V. Summary and Conclusion

This concluding section of the guidance begins with a series of examples from public agencies around the US that are exhibiting the kinds of qualities and effort that has been recommended throughout this document. By focusing on these exemplary actions, the guidance provides concrete examples to the reader when considering the particular course to take in developing an effective TDM program.

The section closes with a reexamination of the guidance's key elements and their implications for future TDM program development. An essential component of the reexamination is the identification of key areas for new methodology and technique development, as well as the areas in which new information and methods of data collection are needed.

A. TDM Program Examples

Section IV outlined a process public agencies could use to design, implement, and evaluate TDM programs to address regional and/or local transportation-related problems. This section illustrates this process through brief examples of the actions of real public agencies for each of the four guidance modules described:

- Module I: Evaluate alternative solutions
- Module II: Identify/develop appropriate TDM strategies
- Module III: Implement TDM strategies
- Module IV: Monitor and evaluate program

Module I: Evaluate Alternative Solutions

Achievement of a fully-integrated regional transportation planning process, one that considers TDM along with other potential approaches--including new construction, TSM, TDM, land/use community planning, and no action (status quo)--to a regional problem, is relatively rare. In most instances, TDM is examined independently of other solutions. But TDM can be one of several components to a solution in which each component supports the others. The examples below show the broad view of TDM adopted by two agencies. In the first, the city of Bellevue, WA has integrated TDM into its broad transportation and land use planning process. The second example shows how Seattle Metro, the primary transit operator for the Seattle region, has adopted a range of TDM activities complementary to its delivery of public transit service.

Bellevue, WA

Context

The City of Bellevue is a suburban downtown, located 12 miles to the east of Seattle, Washington. Beginning in the late 1970s, Bellevue, along with the rest of the Seattle region, underwent a period of fast employment growth. With the growth in employment came an increased demand for housing, and with both came an increased awareness of the need to accommodate the new growth without compromising the character and vitality of the city's downtown. In dealing with these issues, Bellevue gradually moved toward a more integrated view of its transportation and land use planning processes, a move that included a greater emphasis on TDM.

TDM Actions

Since the 1970s, the city has consistently incorporated TDM strategies with other, more traditional, responses to transportation and growth concerns. For example, the centerpiece of the city's approach is a parking management program that specifies a ceiling on parking spaces per employee for various kinds of development rather than a floor. Parking is most often thought of as a land use issue, but by capping the number of parking spaces at less than developers typically would provide, the program also decreases the attractiveness of single occupant driving and reinforces the close connection between these two planning activities.

Bellevue's commitment to TDM extends well beyond its parking management program. For many years the city has emphasized the development of a strong transit network and a transit promotion program called "One Less Car." Additionally, the city has supported employers' TDM efforts and now assists employers to meet the requirements of the state-mandated Commute Trip Reduction (CTR) program.

Significance

Bellevue's objective for all its TDM activities is for TDM to work in concert with other transportation planning approaches, including roadway maintenance and expansion, to maintain the accessibility and economic vitality of its downtown.

Seattle Metro

Context

All too often, public transit operators view TDM and TDM-related activities, in particular ridesharing, as direct competition to their transit services. In reality, TDM activities can be complementary. One agency that has adopted a broad view of "public transportation" is the King County Department of Metropolitan Services (Metro), the Seattle Region's transit bus and vanpool operator.

TDM Actions

For many years, Metro has been instrumental in promoting a wide range of TDM activities and in supporting employer-based TDM programs. In the mid-1980s, Metro introduced a cost-sharing transit pass program that split the cost of transit subsidies with employers. Later, the program was extended to cover vanpool commuting, in vans obtained and maintained by Metro. Metro also has used vans in lieu of transit buses in areas where demand for transit was modest, in order to build ridership, and then shifted to full-size buses when demand grew.

Metro was also among the first transit agencies to market TDM programs to employees through their employers at their worksites and to work with employers to tailor transit service to employees' travel needs. In 1988, for example, the agency began the First Hill Express service, a transit service funded jointly by Metro and several neighboring Seattle hospitals, to provide direct transit service from residential areas to the hospital grounds.

To support TDM success further, the agency has conducted significant research on the effectiveness of TDM programs, lobbied for changes in the tax code to allow employers to provide tax-free commuting benefits for employees who use alternative modes, and supported passage of the statewide Commute Trip Reduction (CTR) legislation. Metro has also encouraged the adoption of transit- and TDM-compatible local zoning codes, which can contribute to dense commercial development and mixed-use employment/residential development.

Significance

Metro's efforts stem from a keen awareness of how a broad definition of "TDM" and "public transportation" can benefit both the Seattle region and Metro itself. Metro has concluded that successful ridesharing and transit share many of the same developmental and socioe-economic prerequisites, but that the markets for these services are not identical. Further, Metro's TDM development and

lobbying activities have created an environment in which transit and other alternatives to driving alone represent attractive and viable travel choices. Through its extensive efforts, the agency has raised awareness and the use of alternative commute modes.

Module II: Identify/Develop Appropriate TDM Strategies

Discussions with public agencies that participated in this project suggested that few public agencies used a systematic process for selecting TDM strategies to implement, relying instead on outside political and financial motivations. The absence of rigorous cost-benefit and market analyses can result in an agency choosing ineffective or inappropriate strategies. Despite the overall lack of thorough analysis, some public agencies have adopted more comprehensive feasibility analysis processes for choosing TDM strategies. Three such exemplary agencies, described below, are the Connecticut Department of Transportation, the Santa Clara County Transportation Agency, and the Pennsylvania Department of Transportation.

Connecticut DOT

Context

The Connecticut Department of Transportation (ConnDOT) has become increasingly interested in TDM and the potential of TDM-related measures to help relieve congestion in its crowded southwest corridor, and in the region surrounding Hartford, the state's capital. Due to the state's relatively high population density and mounting fiscal constraints, ConnDOT has begun to move away from new highway construction and is now looking to TDM as one of several alternative ways to deal with increasing congestion on the state's highways.

TDM Actions

In 1994, the ConnDOT undertook a systematic review of 27 transportation control measures (TCMs), including many TDM strategies, for possible inclusion in the state's State Implementation Plan (SIP) for air quality improvement. As part of the study, titled the *Connecticut TCM Evaluation Study*, the agency estimated the transportation and air quality benefits of each strategy and compared the relative benefits and costs of implementing them. The strategies examined ranged broadly, from fixed-guideway transit and employer-based TDM efforts to suburban vanpool initiatives and roadway pricing systems.

To ensure that each strategy was treated equally and that all important selection concerns were addressed, individual projects and policies were ranked according

to a pre-determined set of criteria. These criteria, which included cost per vehicle mile traveled (VMT) reduced, per unit of pollution reduced, and total cost, were developed by a study review committee composed of representatives from the state's Department of Environmental Resources, the Connecticut Fund for the Environment and the state's largest public utility, United Illuminating, as well as ConnDOT.

Significance

Application of this ranking system allowed easy recognition of effective and cost-effective measures, and ensured consideration of the concerns of all groups that might be involved in implementing the strategies.

Santa Clara County Transportation Agency

Context

The State of California allocates a set amount of funding derived from the state's vehicle registration fee to each county in the state for use on projects that contribute to air quality improvement under Assembly Bill 434 (designated AB434 funds). Santa Clara County Transportation Agency (SCCTA) developed a framework within which to evaluate potential projects for funding purposes.

TDM Actions

The framework consists of a scoring system in which various aspects of a potential project are allotted different weights and scored on the basis of specific criteria, as follows:

- Project Effectiveness
  - How and to what extent will the project improve air quality?
  - How and to what extent will the project reduce traffic congestion?
  - How and to what extent will the project reduce VMT? Person trips?
  - How cost-effective is the project?
  - Who will benefit from the project and how widespread does the analyst expect the benefits to be?
  - What other benefits does this project have?
- Local Matching Funds
  - To what extent are matching funds available?

- Multi-Agency/Public-Private Partnership
  - Are many public agencies or private organizations involved in the project?

- New Programs
  - Is this a new program?

- Projects of Countywide Significance
  - Are the impacts countywide, and are these impacts demonstrable?

- Mode Shift
  - To what extent does the project encourage a shift away from SOV travel?

Significance

The most significant aspect of the SCCTA criteria framework is its range of criteria. By including things such as whether the program has a number of public and private implementing partners (implying a wide agreement on the need for a particular project) and the ability of a project to specifically address the mode of travel, the SCCTA is clearly recognizing the need to expand the purposes and uses, and the salability, of TDM measures in general.

Pennsylvania DOT

Context

Pennsylvania DOT's (PennDOT) involvement in TDM strategy development and assessment originated from its role as the administrator of Congestion Mitigation and Air Quality (CMAQ) funding provided under ISTEA. Beginning in 1992, PennDOT embarked on a developmental process to establish a statewide methodology for assessing the relative benefits of CMAQ projects that produced what have become known as the PennDOT CMAQ Analysis Tools.

TDM Actions

The most significant feature of the CMAQ Analysis Tools was their insistence on uniformity. The Tools were designed and customized to be used in each of the state's 69 counties to perform transportation and air quality analysis on all CMAQ-eligible projects, ranging from arterial signalization to new transit service and ridesharing/vanpool programs. By using a single set of tools to evaluate all projects, PennDOT was able to more fairly determine how funding should be

allocated among all of the potential projects ranked on a series of performance criteria. In effect, all types of projects were analyzed on a level playing field, such that a new express bus service project was examined in the same context and with the same weight as an arterial intersection improvement.

Significance

The development and widespread use of the CMAQ Tools in Pennsylvania represented a giant step forward in the state's efforts to bring all projects that were essentially TDM-related into the same analysis framework, where their relative merits could be assessed more effectively.

Module III: Implement Employer-based TDM Strategies

A public agency's implementation of an employer-based program necessarily involves interaction and significant coordination with other organizations. Employers are one important group of partners, but other public agencies, transportation management associations, and transportation operators can also play valuable roles in providing and marketing TDM support services. Implementation also requires the resolution of legal, institutional, fiscal and other issues that could impede smooth and effective implementation.

Several examples of public agency programs that exhibited strong implementation efforts for employer-based TDM are highlighted in this section. They include: the Chicago Area Transportation Study (CATS), Seattle Metro, and Connecticut DOT in its cooperation with the state's rideshare brokerages, including Greater Hartford Rideshare Company.

Chicago Area Transportation Study

Context

The Chicago Area Transportation Study (CATS), the Chicago region's MPO, was an integral part of several of the employer programs surveyed for the employer side of the current research effort. In response to requirements in the CAAA, CATS joined several Chicago area employers in an employee commute option (ECO) demonstration program designed to familiarize employers in the Chicago Region with essential TDM concepts and measures.

TDM Actions

In the demonstration project, CATS played a supportive, hands-on teaching role that was in sharp contrast to the efforts of many similar public agencies. CATS actively solicited participants in its pilot TDM program, ensuring them that CATS

support would be steady and sufficient to make the program go. CATS met with representatives of each employer individually and helped them craft a TDM program customized to their particular employee needs. CATS also directly funded strategic support measures, including guaranteed ride home and an extensive regional ridesharing database and matching program. A total of 16 employers with almost 12,000 employees were involved in the program, and the range of measures implemented included parking management, compressed work weeks, transit subsidies, and on-site transit pass sales.

Significance

As a result of CATS' support, employers in the demonstration project were able to start TDM programs with much less difficulty and at a reduced cost. This was especially important for the many small employers in the project, many of which might not have participated without CATS' financial and technical advice and support.

Seattle Metro

Context

In addition to its role as a service provider, Seattle Metro has been active in promoting employer-based TDM programs and in creating and expanding public agency TDM partnerships.

TDM Actions

During the late 1980s, Metro sponsored the "Easy Ride" program to market TDM activities at worksites. Metro produced marketing materials, distributed them through "take one" displays, and held promotional events at employment sites. Metro employees also served directly as Transportation Coordinators (TCs) at worksites to assist employers in implementing TDM programs and to provide in-person trip planning assistance to employees.

In addition, Metro has taken a leading role in encouraging local and regional land use policies that complement TDM actions and in raising awareness of public decision-makers of the transportation impacts of local policies. For example, a recent report issued by Metro, *Land Use Actions That Support Mode Choice*, recommends land use actions that local jurisdictions within eight "policy areas" can implement to encourage alternative mode travel.

Significance

Through the wide dissemination of this report, Metro is seeking to highlight the importance of communication with local officials, and the role of local policies in successful TDM implementation.

Connecticut DOT and the State's Rideshare Brokerages

Context

Since the late 1970s, Connecticut DOT has established a long relationship with the state's rideshare brokerages, particularly the Greater Hartford Rideshare Company (GHRC). Primarily in response to the energy crises of that period, ConnDOT joined with large employers in the Hartford Region to form a group of private non-profits around the state that would act as clearinghouses for TDM-related information, services and analysis. GHRC has been the most active of these organizations, and has evolved into a business-oriented provider of transportation and brokerage services with regard to TDM. Two examples below highlight this approach and ConnDOT's participation as a backer and supporter of GHRC's efforts.

TDM Actions

Rockbestos

GHRC, with $40,000 in economic development financial support from ConnDOT, assisted Rockbestos in implementing a company vanpool program. The one-time grant enabled Rockbestos to begin its vanpool program and stay in the Hartford area, at a time when many other employers were leaving the state during a severe economic downturn. The vanpool program allowed Rockbestos to retain employees who traveled unusually long distances to the worksite. GHRC acted as Rockbestos' broker, articulating the company's needs and assisting the company with other technical issues in planning and implementing the vanpool program.

Easy Street

GHRC has also refashioned itself into a direct transportation provider by consolidating the separate vanpool programs of the Hartford region's largest employers into a single vanpool organization that it has recently renamed "Easy Street." GHRC's move comes as a major shift is occurring within the region's economy: many of the region's large employers, traditionally centered on

financial and professional services, are being purchased by out-of-state firms and significantly downsized. Downsizing has put pressure on these newly-reorganized corporations to divest themselves of costs that are deemed ancillary to their core business functions, and a substantial vanpool program was viewed by many as clearly outside of the acceptable range of activities.

It was under these conditions that GHRC decided to step in and combine the separate vanpool programs into a single service, reducing overhead costs and redirecting the focus of the program from employers to employees. It has also received capital funding for van replacement from ConnDOT, viewed as essential to revitalizing a service that had deteriorated amid funding cutbacks.

Significance

GHRC's efforts in both brokering the creation of specific employer programs and in providing services directly to commuters show a consistent implementation pattern: a willingness to tailor TDM actions to specific conditions while seeking new directions into which its actions can be extended. The most important aspects of GHRC's recent moves are its focus on the employee as the ultimate customer, not the employer, and its refashioning of itself into a service provider. This last move is especially important because it stresses the practical and utilitarian aspects of TDM rather than its strictly public policy value.

Module IV: Monitor and Evaluate Program Results

Although the guidance has indicated that monitoring and evaluation are often the most difficult activities to focus on and operationalize, they remain important in the overall process. Actions must be reviewed before, during and after their implementation to insure that the goals and objectives originally envisioned are being fulfilled. If the results do not agree with the intent, then new policies and strategies need to be developed in order to redirect future actions, or the goals themselves need to be altered. One key that is highlighted in the guidance is the need to tailor evaluation to particular situations and purposes, and the three agencies selected as exemplary here -- Maricopa County, the City of Bellevue and the Los Angeles County MTA -- have all exhibited that kind of attention to particulars.

Maricopa County, Arizona

Context

Maricopa County, Arizona, implemented a regional employer-based trip reduction program in 1991. The program requires employers with 100 or more employees to implement TDM programs.

TDM Actions

As part of the trip reduction program, employers must annually report their results to the county's Environmental Services Department. With the data employers provide, the County performs a wide range of evaluation measures, including the frequency with which given strategies are implemented, the impact of various strategies in various employment settings, and the cost of the employer programs.

Significance

Through its evaluation process, Maricopa County has demonstrated that the cost to employers is relatively low, with an annual average cost for all participating employers on the order of $8.11 per employee, lending additional weight to trip reduction efforts in the region. The low program cost is also important to the county, which is concerned with the impact of the program on employers. By keeping current cost data, the county is able to guide employers to low-cost and cost-effective strategies.

Bellevue, Washington

Context

Since 1991, Bellevue has been the responsible local public agency for enforcing and monitoring Washington state's Commute Trip Reduction (CTR) program. In addition to this effort, the City does areawide monitoring on its own to assess the success of its wider congestion and demand management programs.

TDM Actions

The City of Bellevue's monitoring of TDM takes place on two levels. At a lower level, the City collects data from its affected employers on the state-mandated commute trip reduction program that all employers with 100 employees or more must implement. This data provides the City with a ready source of information on the relative success or failure of the programs and measures being offered by City employers.

At a higher level, however, Bellevue is doing even more. It is maintaining and collecting data on traffic conditions overall within its downtown core and referring those results back to its multiplicity of efforts, including TDM. In this way, Bellevue is taking the analysis a step further, in a sense evaluating TDM within a larger context than simply at the employer level. Although it is difficult

to isolate TDM in this case, because in Bellevue it is part and parcel with so many other approaches, the fact remains that trend data can be analyzed for the downtown as a whole, and changes in the combination of TDM and other responses can then be made accordingly.

Significance

Bellevue's monitoring and evaluation approach is as broad and all-encompassing as its policy planning approach. This is significant in many ways, but most importantly in its matching of initial goals and strategies with measurement techniques and strategies. Bellevue has decided to make TDM an integral part of its process, extending all the way from planning and evaluating different measures through their implementation, evaluation and reapplication.

Los Angeles County MTA

Context

The Los Angeles County Metropolitan Transportation Authority (LACMTA) has funded nearly 100 TDM demonstration projects throughout Los Angeles County to make options to solo driving available as soon as possible. This Immediate Action Program is also intended to test and evaluate a variety of TDM strategies on a localized basis prior to consideration for county-wide implementation. This evaluation effort consists of two parts: (1) a rigorous third-party evaluation of 12 demonstration projects to assess the cost effectiveness of selected TDM strategies in reducing vehicle trips, vehicle miles traveled and emissions; and (2) an in-house evaluation carried out by MTA staff based on quarterly reports submitted by project sponsors. Given the limited number of projects undergoing the third-party evaluation, a case study approach is being utilized but the same measures of effectiveness are being applied to make consistent comparisons between projects.

TDM Actions

The twelve projects participating in the third-party evaluation were selected as representative of the overall TDM demonstration program. Diverse in scope and objectives, these projects include:

- a TMA sponsored, employer-based parking management program,
- two telebusiness centers,
- a free taxi feeder service linking a commuter rail station to nearby employment centers,

- a multi-tenant building-based TDM marketing and incentive program,
- a residence-based demand-responsive shuttle service,
- a mid-day shuttle service

- a shuttle service to improve the transit accessibility of a county government complex,
- a vanpool program utilizing new rider rebates and a child care bonus,
- a vanpool program to supplement commuter express service,
- a demand-responsive vanpool program, and
- a child care facility adjacent to a commuter rail system.

Significance

The evaluation process is still ongoing although results are scheduled to be reported to the MTA in the fall of 1995. The small number of projects in the third-party evaluation will preclude generalizations from these results on the ability of one or more TDM strategies to contribute to regional mobility and air quality goals. Results will shed light on the range of results possible, the impact of specific measures applied to a unique situation, and the interactive nature of combined strategies. By providing useful documentation on project effectiveness, information gleaned from the evaluation effort will help inform local and regional TDM funding decisions.

B. Future Needs and Areas for Study

This guidance has been relatively humble in its approach to developing a new TDM program or improving an existing framework. It has concentrated on the overall process, providing an outline or structure within which the most important questions can be asked and the most significant issues addressed.

The avoidance of detailed descriptions has been purposeful. There is little empirical data that can support more than what this guidance has offered. This is not surprising. TDM programs are still in their relative infancy and the environment in which they operate is not sufficiently developed to provide a constant source of reliable and appropriately organized data that the analyst can then turn to and analyze. Overall, however, the information gathered through this research project and the guidance presented here indicate important aspects of the current situation with regard to public agency involvement in TDM. How the current situation can be improved over the short term is a major focus of this guidance document. What is needed to make these changes more

lasting and able to stand up over the long term is better monitoring and reporting of the progress of state, regional and local agencies and participating employers in their search for better strategies and more effective programs.

The Current Picture

The research examined several aspects of public agency involvement in employer-based TDM, but three key elements clearly stand out in the TDM landscape:

(1) *Public agencies are generally not making TDM part of their overall transportation planning and funding process.* Instead of identifying potential actions that have a high probability of successful implementation and problem solution and then finding ways in which to fund them, public agencies are allowing the availability of designated funding to be the primary criterion for program advancement.

(2) *Implementation at the employer level as carried through by public agencies focuses almost entirely on public agency-derived goals.* Too often, public agencies involved in TDM are unwilling or unable to acknowledge that employers may legitimately be uninterested in the public policy goals and objectives to be achieved through TDM.

(3) *With the exception of those places where there is a legal requirement to do so, little or no monitoring and evaluation is going at the employer level.* Public agencies who participated in this project were almost unanimous in their lack of information on true program effectiveness. In most cases, only a small effort, and few resources, were devoted to examining the impacts of specific TDM actions or programs and feeding those results back through the process. When information was available, it was still difficult to compare to other areas and programs because of variations in data availability and performance measures used.

Improvements in This Guidance

This guidance addresses these shortcomings in two specific ways:

(1) *The guidance offers a general, process-oriented framework within which public agencies can develop effective TDM programs.* This process directly addresses points one and three above by making all of the necessary choices and tradeoffs explicit. TDM must become a part of the overall transportation planning process, on an equal footing with other

strategies such as capacity expansion, and it must be examined rigorously during both planning and evaluation.

(2) *The guidance emphasizes a shift away from command-and-control toward partnership.* Employers must be viewed as partners, as co-distributors of TDM services and benefits, rather than as subjects to a public policy imperative. This shift in emphasis should lead public agencies to solicit more information from targeted employers on how a TDM program can be structured to reach employees, the true end-user of TDM services, while serving employer goals or at least not preventing their achievement.

Data and Methodology Needs for the Future

Longer-term research and development needs in the overall TDM picture are also clearly needed, and they are led by the need for more reliable data sources. The lack of clean and well-gathered data remains a significant obstacle to the demonstration of the cost-effectiveness of the range of TDM measures and strategies cited in this guidance. Other key needs include:

(1) *The continued integration of TDM-related planning with the rest of the transportation planning process is not only a short-term improvement advocated by this guidance but also an essential for the long-term future.* Until TDM has equal standing, the process remains compromised by its lack of balance, and will consistently be biased by its stress on traditional supply-side solutions at the expense of the innovation represented by TDM.

(2) *TDM impacts need to be assessed more fully in the land development approval process.* More research is clearly needed on the interaction of land use and transportation, but the land use planning process remains as biased as the overall transportation process, especially when trade-offs can be made between density, varying uses and the transportation infrastructure needed to serve a given site.

(3) *TDM research needs to focus on the individual transportation system user, whether strictly a commuter or anyone making a trip in the impact area.* Although this research project has focused largely on the ways in which employers can become involved in TDM and how public agencies can help them make it happen, the ultimate aim of all of the policies and strategies remains the individual, whether viewed as an employee or simply as a trip-maker. TDM research needs to refocus its efforts and place more emphasis on assessing what affects the unique transportation

mode choice. Effectiveness should be measured in the impact on the individual user's choice, not on the willingness of a given employer to be involved in the TDM process.

Appendix A: Analysis of New Directions for Public Agency Roles in Pricing/Taxation Policy and Land Use Regulation with Regard to TDM

The two sections of this appendix identify areas for future research and summarize the most important piece of current or recently-completed research that seeks to make significant inroads in that area. The direction of concern in the first section is TDM-related public policy and land use policy, while the second section addresses tax and fiscal policy questions.

I. Coordinated TDM and Land Use Policy

Where and when should transportation planners be cognizant of land use policy, and how can it be effectively brought into the transportation planning process? This question has long been a difficult one to answer definitively, but recent research is pointing to a very close relationship between land use and transportation.

Over the last few years, several lines of thinking have come to play significant roles in the debate over how to best move transportation planning beyond a solely capacity-expanding exercise. The first line of thinking was that more efficient use of the transportation system could be gained by making adjustments to supply, i.e. using technology and advances in operations and maintenance to allow the existing transportation system to accommodate a higher level of use than previous. This strategy, known as transportation system management (TSM), relies on traffic engineering, improved roadway geometry, reduced conflicts among modes, and computerization to get more automobiles through the street and highway network.

A second line of thinking has focused on the demand side of the transportation system. Dubbed transportation demand management (TDM), this strategy is geared toward reducing the demand for transportation rather than expanding its supply. TDM measures include an increased emphasis on ridesharing, the shifting of automobile travel to non-peak periods, and subsidization for alternative modes like transit, carpooling, and vanpooling. Since its inception, TDM has been limited for the most part to employer-based efforts, but its application has been slowly moving beyond just the work trip.

The third and most recent line of thinking has been concerned mostly with land use and urban design and its impact on transportation, rather than with the transportation system itself. The rationale behind this approach has been that changes in urban form and the pattern of land use away from sparse, low-density development (which is best served by the automobile and, most particularly, single-occupant vehicle travel) toward transit- and pedestrian-oriented, denser urban form can have significant impacts on the mode and distribution of travel. Basically, the argument is land use arrangement determines the most appropriate transportation to serve it.

Needless to say, this has been a contentious debate, and all three schools of thought have made claims beyond what the data and common sense might support. No one strategy can solve all of the problems encountered by the current transportation system. One common theme brought out in all four parts of the field research in this project has been that land use and TDM interact quite intimately. That is to say, focusing on just one group of strategies, to the exclusion of the others, can serious impair the task of optimizing utilization of the transportation system.

To this end, a recently completed study entitled *The Effects of Land Use and Travel Demand Management Strategies on Commuting Behavior*[1] has made a significant step forward in understanding the potential interaction of TDM and land use policy. The study analyzed and collected additional data on employee commuting and employer site characteristics for 330 employers in the Southern California Air Quality Management District (SCAQMD) area with the following underlying hypothesis:

> [L]and use and urban design characteristics of work sites affect employee work trip mode choices. Furthermore, these land use and urban design characteristics may interact with various employer-based transportation demand management (TDM) strategies to alter commuter work trip mode choice. That is, similar TDMs may cause different changes in mode choice as a result of the mix of land use and urban design characteristics present at different work sites.[2]

Those who are interested in the exact analysis methodology used and a full presentation of the conclusions reached are directed to the original text; only the most relevant conclusions are presented below:

(I) *Financial Incentives are Important as Part of a TDM Strategy*
This conclusion fits with what was found over the course of this research project and other previous employer-based TDM research. The study goes further, however, and asserts that financial incentives were the *only* TDM strategies that had a significant impact on commute behavior. This assertion carries forward to all subsequent conclusions presented.

(II) *A Positive Interactive Effect Exists Between Land Use Characteristics and Financial Incentives*
The combined affect of financial incentives and certain representative land use characteristics -- sites with an aesthetically pleasing urban character, a

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[1] Cambridge Systematics, with Deakin, Harvey, Skabardonis, Inc. *The Effects of Land Use and Travel Demand Management Strategies on Commuting Behavior,* prepared for U.S. Department of Transportation and U.S. Environmental Protection Agency, November 1994.

[2] *The Effects of Land Use and Travel Demand Strategies on Commuting Behavior,* p. 1-3.

preponderance of convenience-oriented services nearby, good access to all services, a perception of safety, and a mix of land uses -- is greater than either aspect alone, but their cumulative affect is less than their sum individually. The study asserts at this point that

> In implementing a regional TDM strategy, efforts should focus on areas that exhibit at least one of the land use characteristics studies as there is a greater potential for increases in the AVR [average vehicle ridership] in these areas. Consideration of this interactive effect when designing a TDM strategy may result in a more effective and efficient program. Adoption of policies that support compatible development of work sites with the land use and urban design characteristics found to encourage alternative modes is warranted.[3]

(III) *Tradeoffs Exist Between Ridesharing, Transit and Walk/Bike*
This was potentially the most important conclusion of the study, even though it might sound as if TDM is doomed to constantly go back and forth between transit and ridesharing when accruing gains from key measures. The study finds that increases in ridesharing in most situations can come at the expense not only of single-occupant vehicle commuting, but also transit and other alternative mode commuting. It then goes on to assert that

> transit and walk/bike shares were found to be highest at sites with supportive land use and urban design characteristics...By understanding the tradeoffs that may occur given particular land use characteristics, a TDM program can be designed to strengthen incentives that will encourage the full range of available non-drive alone modes. It may be effective to focus TDM strategies on ridesharing in areas that do not exhibit land use that are supportive of transit, walking, and bicycling. TDMs that support transit and walk/bike should be featured in areas where the land uses are supportive of these modes.[4]

This last assertion is a clear indication of the truly interactive effects of land use and TDM and how they may be most effectively addressed in the employer-based process. What the study ultimately suggests is that TDM programs and strategies must be tailored as closely as possible

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[3] *The Effects of Land Use and Travel Demand Management Strategies on Commuting Behavior,* p. 4-2.

[4] *The Effects of Land Use and Travel Demand Management Strategies on Commuting Behavior,* p. 4-2.

to site-specific land use characteristics, in order to bring and encourage the highest level of interaction between land use and transportation. From the other side of the equation, the study indicates that land use policy should be closely linked to regional and local transportation planning issues in order to maximize the effectiveness of both TDM and land use policy decisions and programs.

II. Pricing and Taxation Policy

If there are two certainties in the TDM universe at this point in its development, they are that:

(1) Financial incentive-based measures are generally the most effective in terms of trip reduction, and

(2) The regulatory environment for employer-based TDM programs is changing from legal mandates to voluntary employer participation.

With regard to the first certainty, however, this research as a whole and the preponderance of other studies have shown that even though incentive measures are judged to be the most effective, very few employers in the larger TDM environment have actually implemented them. One observation made during the focus group discussions on both sides was that incentive measures have generally been brought into being only when specific site situations demand them, or when employers who have missed a given legally-enforced trip reduction target with support measures are practically forced to turn to more effective incentive measures. If this is indeed the case, it would appear that the future of TDM will consist of attempting to square a circle, i.e. persuading employers to implement incentive measures voluntarily when they have shown an unwillingness to do so unless mandated or coerced.

A recently inaugurated project sponsored by the Association for Commuter Transportation (ACT) as part of its Commuter Choice Initiative takes aim at this difficult situation by focusing on the U.S. tax code's treatment of transportation-related business expenses. The code requires employers who offer subsidies of greater than $60 per employee per month for use of transit or vanpooling to count the portion over $60 as employee-received taxable income. Subsidies for carpooling, walking, and other commute alternatives are wholly taxed as income (over the *de minimis* threshold of $21). On the other hand, the code considers employer-provided parking a transportation fringe benefit, non-taxable unless its value is greater than $155 per employee per month. If employers offer employees the cash value of parking in lieu of parking ("cashing out" parking), the cash value becomes taxable even if the employee chooses the parking option.

Not surprisingly, as structured, the tax code strongly influences employers to provide free or discounted parking to employees to the exclusion of other types of transportation benefits. Ninety-five percent of employee parking in the U.S. is free. Outside of downtown areas, the figure rises to 98%. By contrast, few employers offer financial subsidies for commute alternatives. Those that do tend to be subject to a state or local regulation with ambitious trip

reduction goals, or to be employers with significant internal motivations to reduce trips near the worksite, provide new commute options to employees, or expand their access to labor markets.

TDM research further has shown a strong correlation between the level of parking charges (and other direct user charges) and commute subsidies and the likelihood that an employee will drive alone to work. When a market value parking charge was instituted in a downtown Los Angeles firm, the percent of employees who drove to work alone fell by 77%. Similar results have been found in Washington, DC, Hartford, CT, Seattle, WA and other cities where parking studies have been done. Research also has shown that when cash or financial subsidies are offered in lieu of parking, many employees will accept the subsidy and forego the parking.

Past debate on this issue was decided by several factors. The lack of hard data on the "true" trip reduction impacts of TDM strategies and the difficulty of the groups lobbying for the changes to produce financial analyses credible to legislators and revenue officials allowed room for long and strenuous debate. The prospect of lost tax revenue at a time when a large federal deficit loomed was a very real problem. Conflicts between urban and rural legislators, who measure the potential benefits to their states differently, have further complicated the task of persuading federal legislators to enact changes.

This ACT-sponsored project will undertake solid research to produce "hard" data on costs and benefits that are persuasive and recognizable to decision makers. Further, the data will be presented in the context of transportation, mobility, air quality, and other national concerns related to use of motor vehicles. ACT and the agencies funding the research want to influence the future tax treatment of commuter benefits for the potential payoff in congestion management, emissions reductions, infrastructure cost avoidance, and reduction in business and personal travel-related costs. Although challenges remain, such market-based TDM strategies are gaining acceptance. Support for TDM is shifting away from federally-mandated programs to voluntary, "employer-friendly" actions, focusing on positive motivations rather than command and control requirements. TDM's emphasis now is on finding low-cost strategies that have documented trip reduction impacts and non-transportation benefits, such as enhanced productivity and cost savings on operations and administration, and that fit within employers' existing employee benefits structures.

Appendix B: Listing of Recently Completed and Ongoing Employer-based TDM Research

Recently Completed

Cambridge Systematics, with Deakin, Harvey, Skabardonis, Inc. *The Effects of Land Use and Travel Demand Management Strategies on Commuting Behavior*, prepared for U.S. Department of Transportation and U.S. Environmental Protection Agency, November 1994.

Cleland, Francis and Philip Winters. "Using Survey Research to Determine Carpool/Transit Incentive Levels." Paper prepared for: Annual Meeting, Institute of Transportation Engineers, 1995.

Chen, Quizi, W. Patrick Beaton, and Hamou Meghdir. "A Profile of Employee Transportation Coordinators." 74th Annual Meeting, Transportation Research Board, Washington, DC, January 22-28, 1995.

Giuliano, Genevieve. *Impacts of Compressed Work Weeks on Vehicle Trips and Miles Traveled.* For: California Air Resources Board, #A132-136, October 1994.

Higgins, Thomas. "How Do We Know Employer Based TDM Works? Or, The Need for Experimental Design." 74th Annual Meeting, Transportation Research Board, Washington, DC, January 22-28, 1995.

Maricopa County Regional Trip Reduction Program: Cost Study and Analysis. Environmental Services Department, Trip Reduction Program, Maricopa County, Arizona. May 1995.

Rawlings, Gerald, Mary Jennings (Chicago Area Transportation Study) and Nick Ramfos (San Diego Association of Governments). "Analysis of Employer Costs from the CATS ECO Demonstration Project." In: *Transportation Demand Management Review*, Association for Commuter Transportation, March 1995, 13-16.

Washington State Department of Transportation. *An Analysis of Factors Accounting for Success and Failure in the Acceptance and Utilization of Employer TDM Programs by Employees.* Final Technical Report WA-RD 359.1. Olympia, WA: Washington State Transportation Center, 1994.

Winters, Philip. "So You Want to Design a Cost-Effective Employer Trip Reduction Program?" Paper prepared for: Annual Meeting, Association for Commuter Transportation, 1995.

Ongoing

Association for Commuter Transportation (sponsoring agency). *Commuter Choice Initiative: National Taxation Policy Impacts on Commuter Behavior.* Anticipated completion: January 1996.

Center for Urban Transportation Research for Florida Department of Transportation (sponsoring agency). "Application of Neural Network Analysis of TDM, using SCAQMD Rule 1501 data." No completion date specified.

Appendix C: Bibliography of Selected TDM Implementation Documents

Association for Commuter Transportation, *TDM Review*, published quarterly by Sufka & Assocations on behalf of the Association for Commuter Transportation, Washington, D.C.

Brentwood Area Transportation Management Association; *Employee Transportation Coordinator Handbook: Creating Employee Transportation Programs and Services in Williamson County*; Brentwood Area Transportation Management Association, Brentwood Tennessee, January 1992.

Commuter Transportation Services, Inc., *ETC Handbook: A Commute Management Guide for Employee Transportation Coordinators*, Commuter Transportation Services, Inc., Los Angeles, CA, May 1990

Commuter Transportation Services, Inc., *Guaranteed Ride Home: Taking the Worry Out of Ridesharing;* Commuter Transportation Services, Inc. Los Angeles, CA; May 1990.

Commuter Transportation Services Inc.; *Telecommuting: A Handbook to Help You Set Up a Program at Your Company.*; California Department of Transportation, Sacramento, CA.

Commuter Transportation Services, Inc., *TMA Handbook: A Guide to Successful Transportation Management Associations*, Commuter Transportation Services, Inc . Los Angeles, CA, 1994

Commuter Transportation Services, Inc.; *Vanpooling: A Handbook to Help You Set Up a Program at Your Company*, Commuter Transportation Services, Inc. Los Angeles, CA, 1993

COMSIS Corporation and Harold Katz & Associates, *Evaluation of Travel Demand Management Measures to Relieve Congestion*, Federal Highway Administration DOT-T-90-14, February 1990.

COMSIS Corporation, Institute of Transportation Engineers, Georgia Institute of Technology, K.T. Analytics, Inc., R.H. Pratt, Consultant, Inc., *A Guidance Manual for Implementing Effective Employer-Based Travel Demand Management Programs*, Federal Highway Administration & Federal Transit Administration DOT-T-94-05, November 1993

COMSIS Corporation, Institute of Transportation Engineers, Georgia Institute of Technology, K.T. Analytics, Inc., and R.H. Prattt, Consultant, Inc., *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience*, Federal Highway Administration DOT-T-94-02, September 1993.

COMSIS Corporation, Eric N. Schreffler, Transportation Consultant, K.T. Analytics, Inc., Applied Management and Planning Group; *MTA TDM Demonstration Program'Third-Party Evaluation Final Report*; Los Angeles County Metropolitan Transportation Authority, February 1996.

King County Department of Metropolitan Services; *Charging for Parking in Suburban Areas: Case Studies of Worksites in King County, Washington*; King County Department of Metropolitan Services, Seattle, Washington, February 1995.

K.T. Analytics, Inc.; *An Assessment of Travel Demand Management Approaches at Suburban Activity Centers*; U.S. Department of Transportation, Transportation Systems Center, Cambridge, MA 02142, July 1989.

Municipality of Metropolitan Seattle; *Managing Employee Parking in a Changing Market: A Workshop for King County Employers;* The Commuter Challenge Program, Seattle, Washington, November 1993.

Municipality of Metropolitan Seattle; *Managing Employee Parking in a Changing Market (Handbook)*; Municipality of Metropolitan Seattle Service Development Division; November 1993.

Northeastern Association of State Highway and Transportation Officials; *Transportation Demand Management in the Northeast: Catalog of TDM Techniques*; Northeastern Association of State Highway and Transportation Officials, April 1991.

Appendix D: Focus Group Summaries

Tasks four and five of this research consisted of holding focus group meetings with employers and public agency representatives in three locations around the country: Seattle, Washington, D.C., and Miami. These meetings were directed primarily at eliciting responses to the findings and implications of the research to that point, and at encouraging further debate of employer and public agency needs in terms of information and guidance on TDM cost-effectiveness.

This appendix summarizes the structure and the public agency-oriented outcome of the meetings which were held in late August and early September of 1994.

I. Outline of Focus Group Meetings

Although held on the same day in each region, the focus group meetings were held separately for employer and public agency representatives. Each session was three hours in length, with the employers taking up the morning and public agency representatives the afternoon.

Participants in both sessions were given outlines of the research findings through the two working papers -- employer and public agency -- and discussion guides for a number of topics. Both sides were supplied with information on the following five topics:

(I) Client
(II) Study Purpose
(III) Products: employer and public guidance
(IV) Study Organization
(V) Study Process

The sixth part of the introductory information set up the discussion agenda for the remainder of the focus group session. Participating employer representatives were presented with the following discussion goals/purposes:

(A) Critique the working paper on employer-based TDM programs
(B) Further identify costs and benefits, economic and productivity measures, and other cost-effectiveness issues related to TDM strategies
(C) Discussion key elements of the employer decision-making process, and identify expectations for study guidance products
(D) Offer insight on public agency requirements and support

Public agency representatives were given a somewhat different charge, as follows:

(A) Critique approach and findings in employer-based working paper

(B) Critique approach and findings in public agency working paper
(C) Expand/refine key decision criteria used by public agencies in relation to TDM
(D) Discuss expectations and priorities for public agency guidance product

II. Outcome of the Focus Group Meetings

The outcome of the focus group discussions with regard to public agency roles and responsibilities will be summarized in this section.

Views of Employer Needs for Public Agency Guidance and Support

- *Role of the Public Sector in Determining Participation*
  Most participating employers indicated that their involvement in TDM was at least initially or partially due to some requirement or pressure from the public sector, usually through a trip reduction ordinance or transportation management requirement. Most employers, however, who were initially required to implement a program later found a real value in providing a tangible service to their employees. If there was one reservation, it was that the targets originally established seemed unrealistic in light of the information they had to figure out how to meet those targets, and that such targets were often established without a real emphasis on providing viable alternatives to SOV commuting (ridesharing, vanpool, transit) that could make the targets attainable.

- *Types of Actions/Services Most Desired from the Public Sector*
  The desirability of tax incentives or credits for either employers or employees to support major incentive programs was heavily supported. If parking charges were to be considered, most felt that it would necessarily have to be a part of a "level playing field" across a given region for all employers.

  Employer participants thought it important for public agencies to create a "regional culture" to promote TDM concepts and measures, to lobby and educate more thoroughly to change popular attitudes about TDM and its relative usefulness.

  Public agencies were generally thought to be better equipped to document and provide information on the impacts of successful TDM programs, with additional information on how to replicate those programs' results.

A common theme was the need for coordination in public agency efforts, both in programming and funding of TDM. In particular, directives for employers to achieve trip reduction should be consistent with policies regarding better and more comprehensive transit service and appropriate support services. Most participants suggested that the best vehicle for TDM might be a one-stop provider who could bring all TDM-related services under one roof, or at least be solely responsible for their coordination.

Most participants also stressed the following basic objectives as being mostly the responsibility of the private sector:

- better transit service, incorporating more attention on suburb-to-suburb, inter-county services, better intermodal linkage, and special pricing measures
- fully-integrated HOV facilities
- consistent and sensible growth management and land use policies
- application of market-based measures to encourage behavior change and support alternatives

This part and the two that follow it indicate the reaction of public agency representatives to their four central issues.

Current Public Support and Decisionmaking

In general, public agency participants agreed that the efforts of agencies to support TDM are generally soft, not well integrated, not representative of common objectives, and sporadically funded. Furthermore, most participants acknowledged that there is still considerable anxiety about TDM at the state and local levels.

In particular, states with sluggish economies are concerned that implementing TDM may place pressure on employers that will cause them to leave. States with growing economies are afraid to place requirements on employers that have recently left jurisdictions with such regulations. Within metropolitan areas, regions and jurisdictions face similar battles, with concerns about a lack of equity between downtown and suburb employers, and losing employment to either part of the region.

Overall, achieving effective employer-based TDM programs is viewed as being costly, unattainable, and unreliable, and hence, programs and decisionmaking do not appear to be substantial considerations or even relevant to the type of guidance and support that would lead to effective programs.

Types of Support Services Most Effective

Several support services were determined by the focus group participants to be most effective in assisting and stimulating employer-based TDM efforts:

- *Transportation management associations (TMAs)*
  TMAs are still felt by many regions to be an effective way to get the message out to employers and provide necessary assistance and guidance, particularly in areas where public pressure for employers to perform is light.
- *Improved research and evaluation*
  Because local evidence is ultimately most compelling, studied efforts should be made to track local programs, using reliable before and after surveys and defensible statistical methods in acquiring the baseline data.
- *Outreach services and guidance to employers*
  Employers are constantly in need of advice and expert help in making program decisions, collecting data, performing analysis, etc. Agencies should be better equipped and more willing to provide such assistance.
- *ETC training*
  ETCs are felt to be critical to successful employer programs -- from convincing the employee to convincing management of the worth of TDM. It was assumed that more and better training would lead to much more effective ETCs and aid in the creation of a "regional climate" for TDM.
- *Financial Inducements*
  A number of participants believed that tax credits or similar instruments would be necessary if employers were to be able to introduce the more effective incentive and disincentive measures.
- *Land Use*
  TDM programs should be coordinated with land use and zoning changes that will encourage rather than discourage their implementation.
- *Infrastructure*
  Many noted that much more can be done to make transit a truly viable alternative, including better connectivity and service concepts. HOV lanes have proved important in a number of settings, though they need to be better marketed and enforced.

Needs for Guidance

A wide range of guidance needs were raised by focus group participants, including:

- Comparison of the cost-effectiveness of TDM and demand-side approaches with the alternative of building new highway capacity.

- Concern continued to be expressed over the applicability of national results to particular local circumstances. A need for local data collection and analysis was indicated.

- Comparison of results and implications with a widely-accepted traffic engineering benchmark like Level of Service or another corridor/areawide measure of system performance was viewed as a desirable development.

- Emissions impacts of various TDM options should be made explicit.

- Representatives of TMAs described themselves as either having to justify their existence or find better ways to provide service and make an impact. They wanted to know how the guidance would account for their role and importance, or provide them with direction.

- Clear definition of public agency and private employer roles and responsibilities was seen as an essential step toward demonstrating fairness and the potential for synergy.