1. Control. TSM is a facility manager's activity. It is not an activity in the political process that might lead to major institutional revisions. If facility managers are limited in their actions, we should expect little from TSM.
2. Claims to rights. Spatial-population claims to rights are ignored; temporal rights are challenged by TSM. The rights of a minority are advocated (transit users); the rights of the majority are challenged (automobile users). If facilities supply goods and services that are rights, TSM is inconsistent with facility purposes.
3. Capital intensiveness. TSM undertakes to deploy management solutions to avoid continued capital investment. If there is a bias toward capital investment, capital intensiveness will not be avoided.
4. Technology supply. TSM will deploy certain technologies familiar to system managers (traffic engineering); other of its technologies are foreign to the delivery system (pricing, for example). If facility actors use only those technologies familiar to their professions, TSM will be a traffic engineering activity.
5. Incremental, disjoint decision making. TSM favors facility-improving measures to be deployed in a manner consistent with current incremental, disjoint decision-making procedures. If this decision-making procedure results in changes that are slow, change from TSM will be slow.
6. System robustness. TSM is addressed to heavily used routes. If improvements in one part of a system are limited by other system parts, then TSM will not be very effective even on those routes where it is applied.
7. Location conflicts. Again, TSM is addressed to heavily used routes. If facility improvements result in location conflicts, then there will be location conflicts.
8. Land development. TSM is focused on the transportation plant alone; development consequences are ignored. If facility services affect land development, there will be development consequences.
9. Organizational roles and perceptions. There are several organizations in urban areas providing transportation services (transit systems, local public works agencies, and so on). TSM is to orchestrate these organizations. In addition, TSM emphasizes operations versus facility deployment. If extant roles and perceptions limit change, then change from TSM will be limited.

TSM managers and those who formulate TSM strategies may wish to make their own evaluations of the correspondence between TSM strategies and the characteristics of public facility systems. They may wish to alter old strategies or adopt new strategies (5).

The opportunity to better align the transportation system with the service society is of special interest. TSM strategies ought to be formulated so that they can be quickly readjusted as it is learned whether they are counter to, neutral about, or supportive of present-day social activity patterns. The TSM manager will have considerable help discovering how effective strategies are. As strategies are deployed that are counter to today's needs, then he or she will be quick to hear about that. If those strategies are supportive of those needs, then those processes by which the rights to service are claimed, especially political processes, will begin to come into play to support TSM activities.

Urban transportation provides many opportunities for scaling. It is easy to imagine a rescaled system where special roadways, small vehicles, and appropriate traffic controls provide for those short trips, approximately half of all trips, that are neighborhood in orientation. This would increase neighborhood accessibility, reduce resources used in transportation, and improve the environment of the residential neighborhoods. Access throughout sectors of the city might be provided by urban cars operating principally on what are now arterials. Over-the-road vehicles or commuter cars might provide for the longer journey to work via freeways. Line-haul transit might be served by collector-distributor neighborhood transportation vehicles.

If urban transportation management seeks to direct the evolution of urban transportation in new directions, as opposed to making the present path of development work somewhat better, then transportation system management strategies of the very demanding sort are required, strategies that will have to be based on a rich understanding of the question of how public facility systems may be changed.

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FEDERAL PERSPECTIVE REGARDING TSM

C. Kenneth Orski
Office of Policy and Program Development
Urban Mass Transportation Administration

This paper focuses on the institutional dimension of transportation system management and suggests local and federal policy to promote understanding and agreement on the institutional roles and responsibilities so that TSM is not enmeshed in debilitating jurisdictional disputes.

There are, I suppose, two ways of viewing the institutional roles in transportation system management planning. The first way is to place transportation system management in the context of the classical system planning process: a process that begins with the adoption of systemwide goals and objectives, proceeds to the iden-

tification of deficiencies in the system, and then leads to the selection of appropriate implementing actions. In this process, the metropolitan planning organization plays the role of the systemic planner, designing and orchestrating a comprehensive, areawide TSM strategy, with the goal of optimizing the operating efficiency of the transportation system as a whole. The modal agencies—the transit operator, the state highway department, the city traffic engineer, and the parking authority—are placed in a subordinate role, one of implementing agents whose mission is confined to executing the individual pieces of the master plan designed by the MPO. For purposes of characterization, I shall call this the top-down approach to TSM plan development—an approach that tends to reflect the classical planning style employed by areawide planning agencies in their traditional long-range planning activities.

The other approach—which I shall call the bottom-up approach—takes a more realistic view of the real-world environment of metropolitan decision making. This approach tries not to ignore the hard realities of jurisdictional fragmentation, dispersed implementation responsibilities, and diffusion of political power prevailing within the typical metropolitan area. It recognizes the need for sharing power, for a negotiated process of resource allocation, for some ad hoc responses to local pressures, and for some willingness for political give and take. In this approach the process of TSM planning is viewed not as an idealized strategy of seeking optimum systemwide efficiency but as a piecemeal, project-by-project effort that relies heavily on negotiated solutions, that is quick to exploit unique opportunities, and that is not indifferent to public response and the probability of success.

Accordingly, the roles of the various metropolitan actors in this second approach will be different. The responsibility for initiating TSM actions will rest heavily with the operating agencies—the transit authority, the city traffic department, the police department, the redevelopment agency, the state and county transportation authorities—all the different bodies that have the power to make things happen. The function of the MPO will be to ensure that the individual initiatives are consistent with the area's overall transportation plan, that they do not interfere with but reinforce one another, and that they are implemented in a coordinated fashion. The MPO will also serve as a forum in which joint TSM ventures between two or more agencies are facilitated and in which new TSM initiatives are first broached. The MPO, in other words, will act as a convenor, a broker, and a conflict-resolver, but not as an overall architect of an areawide TSM strategy.

These, as I see it, are the two models for the TSM planning process. The systemic, top-down approach may possibly be workable, but the bottom-up, project-by-project, incremental approach is, in my view, far more compatible with the reality of metropolitan decision making. I have serious doubts that transportation system management lends itself to the comprehensive approach as practiced by the regional planning agencies in their long-range planning process. Those who try to apply the master-plan mentality to TSM ignore one key point: that the planning institutions at the metropolitan level are not in a position to make policy trade-offs at the regional or systemwide scale and that, lacking the power of implementation, their plans will remain "wish lists" unless they are supported by the implementing agencies.

What conclusions do I draw from all this for local and federal policy? Let me suggest the following agenda.

1. MPOs must work ever more closely with the operating agencies and must offer them positive inducements to stimulate TSM planning and implementation. One tangible incentive would be for the MPOs to pass through a portion of the planning funds that they now receive from federal sources. Important beneficiaries of such pass-through planning funds could be the transit operators, but they could also include city traffic departments and other municipal, county, and state agencies that have the power to initiate and follow through on TSM actions.

2. The MPOs themselves must develop a greater capability to do short-range operational planning so that they can effectively evaluate and coordinate the various TSM initiatives that come from the operating agencies. We want to see the MPOs devote more of the section 9 planning funds to operational planning, and we intend to use the annual review of the unified work programs as an opportunity to monitor progress toward this goal.

3. We need to consider how private transportation service providers can be effectively involved in TSM plan development and project formulation. Such projects would typically involve taxi companies in the provision of specialized services for elderly and handicapped persons, feeder services in low-density neighborhoods, and shared-ride community transit services to facilitate daytime circulation. UMTA has taken a significant step in the direction of facilitating private operator involvement by promulgating a statement of paratransit policy. The policy requires that private transportation providers (a) be given full opportunity to participate in the local planning and programming process conducted under the aegis of the MPO and (b) be given the right to propose and participate in the provision of local paratransit services. The local private operators and the planning and transit authorities must now give effect to this policy.

4. We need to consider how to involve the private sector in TSM plan development. Many TSM initiatives, staggered workhours or van-pooling programs, for example, greatly depend on the initiative of private employers. Today these initiatives, to the extent that they occur, are haphazard and uncoordinated. We need to make a greater effort to integrate them into the urban transportation management process.

5. We also must open the TSM planning process to greater public participation. Public attitudes and citizen involvement have played a significant role in the movement away from the philosophy of massive construction projects and toward the philosophy of urban conservation. The role of the public must also be recognized in TSM planning and implementation, since many types of TSM projects are based on neighborhood initiative and public acceptance.

6. We must make a determined effort, as part of the TSM planning process, to do away with laws, regulations, and local ordinances that hinder TSM implementation. Some of the more obvious examples of legal barriers to TSM implementation include zoning laws that require provision of a minimum number of parking spaces in new buildings, ordinances that prohibit the use of shared-ride taxi service, insurance impediments to cooperative van pooling, stringent design and construction standards for streets and highways, and banning of tolls on federally aided highways.

7. We must seriously consider the possibility of earmarked funding for TSM. Although TSM project implementation can be supported out of a number of UMTA and FHWA funding sources, the competition from established claimants may be too intense to allow TSM to compete fairly for the money. As a general rule, we should resist the temptation to create new categorical programs every time we wish to promote a new policy; however, this is a situation in which a modestly funded program

could have an enormous payoff in terms of its beneficial impact on the urban environment.

8. The MPO must become a true forum for cooperative resource allocation decision making. We recognize that the exercise of true programming responsibility is not an easy thing to accomplish. It will be an evolutionary process, and many MPOs will have to mature before state and local political leadership will tolerate the exercise of that responsibility at the regional level. Again, as with the planning function, the MPO will often act only as a referee. The specific project proposals may typically come from local governments and transit authorities. But where there is not enough money to go around, some tough resource allocation and priority-setting decisions will have to be made. Further, to ensure that certain of UMTA's special policy requirements are met, such as special effort on behalf of the elderly and handicapped, Title VI equity, and private operator involvement, somebody will have to bear the local responsibility. Although most proposals for individual TSM projects will be developed on a bottom-up basis, the requirements will have to be enforced and any competing demands resolved on a top-down basis, and we think the MPO will have to be the forum for doing that.

This, then, is our perspective on the difficult and sensitive issue of the institutional roles in TSM planning and implementation. My intent is not so much to prescribe a particular model of intergovernmental relations as to argue for a balanced allocation of roles and for a sharing of power among the various actors on the metropolitan scene.

Unlike highway building, traffic flow improvements, or transit operations, TSM does not have a powerful constituency of its own. If TSM is to succeed, it must win the support of a coalition of interests—business, civic, environmental, professional—and the good will of numerous metropolitan agencies that have the power to make things happen—or to block action if they are so disposed.

So, as one who sees great promise in TSM and wishes it well, let me plead for metropolitan and state cooperation, for I see the exercise of shared power not only as the best way but as the only way for TSM to succeed.

TRANSPORTATION SYSTEM MANAGEMENT FROM THE FEDERAL HIGHWAY ADMINISTRATION PERSPECTIVE

William L. Mertz
Office of Planning
Federal Highway Administration

This paper reviews the history of federal aid to highways as it relates to those improvements that are now considered to be within the scope of transportation system management. Examples are given of current federal programs that provide funds for TSM improvements.

The federal highway program began in 1916, but before 1933 federal aid to highways was largely devoted to improving rural roads. The first program that funded highway projects in urban areas was the National Industrial Recovery Act of 1933, which authorized $400 million for states to use for highway projects. Among the eligible items were the construction of routes to avoid congested areas, the construction of facilities to improve the accessibility and the free flow of traffic, and the cost of any other construction to provide safer traffic facilities or eliminate existing hazards to pedestrians or vehicular traffic. These were transportation system management issues.

It was not until 1944 that specific provision was made for a continuing urban area highway program. In the Federal-Aid Highway Act of 1944, Congress established a program that authorized the expenditure of funds on urban extensions of the federal-aid primary and secondary systems.

Early in 1959, the Bureau of Public Roads launched a study to determine the level of increased capacity that could be achieved by applying a combination of traffic operations techniques to an existing urban street. The study was carried out in Washington, D.C., and the results were published in 1962 as the Wisconsin Avenue Study, a document that gave new direction to efforts to help local areas improve street efficiency. The findings of the Wisconsin Avenue Study were translated into action in July 1966 in Instructional Memorandum 21-5-66 issued by the head of the Bureau of Public Roads and stating,

> The decision to construct or to reconstruct a street or highway in order to provide greater capacity and safety should be made only after a study of available alternatives. Particularly when the alternatives include a major investment (e.g., the taking of new right-of-way in an urban area to provide additional lanes), full consideration should be given to the alternative of improving the existing facility or a parallel facility to provide the additional capacity and greater safety.

In short, the memorandum provided that alternative measures (improved signal control, parking restrictions, turning prohibitions, reversible lane operation, and other traffic engineering measures) should be explored before urban area projects are undertaken. Seven months later, in February 1967, the Traffic Operations Program to Improve Capacity and Safety (TOPICS) was established administratively within the Federal Highway Administration to encourage consideration of these strategies. Recognizing the importance of reducing traffic congestion in urban areas, Congress, in the Federal-Aid Highway Act of 1968, formally authorized the use of federal-aid system funds in urban areas for improvements that directly facilitate and control traffic flow. As of June 1976, a little more than $1 billion in federal-aid funds for fiscal year 1975 was obligated to such low-capital transportation improvements.

The Federal-Aid Highway Act of 1973 made significant changes in the direction of the federal highway program.