders Fee"	Boost In Carpool And Transit By 658 Users And Reduced 115 Peak Hour Vehicle Trips	Third Year Evaluation Of The Germantown Share-A-Ride Program, Maryland National Capital Park And Planning Commission, June 1988	Third Year Results
Hacienda Business Park Pleasanton, CA 7,800 Employees 75 - 3,400 Per Company	TMA and Coordinator Rideshare Matching Preferential Parking Bike Lanes And Parking Shuttle To BART	Decrease In Peak Hour Vehicle Trips Of 43.5 Percent Presuming All Drive Alone In Peak	Directory Of TMA's Association For Commuter Transportation, 1987	Results Incorporate "Ambient" Or Background Levels Of Alternative Mode Use
Irvine Spectrum Irvine, CA 39 Employees Over 100 Employees Each 17,000 Employees Total	TMA And Coordinator Ridematching Transit Promotion Cycling Flexitime, Staggered Hours Vanpool Subsidy	82 Percent Solo Share Compared To About 86 Percent Countywide, Though Over 40 Percent Leave Outside P.M. Peak	1987 Community Report Irvine Spectrum TMA, Interviews With Coordinator And City Staff, And Review Of Program Video	Program Three Years In Operation
Rock Spring Park Montgomery County, MD 12,000 Employees 8 Major Employers From 100 To 3,600 Per Employer	Center Coordinator Company Coordinators Ridematching Preferential Parking Vanpool Subsidy Transit Pass Subsidy Bicycle Club	Boost In Carpool And Transit Use Up To 10 Percent Across Employers, Reduced 220 Peak Hour Vehicle Trips	Interview With Coordinator And Rock Spring Park Evaluation, Maryland National Park And Planning Commission October, 1988	Parking Ample And Free At Site; Results Reflect Over Two Years Of Program Operation

TABLE 4: INEFFECTIVE OR UNCERTAIN EFFECT TSM AND PM PROGRAMS

Program	Components	Results	Source	Notes
Bellevue, I-90 Bel-Red, Overlake, Bellevue, WA 52,000 Employees 52 Small To Large Companies	Wide Range Of Programs With Range Of Densities, Transit Services And TSM/PM Strategies	No Significant Results	Metro 1987 To 1988 TSM Survey 68th Transportation Research Board Meeting, Washington, D.C.	Results Based On Many New Programs, Except For Bellevue
Cargill, Inc. Minnetonka, MN 2,000 Employees	Coordinator Self Matching Subsidized Transit Passes Vanpools Preferential Parking For Vans Limited Parking	About 87 Percent Drive Alone Compared To 90 Percent For Corridor Businesses	Interview With Transportation Coordinator And Regional Government Regarding Recent NCHRP Survey	Results Have Held Close To Same Levels Over Past 6 Years
City of Concord, CA 25 Employees 50 - 3,300 Per Company	Company Coordinators Rideshare Matching Transit Passes Bike Racks Flextime/Staggered	Increase In Solo Driving At Most Employers Up To 8 Percent With Some Declines Up To 4 Percent	Report To The Concord City Council, Focus On TSM, City Staff Report August, 1988	Results Based On Limited Employee Survey Returns And Some New Programs; Large Employers Most Successful
Contra Costa Center Pleasant Hill, CA 1,500 Employees Up To 400 Per Company	Coordinator Oversight Committee Ridesharing Transit Passes Bike Racks	Increase In Solo Driving From 78 To 82 Percent Over Ordinance Goal Of 80 Percent	Contra Costa Centre Association 1988 Employee Survey, June 1988 And Interviews	Results Over 1986 To 1988
Sacramento County, CA 160 Employers And Developers From 100 To Several Thousand Employees Per Company	Transit Passes Bike Racks/Showers Rideshare Matching Flextime	5 Percent Increase In Solo Shares Over Four Years, Mostly Due To Rideshare Declines	Trip Reduction Implementation Program Evaluation Study, Sacramento County, 1988	Results Possibly Biased Due To Different Sample Sizes 1983 to 1987, And Decline In Gas Prices
3M Company Maplewood, MN 12,000 Employees	Coordinator Self Matching Subsidized Transit Passes Vanpools Garage Parking Priced Preferential Parking For Vans (Go To Top Of Wait List) Flextime	About 90 Percent Drive Alone Compared To Same Level For Corridor Businesses	Interview With Transportation Coordinator And Regional Government Regarding Recent NCHRP Survey	Vanpool Share Decline Possibly Due To Employee Turnover, Relocations And Flextime

Probably and Somewhat Effective programs are those showing modest reductions in solo driving, in the range of a few percent to ten percent. Also in this category are programs where there is some uncertainty about the reductions because comparison or preprogram data is not very reliable. Also included are cases of reductions in the proportion of commuters driving during peak periods rather than reductions in the proportion of solo drivers. Finally is the category of *Ineffective or Uncertain Effect*. This category contains programs with little if any effect, or programs with *increases* in solo driving over the evaluation period. The significant findings are:

Finding 1: The range of TSM and PM programs effectiveness is very large. Some researchers reviewing TSM and PM programs have concluded the effects of TSM and PM programs are generally "modest."³¹ Our conclusion is that results are highly variable. Some programs bring no result. Others bring modest results. Some bring very substantial results. In the category of Effective Programs are cases with reductions ranging from 12 to about 40 percent.

"PLANNERS ... CAN COUNT ON NO RESULTS, MODEST RESULTS OR LARGE RESULTS DEPENDING ON ... MANY VARIABLES ..."

Planners and decision makers can not count on "modest" results. They can count on no results, modest results or large results depending on the many variables important to program outcomes.

Finding 2: Most of the effective programs entail aggressive parking pricing strategies. The programs at CH2MHill, Pacific Northwest Bell, Bellevue City Hall, Nuclear Regulatory Commission and Twentieth Century Corporation all involve charge parking for employees. In some cases, priced parking is accompanied by travel allowance or discount carpool parking. The decreases in solo driving under these programs range from:

- a 10 percent in the case of the Nuclear Regulatory Commission compared to before pricing (though the 42 percent solo share is about 40 percent below solo shares of other employers in the area)
- a decline of 17 percent for Bellevue City Hall compared to before pricing
- a decline of 20 percent for CH2MHill compared to before pricing
- a 25 percent decline in the case of Twentieth Century Corporation
- nearly a 40 percent difference in solo shares at Pacific Northwest Bell compared to other employers in the area.

Furthermore, none of the companies in the categories of somewhat effective or ineffective programs provide priced parking, except 3M Company in *Minnesota* which does price some but not all of its parking. Also, the very effective programs do not involve any strategies other than parking pricing which would distinguish them from other programs in the sample. In short, the evidence strongly suggests parking pricing is a major determinant of effectiveness in these programs.

**"THE EVIDENCE STRONGLY SUGGESTS,
PARKING PRICING IS A MAJOR
DETERMINANT OF EFFECTIVENESS ..."**

Finding 3: Occasionally, very comprehensive programs without parking pricing have achieved significant results, at least for a time. In the category of very effective programs, Lawrence Livermore Laboratory and Varian in the San Francisco Bay Area, California have achieved very significant declines in solo shares by virtue of strong program efforts. However, in the case of the Laboratories, solo shares are on the rise probably due to reduced staffing and overall commitment. The program at Varian is in response to very tight parking supplies at the site, again underscoring the importance of the parking variable. But the great bulk of programs offering similar strategies to these do not fall within the very effective category.

Finding 4: Confirming the literature findings, TSM and PM programs tend to be more successful with larger employers. For example, at three sites where local evaluation reports are available on solo shares by employer size, the proportion of drive alone commuters varies by size of employer. The area include: Bishop Ranch in San Ramon, California and employers in Concord and Pleasanton, California.

Finding 5: Results suggest it may be easier for TSM and PM programs to shift when employees commute rather than to reduce solo driving, at least where parking pricing is not employed. For the bulk of programs without parking pricing, reductions in solo shares

range from five to ten percent irrespective of the mix of strategies. However, several employers in this category have achieved much more significant reductions in the proportion of peak period trips. For example:

- Pleasanton's program has emphasized both mode and peak period shift strategies, but most employers and employees are achieving program goals by commuting outside the peak hour rather than through reduced solo driving.
- FMC Corporation in Princeton, New Jersey has achieved a very significant reduction in peak period commuting (70 percent arrive before the 8 a.m. peak), at the same time their vanpool program has been curtailed.
- Hacienda Business Park, Pleasanton, California has been more successful shifting peak period commuting rather than shifting mode shares.

Finding 6: While there is little evidence to suggest which mix of strategies is best, at least two relatively untried strategies deserve more testing. Most of the successful as well as unsuccessful TSM and PM programs employ similar strategies, with the exception of parking pricing strategies. Thus, it is difficult to say which combinations of strategies are best. Nevertheless, two relatively new strategies appear to deserve more testing:

- The Guaranteed Ride Home program in Bellevue, Washington suggests offering guaranteed ride home insurance can boost the frequency of ridesharing among regular carpool and vanpool commuters, and even can attract some solo drivers to ridesharing.

- Also, the Germantown Share Ride Program in *Germantown, Maryland* is demonstrating that rideshare promotions aimed at residential areas can bring some modest success. Both strategies are not often incorporated into suburban based programs and deserve further testing.

Finding 7: TSM and PM programs take considerable time to become effective and are susceptible to declines in effectiveness over time. First, programs take at least a couple of years to become effective. The Germantown Share Ride Program has taken three years to achieve its level of effectiveness. The Rock Spring Park program has taken two and one half years to increase carpool and transit use by ten percent.

Second, programs may decline in effectiveness due to variables outside or inside the program. For example:

- Pacific Northwest Bell in *Bellevue, Washington* is experiencing some erosion in effectiveness due to new nearby inexpensive parking.
- Lawrence Livermore Labs has experienced increasing solo shares, from 36 percent to 51 percent over the last few years. In this case, the cause appears to be lack of continuous commitment and staffing.
- Coors Company, *Golden, Colorado* has experienced a decline from 50 to 18 vanpools since 1984. The Coordinator attributes the decline to declines in gasoline prices and the end of gasoline shortages.

- The 3M Company in *Maplewood, Minnesota* has lost vanpool shares over recent years. Company managers believe the reason is high employee turnover, relocations and the introduction of flextime.
- Contra Costs Center, Pleasant Hill, and several employers in Concord, California provide other examples of declining effectiveness. Staffs speculate the reason may have to do with employees relocating closer to their jobs which makes ridesharing and transit less attractive options.

There are programs showing durable results, for example Cargill, Inc. in *Minnetonka, Minnesota* and Employees Reassurance Corporation, *Overland Park, Kansas* and Varian in *Palo Alto, California*. However, it's clear TSM and PM programs are susceptible to declining effectiveness whether due to program changes or changes in "exogenous" variables.

Finding 8: The effectiveness of TSM and PM programs is related to the presence and stringency of underlying policy instruments, but not strongly related. More important are program commitment and vigilance of oversight. Among the clearly very effective case studies three are supported by strong policy instruments (Pacific Northwest Bell, Nuclear regulatory Commission and Twentieth Century Cooperation). The instruments specify some combination of either very specific program requirements or aggressive goals or penalties for non compliance or not attaining goals.

However, the remaining four in the very effective category are not supported by any instruments whatsoever. Furthermore, relatively stringent policy instruments support several programs in the categories of somewhat effective and ineffective programs, for example Contra Costa Center, Sacramento County, City of Concord, City of Pleasanton, Germantown and Rock Spring Park. In short, the presence of strong ordinances, developer agreements or other instruments is no assurance of effective programs.

" ... THE PRESENCE OF STRONG ORDINANCES, DEVELOPER AGREEMENTS OR OTHER INSTRUMENTS IS NO ASSURANCE OF EFFECTIVE PROGRAMS."

What appears to distinguish the effective programs is not the presence or absence of certain policy instruments, but parking pricing in most cases; or, in a few cases, strong program commitment and vigilance (e.g. Varian, and Lawrence Livermore Labs, successful without parking pricing).

III. CONCLUSIONS AND RECOMMENDATIONS

A. SYNTHESIS AND CONCLUSIONS

Before deriving recommendations for localities and federal policy with respect to TSM and PM, it is important to synthesize findings. The synthesis examines findings across the literature, local evaluation reports and case studies to derive common findings, implications and conclusions. We divide the resulting conclusions into three areas: *Effectiveness, Policy and Implementation.*

1. Effectiveness: Program results are highly variable, subject to change over time and influenced by variables outside manager control. Nevertheless, results suggest best directions for suburban TSM and PM programs:

- Overall, TSM and PM strategies in suburban areas show highly variable results ranging from no effect to thirty percent reductions in solo driving, depending on how key variables align to support or detract from program outcomes.
- Some of what determines program effectiveness is within the control of policy makers, including parking supply, price and management; quality and intensity of program effort; and the nature of underlying policy instruments. Yet, many important variables bearing on program outcomes are not under the control of program managers, including proximity of projects to transit service, the size and nature of employee populations, and such "exogenous variables" as the price of gasoline.

- Both the case studies and literature review suggest parking pricing and management are probably the most important variables to attend to in developing TSM and PM programs. Findings indicate introducing charge parking where parking is free or removing parking subsidies (whether or not coupled with other compensation, e.g. travel allowances, discount carpool parking or transit passes) can reduce solo driving shares as much as thirty percent. Very few case study programs show this level of success without parking pricing strategies.

" ... BOTH THE CASE STUDIES AND LITERATURE SUGGEST PARKING PRICING AND MANAGEMENT ARE PROBABLY THE MOST IMPORTANT VARIABLES TO ATTEND TO ..."

- Comprehensive TSM and PM programs at employment sites in suburban areas will take at least two years to develop and can become ineffective for reasons of reduced commitments, changing employee populations or changes in variables outside the program.
- While most TSM and PM programs employ proven strategies, (including personalized coordinator services, rideshare, transit and cycling promotions), the literature and case studies suggest certain strategies deserve

more testing. One, flextime may be counterproductive to ridesharing and should not be implemented without careful monitoring and evaluation. Two, residential matching and guaranteed ride home services may be worth more testing.

- All else equal, TSM and PM programs probably will have more success at larger companies rather than multi-employer centers, and among clerical and data processing employee groups, as opposed to professional workers. Both the literature and case studies support this conclusion, though we can not conclude employer size is a critical determinant, as there are some examples of successful programs at smaller employers.
- Policy instruments in support of TSM and PM programs, such as ordinances and developer agreements are important for initiating programs, bringing equity to regulations, and demonstrating public commitment.

**"MORE IMPORTANT THAN THE
POLICY INSTRUMENT ... MAY BE
THE RESOURCES DEVOTED ...
VIGILANCE OF MONITORING AND
... COMMITMENT TO THE TSM AND
PM EFFORT"**

However, neither the instruments or their stringency are strongly correlated with effective programs. More important than the policy instrument or its terms and provisions may be the resources devoted

to the programs, vigilance of monitoring and general level of visibility and commitment to the TSM and PM effort.

2. Policy Instruments: Policy instruments are increasingly important to initiating TSM and PM programs in suburban areas. The instruments set the stage for monitoring and enforcement, if necessary, and for program modifications. Consequently, the design of policy instruments is important and experience suggests some lessons:

- For broad applicability of TSM and PM requirements across new and existing employers, TSM ordinances or special permits are preferred instruments. For focused requirements on new developments, developer agreement requirements are appropriate to consider. To date, there is little experience with cooperative or joint power ordinances regulating more than one jurisdiction.
- Localities have had a difficult time establishing parking requirements and relaxations so to attract developers and lenders. Apparently, it is difficult anticipating what developers and lenders prefer in terms of supply, and their interest in reduced supplies in return for TSM and PM.
- Parking pricing strategies can be encouraged by insuring any publicly controlled parking is not under market, and through developer agreements specifying pricing strategies. A danger in fashioning such policies is the possibility of encouraging spillover parking in uncontrolled areas.

- Given the wide variation in TSM and PM program results, and the difficulty of knowing which strategies are most effective, localities must be cautious in establishing uniform or stringent goals in policy instruments, or prescribing implementation of specific strategies.
- Requiring Program Plans from developers and employers requires locality staff time and resources which may prove a burden on small localities. However, requiring and negotiating plans has the advantage of tailoring TSM and PM programs to each site, a strong plus given the many program and site variables influencing program outcomes.
- Though courts have yet to test TSM ordinances and regulations, State law generally should enable localities to set TSM and PM requirements and enforcement provisions. Fines and civil penalties for failure to act in accordance with requirements also are possible under ordinances, provided usual appeal procedures are added. Performance contracts, bonds and letters of credit are possible assurance mechanisms in developer agreements, though these must be added to covenants running with the land to provide maximum assurance.

"ONE AREA OF CAUTION IS IN STRINGENT AND BINDING TRAFFIC PERFORMANCE STANDARDS OR GOALS"

One area of caution is in stringent and binding traffic performance standards or goals. While these may be upheld in developer agreements presuming acceptable contractual practices were followed, very ambitious and binding goals in ordinances applying to existing employers may be successfully challenged on grounds of reasonableness.

- Exemptions to policy requirements are not very common in policy instruments, but are useful in cases with pre-existing TSM and PM regulations, or in cases where annual plan and survey deadlines may unreasonably burden new, expanding or relocating employers.
- Fees and financing mechanisms in support of TSM and PM programs are not built into many local policy instruments. This practice may speed passage of policy instruments, but may hinder later monitoring, plan review and enforcement.

3. Implementation: Comprehensive TSM and PM programs in localities require: participation by numerous parties, public and private; monitoring mechanisms; and financing mechanisms. In particular:

- Localities with comprehensive programs involve planning departments, task forces or review committees with monitoring responsibilities and possibly private TMA organizations. Local decision makers also serve as points of appeal in the enforcement of policy instruments.
- Monitoring of mode shares, traffic levels, and parking volumes are useful for determining program effectiveness.

However, with the exception of an evaluation program by Metro, Seattle, Washington, no TSM and PM programs reviewed employ any regular comparisons of program results with control sites without TSM and PM programs. In light of the many variables affecting travel behavior to and from employment centers, such comparisons would be useful.

- Annual program costs at employment sites range from a few thousand dollars at small employers with modest programs to \$250,000 at large employers with extensive programs. Both voluntary and legally binding mechanisms are in place, as well as TMA fee structures in support of private financing.

B. RECOMMENDATIONS FOR LOCALITIES

Recommendations for localities are divided into three areas: Strategies, Policies and Implementation.

1. Strategies: While results of the analysis suggests there is no optimum mix of TSM and PM strategies, certain parking strategies deserve emphasis, and certain other TSM and PM strategies deserve cautious implementation. Additionally, TSM and PM should be initiated so to insure the best possible chances of success, supported by appropriate ancillary policies. Finally, vigilance will be necessary to insure long term success. In particular:

- For TSM and PM programs in suburban areas to have the best chances of success, they should be accompanied by supportive policies and services encouraged among employers and

developments where they can best work. Employer based programs should be accompanied by transit development and high occupancy vehicle facilities, if possible. Preferably, TSM and PM programs and strategies ought to be encouraged, at least initially, at larger employers and developments, especially those with large work forces of clerical or data processing personnel.

- Localities should evaluate parking pricing strategies for implementation. Parking pricing stands out as the most potent of the TSM and PM strategies. Several options should be evaluated. For large new developments, localities might strive to negotiate for priced parking in developer agreements. Or, where localities control some parking supplies directly, they should insure prices are at or near market levels. Of course, at the same time, localities must guard against possible spillover parking through enforcement of retail parking areas and neighborhoods.

"... LOCALITIES SHOULD ENCOURAGE SALARY HIKES OR TRAVEL ALLOWANCES AS OPTIONS TO PARKING SUBSIDIES."

Where parking is priced but employees enjoy employer subsidies, localities should encourage salary hikes or travel allowances as options to parking subsidies. Programs at CH2MHill, Pacific

Northwest Bell, Twentieth Century Corporation and the Nuclear Regulatory Commission provide models.

- Localities also should insure parking supplies are kept on the tight side. Findings suggest many suburban areas encourage an oversupply of parking through ample requirements in codes. Thus, codes should be revised in support of TSM and PM strategies to insure a tight supply. Possibly new maximum requirements might be added to codes for this purpose. Bellevue, Washington provides one model. However, flexible parking requirements should not be relied upon to bring reduced supply as these policies have not worked well to date.
- Before encouraging flextime as a TSM strategy, localities should review the latest evidence on its effect on ridesharing. Localities primarily interested in shifting commuter time of travel should consider flextime. However, primarily localities interested in encouraging ridesharing should proceed with caution.

"... FLEXTIME SHOULD NOT BE ENCOURAGED ... WITHOUT CAREFUL EVALUATION."

In any case, flextime should not be encouraged or implemented without careful evaluation. RIDES of the San Francisco Bay Area, the regional

rideshare agency, is evaluating flextime impacts on carpooling. Localities should track this work and other evaluations.

- Rideshare promotions at residential trip ends as well as guaranteed ride home services for rideshare and transit patrons deserve more encouragement and testing. The Germantown Share Ride Program, Germantown, Maryland provides one model.
- TSM and PM strategies must not be judged too hastily. Most will take at least two years to fully develop.
- Because TSM and PM strategies and programs are susceptible to change and diminished effectiveness, localities must be prepared to monitor strategies carefully and exercise long term vigilance to insure continued success.

2. Policies: Localities do not need to institute stringent policies to insure program success. More important than the exact policy terms and provisions is how implementation proceeds. Nevertheless, policy instruments are important for initiating TSM and PM efforts, setting commitments and resources, and establishing the evaluation framework. TSM and PM ordinances, developer agreements and other instruments have their place:

- Before considering local TSM and PM policies, localities should check with county, regional and state air quality or other agencies with missions in transportation control or traffic mitigation. Increasingly, these agencies are developing their own "trip reduction" regulations which may supersede local regulations. Los Angeles Regulation XV

provides an example. Where such regulations are not developing, localities may wish to cooperate with one another to institute consistent instruments across jurisdictions. However, localities should proceed with caution: aside from Maricopa County, Arizona, there are no region wide policy instruments serving as models.

- Before selecting the type of policy instruments to develop, localities must consider their traffic problem, their traffic objectives (reduced solo driving, shift in peak travel, focus on internal versus through traffic); the source of the problem (all employers, new employers); the best types of TSM and PM strategies to encourage (experience suggests strategies shifting the time of employee commuting may be more successful than strategies shifting mode of travel); and the difficulty of getting approval for proposed instruments and implementing them.
- Generally, larger communities with areawide traffic problems caused by new and existing employment should consider ordinances applicable to all medium to large size employers. Of course, new ordinances will require public hearings, legal council review and passage through decision making bodies.
- Smaller communities with spot congestion problems attributable to new development should consider special permits, and developer agreements secured by covenants. These instruments may involve less time consuming review and consensus building with decision makers to gain passage. They also may

require only staff review and negotiations to carry out. Developer agreements also are more appropriate for securing specific physical facilities such as bike racks, transit turn outs or parking areas devoted to carpoolers.

- Generally, localities should require implementation of specific strategies only as appropriate to a particular employer and development, not as a uniform requirement across numerous employers and developments.

"... LOCALITIES SHOULD REQUIRE ... SPECIFIC STRATEGIES ONLY AS APPROPRIATE TO A PARTICULAR EMPLOYER AND DEVELOPMENT, NOT AS A UNIFORM REQUIREMENT ACROSS NUMEROUS EMPLOYERS ..."

Policy instruments may require a designated coordinator, regular reporting, annual survey and distribution of basic rideshare and transit information. However, instruments should avoid requiring uniform and specific proportions of parking devoted to carpool stalls, or the provision of transit passes at specified discounts or imposition of specific parking prices.

- The preferred approach in policy instruments is to require and negotiate plans spelling out specific strategies, and then to negotiate, approve and agree to plan strategies based on their suitability to the site and employee population. This approach is especially recommended for

special permits and ordinances applying to an entire jurisdiction, core area or industrial park. Localities should develop plan requirement guidelines to ease compliance and speed review. Concord provides one model for such guidelines.

- For specific development sites where developer agreements are the preferred policy instrument, localities may require and negotiate specific strategies without requirements for plans. This might be done where there is little doubt about effectiveness of strategies. For example, bike lockers or transit pass promotions may be required as complements to other locality programs such as bike paths or transit centers near the subject development. But as a general rule, localities must be cautious about specifying TSM and PM strategies as it is difficult estimating probable effectiveness.
- Localities must attend to monitoring and enforcement in policy instruments, but must be careful not to develop or try to enforce binding traffic or mode share standards which are too stringent, especially in areawide ordinances and permits.

"LOCALITIES MUST BE CAREFUL NOT TO DEVELOP OR ... ENFORCE ... STANDARDS WHICH ARE TOO STRINGENT, ESPECIALLY IN AREAWIDE ORDINANCES ..."

Very ambitious goals may invite successful legal challenge, since attainment of such goals may not be possible. Localities must appreciate that some of the variables influencing traffic volumes and commuting patterns to and from employment sites are not within the control of employers or developers.

- Localities probably can be more secure in applying stringent and binding performance requirements to developer agreements. Experience suggest such provisions may be enforced without legal challenge. Novato, California provides one example in the case of Fireman's Fund.
- Localities should develop exemptions in policy instruments only to allow for cases of duplicating regulations or unusual hardship in complying with survey and reporting deadlines.
- Policy instruments should include provisions for financing monitoring, plan review and enforcement. Too often, instruments ignore the need for fees and financing.

3. Implementation: Localities must provide local resources in support of TSM and PM programs; monitoring of both regulated and unregulated sites is useful, and monitoring of spillover parking should accompany PM strategies; the private sector needs to be involved in program development and appraised of the costs involved in implementing programs:

- Localities should strongly consider establishing a Transportation Coordinator position in support of TSM and PM start

programs, especially programs required by ordinances or permits over broad areas. The Coordinator should serve to explain requirements, review plans, and survey results, provide technical assistance and possibly centralized rideshare matching services if not available through other agencies. A Coordinator may not be required where only a few developer agreements are in place or planned, though staff still needs to be designated for monitoring and review.

- Localities should organize a review and support Task Force to help monitor the program, recommend enforcement, policy changes and assist with special events. The private sector should participate in the Task Force or Committee, whether through representation from the local TMA or from local employers. Private employers should be appraised of policy instrument provisions, provided information on typical TSM and PM programs, levels of effectiveness and costs.
- Localities should not only monitor mode shares at employers subject to TSM and PM requirements, but try to track the same variables at sites not subject to requirements.
- Localities should pay special attention to monitoring of PM strategies such as pricing or restricted supplies negotiated through developer agreements or required by parking codes. These strategies may be accompanied by spillover into residential or retail areas. If so, localities should be prepared to enforce against

spillover parking. The enforcement procedures of the TMA in Bellevue, Washington provides one model.

- All program participants should be prepared to develop, monitor and modify the local program and policy instruments over a period of several years, as programs typically take considerable time to evolve and can experience declining effectiveness over the long haul.

C. RECOMMENDATIONS FOR THE FEDERAL GOVERNMENT

The Federal Government can play an important role in the development of effective TSM and PM policies in suburban areas. Currently, the federal Suburban Mobility Program aims at strengthening the organizational and planning capabilities of localities to develop programs. The Urban Mass Transportation Administration has sponsored planning workshops and studies in suburban communities, and actively supported the formation of Transportation Management Organizations.

A worthy complement to these activities would be capacity building at the local level in support; testing and evaluation of specific TSM and PM strategies and policy instruments; and changes in certain federal policies. In particular, the Federal Government should consider:

1. Strategy Support: Our analysis suggests certain parking management strategies, especially related to parking pricing, are extremely effective in attacking congestion problems. Yet, suburban localities need help in implementing and evaluating such strategies as experience is quite limited. Likewise, a few

other strategies require more testing and demonstration. We recommend the Federal Government:

- Encourage parking pricing strategies through model developer agreements; demonstration partnerships with localities for removal of parking subsidies; and substitution of compensating travel allowances, transit passes or salary hikes.
- Sponsor demonstration and evaluation of flextime in suburban settings as research and evaluation to date suggests contradictory results.
- Sponsor demonstration and evaluation of guaranteed ride home services and residential end carpool matching services at large residential complexes as both strategies appear promising but with limited experience.
- Hinge federal funding of TMAs on their roles in parking management and pricing. For example, require participating employers in supported TMAs to end employee parking subsidies, if any; to test travel allowances; and to contract for parking management (e.g. Bellevue, Washington).

"THE FEDERAL GOVERNMENT ... SHOULD EVALUATE FLEXTIME AND GUARANTEED RIDE HOME... HINGE FUNDING OF TMAS ON THEIR ROLES IN PARKING ... SUPPORT EFFORTS TO END TAX BENEFITS OF FREE PARKING."

2. Policy Support: Our analysis suggests various policy instruments are important to initiating and maintaining TSM and PM strategies and programs in suburban areas. While the stringency of the instruments is not vital to effectiveness, instruments still must be developed with care. Again, the knowledge of how to fashion such policy instruments is quite limited. We recommend the Federal Government:

- Develop model ordinances, developer agreements and permits suitable for adoption by cities, counties, and special districts (e.g. air quality). The model should contain specific terms and provisions, sample language and step by step procedures for developing the various provisions of the instruments.
- Develop model lease provisions for localities to use in negotiating with developers. The provisions would make explicit the cost of parking to tenants in multi-tenant facilities. The Federal Government might also consider developing model legislation for States interested in requiring "truth in leasing clauses" to support full disclosure of parking costs to tenants, at least in large office and commercial complexes.
- Develop model TSM and PM by-laws empowering local TMAs to manage, price and enforce parking at office and commercial complexes.
- Develop model parking codes specifying maximum requirements, "truth in leasing" provisions, prohibitions on parking subsidies, or requirements for substitution of general travel allowances or subsidies for other modes.

- Cooperate and interact with EPA in the development of Transportation Control Measure regulations, guidelines and requirement for States and localities to insure regulations take into account latest findings of this research and other research on best strategies, policies and implementation procedures for TSM and PM in suburban settings.

3. Policy Change: Certain changes in federal policy will enhance the effectiveness of local TSM and PM programs, as well as encourage use of alternatives to solo driving among federal employees at suburban and urban facilities throughout the United States. We recommend the Federal Government:

- Investigate the legal and regulatory status of charge parking for federal employees and, if allowed by court decisions, revise General Services Administration regulations as necessary to permit charge parking for employees at federal facilities.
- Revise regulations prohibiting federal agencies from providing employees with subsidized transit passes.
- Support legislative efforts to end the tax deduction benefits of free parking, preferably by allowing the deduction for a general travel allowance applicable to all travel modes. If this is not feasible, support putting transit pass subsidies on a par with parking subsidy treatments.

D. FUTURE RESEARCH NEEDS

This study has reviewed and synthesized experience with TSM and PM approaches in suburban areas. While the assessment has

resulted in useful findings and lessons, many results are based on case studies of relatively new programs. Many programs are still evolving and additional implementation experience continues to accrue. Consequently, it is important to continue evaluating these programs. In particular, we recommend:

- Localities and the Federal Government carry out in-depth, multi-year case studies at selected locations to uncover and document successes and failures. Possible candidate sites include localities with some evaluation data on hand. They might include: Pleasanton, Bishop Ranch and Hacienda Business Park in Northern California; South Coast Air Quality District in Southern California; Bellevue, Washington; and Montgomery County, Maryland.
 - More careful review of the effects and operations of selected suburban TMAs funded by UMTA, as information about effectiveness and operations is lacking in many cases. More careful review of these TMAs would generate data critical to the future UMTA role in suburban mobility, as well as the what localities can and should expect of TMAs in the implementation of TSM and PM strategies.
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FOOTNOTES

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1. Donald Pickrell, *The Causes of Rising Transit Operating Deficits*, Urban Mass Transportation Administration, Washington D.C., 1983.
 2. ENO Foundation, *Commuting in America*, 1987. Regarding the proportion of solo drivers, see Robert Cervero, *America's Suburban Centers - A Study of the Land Use Transportation Link*, University of California at Berkeley, January 1988, p45.
 3. John Suhrbier, *Addressing Suburban Mobility in Metropolitan Dallas*, Background Paper for the UMTA Suburban Mobility Seminar, Dallas, Texas, April 6, 1988.
 4. Rice Center, *Suburban Mobility in Houston*, Background Paper for the UMTA Suburban Mobility Seminar, May 4, 1988.
 5. Robert Cervero, "Managing the Traffic Impacts of Suburban office Growth," *Transportation Quarterly*, Vol. 38, No. 4, October 1984.
 6. J. Schneider, *Transit and the Polycentric City*, Urban Mass Transportation Administration, 1981.
 7. A recent survey of 88 suburban employment centers found an average of 3.85 parking spaces per 1,000 gross square feet of floor space, nearly one space per worker. See Robert Cervero, *America's Suburban Centers - A Study of the Land Use Transportation Link*, January 1988, Op. Cit., p39.
 8. Robert Cervero, *America's Suburban Centers - A Study of the Land Use Transportation Link*, January 1988, Op. Cit., p. 41.
 9. R.H. Pratt Associates, *Traveler Response to Transportation System Changes - A Handbook for Transportation Planners*, for the Federal Highway Administration, Washington D.C., February 1977.
 10. Jan Alexander Aarts, Jeffrey Hamm, "Effect of Ridesharing Programs on Suburban Employment Center Parking Demand," *Transportation Research Record No. 980*, 1984.
 11. Robert Cervero, *America's Suburban Centers - A Study of the Land Use Transportation Link*, January 1988, Op. Cit., p. 101.
 12. David Burch, *1988 Database Survey*, RIDES For Bay Area Commuters, Inc., San Francisco, California, December 1988.
 13. Robert Cervero, *America's Suburban Centers - A Study of the Land Use Transportation Link*, January 1988, Op. Cit., p. 128.
 14. Kay Kenyon, "Increasing Mode Split Through Parking Management: A Suburban Success Story," *Transportation Research Record, No. 980*, 1984.

15. Monica Surber, Donald Shoup, Martin Wachs, "The Effects of Ending Employer-Paid Parking for Solo Drivers," University of California, Los Angeles, California, 1984.
16. Cambridge Systematics, Inc., *Improved Air Quality in Maricopa and Pima Counties - the Applicability of Transportation Measures*, for the U.S. Environmental Protection Agency, November 1986.
17. Robert Cervero, *America's Suburban Centers - A Study of the Land Use Transportation Link*, January 1988, Op. Cit., p. 46.
18. Crain and Associates, *Summary of Demand Management Programs*, Menlo Park, California, December, 1986.
19. Everett Carter, Kenneth O'Connell, *Ridesharing Element of Parking Facilities for Industrial Employment Centers*, University of Maryland, September, 1982.
20. M.R. Misch, J.B. Margolin, D.A. Curry, L.J. Glazer, G. Shearin, *Guidelines for Using Vanpools and Carpools as a TSM Technique*, National Cooperative Highway Research Report 241, December 1981, pg. 24.
21. DKS Associates, *Office Building Parking Demand Study*, for the City of Walnut Creek, Draft Final Report, Oakland, California, 1982.
22. U.S. Department of Transportation, *Innovative Techniques and Methods in the Management and Operation of Public Transportation Services*, Washington, D.C., December 1980.
23. Kay Kenyon, "Increasing Mode Split Through Parking Management: A Suburban Success Story," in *Transportation Research Record 980*, Transportation Research Board, n.d.
24. Susanne M. Pelly, "Managing Future Pollution: The Minnesota Indirect Source Permit," presentation before the 80th Annual Meeting of the Air Pollution Control Association, New York, June, 1987.
25. Presentation by Roger Loomis, Director of Security, Varian, Palo Alto, California, March 4, 1987.
26. Crain and Associates, *Working Paper Five, Program and Administrative Options for Marin County*, Menlo Park, California, May 1987.
27. Presentation by Gail Gilpin, TSM Coordinator, before a TSM workshop, City of Palo Alto, California, March 4, 1987.
28. Presentation by John Clark, Director of Planning, Montgomery County, before the North Bethesda Working Group, San Francisco, June 16 and 17.
29. Presentation by Jim Bourgart, Vice President, Bay Area Council, before the San Francisco Bay Area Planning Directors' Association, St. Helena, California, June 19, 1987.
30. Thomas Higgins, "Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policies," presentation before the Transportation Research Board 68th Annual Meeting, Washington D.C., January, 1989.

31. Susan Pultz, "Key Considerations for Developing Local Government TSM Programs," Metropolitan Transportation Commission, Oakland, California, March 1988. The study of TSM programs in the San Francisco Bay Area concluded "good employer programs resulted in 5 to 8 percent of employees switching to non-solo driving."

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