sumption at a disaggregate level need to be established. This information should be coordinated with data on long-term public perceptions of, and reactions to, the future transportation-related energy environment.

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Redevelopment of a Comprehensive Approach to Urban Transportation Planning

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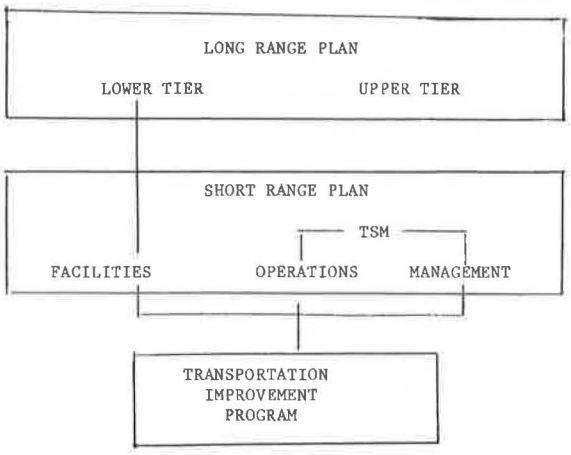
An attempt is described that is under way in southeastern Wisconsin to convert the conventional urban transportation planning process into a more problem-centered planning process, one that considers and integrates short-range and long-range considerations and comprehensively examines alternative facility and systems management solutions. The key to this improved planning process is the use of a new short-range transportation system plan in place of the conventional short-range transportation systems management plan. The new plan would be aimed at existing and short-range problems. Alternative solutions to be considered would include management and operational actions as well as facility improvements as staged and recommended in the long-range plan. The recommendations of the short-range plan should be appropriate for direct inclusion in the transportation improvement program. The short-range transportation planning process and its relation to long-range transportation planning, the steps that have been taken to apply the process, and some of the general principles used in developing the new short-range plan are discussed.

Urban transportation planning has undergone radical change in the past 10 years. Witness the list of acronyms of newly required or increasingly regulated urban transportation planning documents: TSM, TIP, LRP, AA, EIS, and TDP. Some believe these changes have led to necessarily fragmented urban transportation planning. The urban transportation planning process that has evolved is most commonly composed of a number of planning elements, each of which is largely considered separately from, and is not strongly related to,

Figure 1. Place of conventional transportation planning elements in the short-range planning process.



the other. The two principal elements of the most common urban transportation planning process are the long-range plan (LRP), which usually focuses on future problems and needs and alternative facility solutions, and a transportation system management (TSM) plan, which examines existing and short-term problems and needs and potential managerial and operational improvements.

A strong need would appear to exist for the urban transportation planning process to consider and interrelate existing, short-range, middle-range, and long-range transportation problems and needs and evaluate together and without bias their alternative facility and systems management solutions. Such a planning process is problem centered, recognizes short-range and long-range considerations and their interrelations, and considers artificial the distinction between planning for transportation system management and planning for facility improvement and expansion because in the proposed planning process both are considered jointly and equally as alternative solutions of largely the same problems.

This paper describes how such an overall (problem-centered), comprehensive (facility and management), integrated (short-range and long-range) urban transportation planning process is being considered in southeastern Wisconsin by the Southeastern Wisconsin Regional Planning Commission (SEWRPC). The process would be based primarily on the two common planning elements—a long-range plan and a short-range plan.

Consideration of the concept of a new planning process occurred when SEWRPC completed its first formal TSM plan (1). That first-generation plan contained recommendations for immediate and short-term TSM project implementation, outlined an agenda of more detailed planning to be undertaken for a few of the most promising and yet uncertain TSM improvements, and provided a design for a comprehensive, integrated, and overall short-range planning process to be undertaken for the second-generation TSM plan.

This paper summarizes the proposal for such a short-range planning element and includes a discussion of the general principles that were established for the design of the planning process, the basic elements that compose the planning process, and the relation of the proposed planning process to conventional long-range and TSM planning elements.

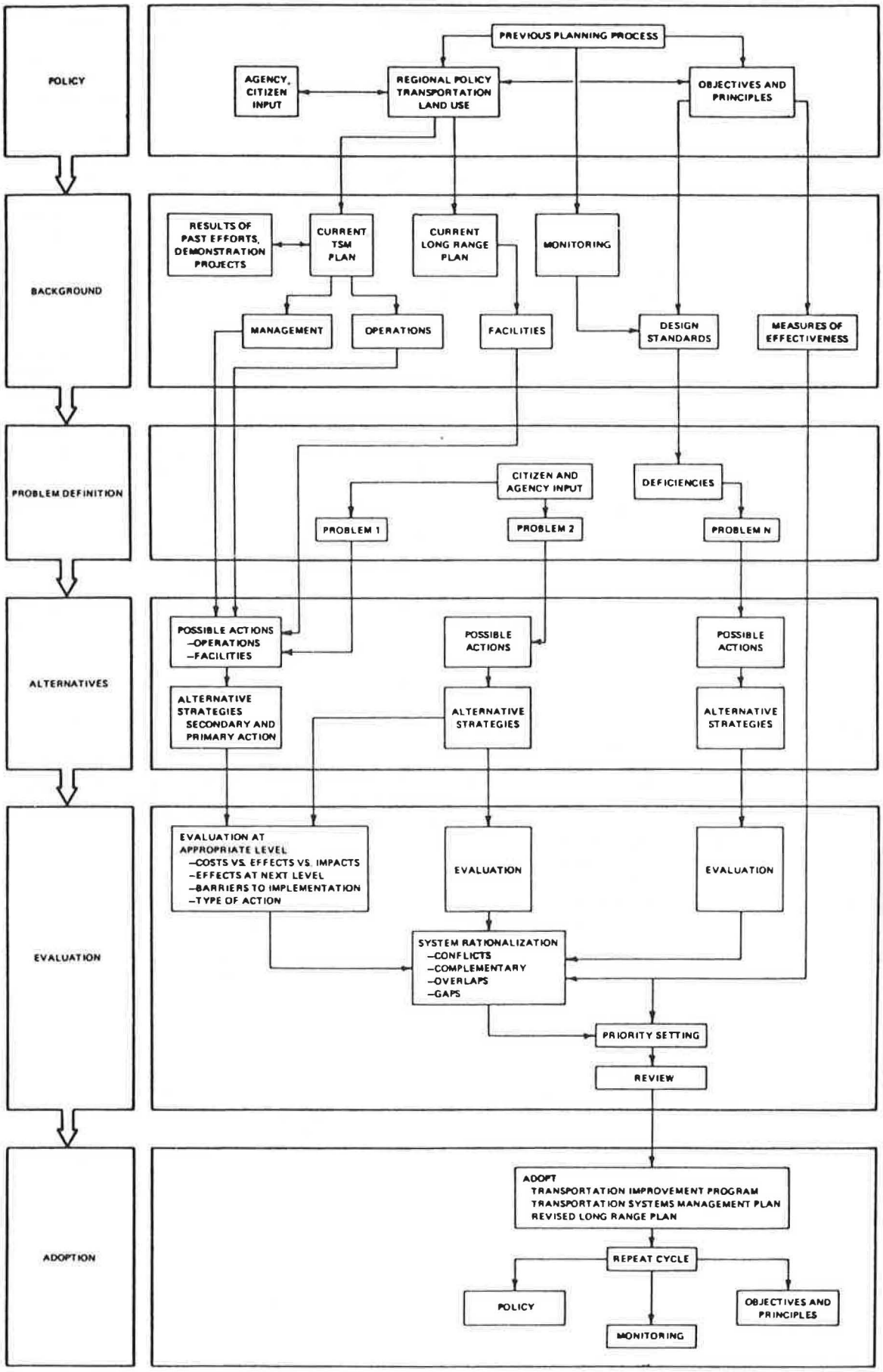
RELATION BETWEEN SHORT-RANGE AND CONVENTIONAL PLANNING ELEMENTS

The proposed short-range planning process is closely related to the common LRP and TSM planning elements. As Figure 1 shows, the proposed short-range planning process in essence combines TSM planning (by considering TSM alternatives to short-term problems) with short-range facility planning (by simultaneously considering staged facility alternatives from the LRP to the same problems). The LRP element serves as an input to the process, and the results of the process in turn provide for the possible advancing or delaying of the implementation recommendations of the LRP, thereby establishing a link between the long-range considerations of the LRP and short-range considerations and problems. The conventional TSM plan element can be viewed as some subset of the short-range planning process because conventional short-range TSM alternatives are part of the new short-range process and, in fact, a TSM plan could be abstracted from the short-range planning process recommendations. In addition, the recommendations of the short-range planning process more than those of any other planning process can be viewed as being capable of flowing directly to the transportation improvement program. This is because long- and short-term considerations would be included in the planning process and all competing alternatives—management, operations, facilities, and services—would be evaluated for their relative effectiveness.

The concept of the long-range plan, as developed and recently refined by SEWRPC in its just-completed long-range plan update, is uniquely suited to the development of an overall short-range planning process (see Figure 2). The new long-range plan of SEWRPC explicitly considers long-range and middle- to short-range needs as well as the uncertainty of those needs and their potential solutions by preparing the long-range transportation plan in two tiers of recommendations, an upper tier and a lower tier. Facilities placed in the lower tier of the plan are considered necessary to meet middle- and long-range needs and are recommended for short- or middle-term implementation as staged in the plan. Facilities placed in the upper tier remain in the long-range plan, but no further work is to be undertaken on their construction for a period of at least a decade. Facilities can be placed in the upper tier for a variety of reasons, including (a) a need that is only long term in nature, (b) uncertainty of need, (c) high cost or potentially significant impacts, and (d) current division of technical or public opinion. The concept of the two-tier long-range plan at SEWRPC, however, goes beyond that of separating the facility recommendations of a long-range plan on the basis of immediacy and certainty of need. The plan explicitly recognizes the potential of working over the short term to address certain transportation problems and deficiencies and thereby possibly reducing the need for planned upper-tier facilities. This is accomplished in the plan by recommending that, during the decade for which the implementation of upper-tier facilities is to be delayed, a combination of a small number of promising TSM measures be implemented to address the problems that the upper-tier facilities were to meet.

The SEWRPC two-tier plan envisioned that, if at some future time it was determined that the TSM actions along with lower-tier facility recommendations had been effective in adequately accommodating travel demand, steps could be taken at that time to formally remove the upper-tier proposals from the long-range plan. On the other hand, if the consensus at such a future time was

Figure 2. Short-range transportation planning process.



that such efforts had not adequately provided the needed transportation service, work could again proceed toward the construction of the proposed upper-tier facilities. In the meantime, the plan recommended that all right-of-way already cleared for upper-tier proposals be held in a transportation land bank and that appropriate consideration be given to the use of the land for parks and open space. The plan also recommended that any currently undeveloped lands needed to accommodate construction of the upper tier of the plan continue to be held in open use.

The short-range planning element to be discussed in this paper is intended to fit together well with this concept of a long-range transportation system plan. First, the short-range plan would serve to expand on consideration in the long-range plan of TSM actions that are intended to eliminate, if possible, the need for upper-tier facilities recommended in the long-range plan that should or should not be considered as facility alternatives in the short-range plan.

BASIC PRINCIPLES FOR THE SHORT-RANGE PLANNING PROCESS

The initial step in the development of a new short-range planning process at SEWRPC was to establish a set of basic principles to be used to describe in general terms what should be the characteristics of a new short-range transportation planning process. The basic principles established for development of a short-range plan were the following:

1. The planning process should focus on decision making, have as its general purpose the provision of highly relevant information for the careful consideration of alternatives, and lead to a selection of a proper course of action for various time frames.
2. The proposed transportation plan should constitute an integrated system. It is not possible through the analysis of individual actions alone to ensure such a system; rather, it is essential to examine how the individual actions interact and fit together into an integrated system.
3. The planning process must consider land-use activities as well as transportation. The interaction between land use and transportation is well known and should be explicitly considered. As far as possible, transportation actions should be used to complement land-use development and redevelopment plans that relate specifically to the needs of the region and of the individual communities that constitute the region.
4. The planning process needs to be concerned not only with end states but also with the steps necessary to reach end states. There is a need to consider the entire time span between the present and the long-range future. Thus, there should be a concern about the sequence in which projects are implemented and their staging. Furthermore, it should be recognized that the transportation planning process is an iterative process that alternates between systems-level and project-level planning. Thus, the output of a planning effort at one level will serve as input to the next cycle of planning activities at the other level.
5. The planning process should provide a well-working transportation system at all points in time. Although certain improvements can be expected to effectively solve transportation problems over the long term, there is a need to consider a wide range of interim measures that deal with problems over the short term.
6. The planning process should deal specifically with the uncertainty associated with the implementation of plans. Uncertainty exists in future energy supplies, growth patterns, funding, and public acceptance of proposed actions. These uncertainties should be explicitly dealt with in the planning process. The plans produced by the process should therefore be flexible and adaptive and recognize the feasibility problems that may be involved in implementing certain types of actions.
7. The options that should be considered in a short-range planning process should be based on specific statements of transportation objectives and relate directly to identified problems and deficiencies. These actions should not only involve changes in procedures and policies for the operation and management of the transportation system but should also, as necessary, include system expansion and new technologies that are consistent with the long-range plan. Furthermore, there should be room in the process for experimentation and demonstration of innovative as well as conventional options.
8. In developing a short-range plan that considers facilities as well as operational and managerial improvements, a fundamental principle that should be followed is that major investments in new facilities will take place only after it has been demonstrated that operational improvements have not or cannot provide an acceptable quality of service or have failed to adequately address transportation problems and deficiencies. The facility options considered must be recommended in the lower tier of the long-range plan.
9. Evaluation of options should relate to the particular level at which they function. Options such as carpooling, transit information services, and rescheduling of work times affect an entire urbanized area. Other options, such as intersection redesign and transit shelters, have a primary effect on a limited local area. Other options may have primary effects at the level of the urbanized subarea, the freeway corridor, the arterial corridor, or the region. Each option should be primarily evaluated only at the level at which it has its major effect (in comparison with other options at the same level) and at the next higher level to check for system consistency. Some examples of TSM strategies and their level of primary effect are given in the table below.

Level	Strategy
Region	Freeway projects
	Intercity and suburban transit service
	Major regulatory changes
Urbanized area	Areawide ride-sharing programs
	Transit marketing
	Transit information services
	Work rescheduling
	Congestion pricing
	Transit fare policies
	Improved transit management
Urbanized subarea	Computerized signals
	Changes in parking pricing policy
	Regulation of parking supply
	Restriction of trucks
	Automobile-restricted zones
Freeway corridor	Centralized freeway operational control
	Priority lanes for high-occupancy vehicles
	Park-and-ride facilities
	Reversible lanes
	Safety improvements
Arterial corridor	Bus lanes and streets
	Signal preemption by buses
	Removal of on-street parking
	One-way streets
	Transit service improvements
	Safety improvements
Local and spot improvements	Improved signalization
	Transit shelters
	Channelization

10. Certain objectives and measures of effectiveness may conflict and require resolution through compromise. Meaningful plan evaluation can only take place through a comprehensive analysis of each of the alternatives in relation to measures of effectiveness. Criteria for evaluation should include measures of changes in mobility, impact, and costs, and the evaluation process should identify the trade-offs between these factors in the selection of a course of action.

11. Finally, the transportation planning process should provide a forum for constructive debate on the shape and form of the transportation system. Such a debate should be structured so as to lead to decisions that recognize the diverse interests of the residents of the region.

SHORT-RANGE TRANSPORTATION PLANNING PROCESS

A new short-range transportation planning process was proposed within the framework of the basic principles. As Figure 2 shows, the planning process is built around the identification of existing and short-range transportation problems and the assessment of alternative solutions to these problems. The definition of short-range problems and deficiencies is viewed as proceeding from the inventories, analyses, and findings of recent planning efforts and the assessment of currently monitored transportation system performance with respect to attainment of the adopted regional transportation system objectives. Alternative managerial, operational, and facility improvements would then be examined as potential solutions to problems. These alternative actions would be taken from the lower-tier recommendations of the long-range plan or would be newly developed and proposed. After the evaluation of alternative actions and the preliminary selection of actions that are appropriate in response to particular problems, these actions would be combined into a rational regional system.

The planning process is slightly different from the conventional type in that it is intended to be a continuous process composed of a number of studies that involve different problem-solving activities. These studies could be going on at the same time, but they would begin and end at different times (see Figure 3). It can be expected that certain problems will have obvious solutions or a limited number of solutions that can be easily assessed and implemented whereas other problems will require lengthy and complex analyses. Each study would have its own evaluation of alternative strategies, recommendations for implementation, and an evaluation of consistency with other transportation plans, principally the long-range plan. As the results of various short-range studies became known, they would be incorporated in the short-range plan and, if appropriate, in the long-range plan. It is expected that the short-range plan would be updated annually and principally include the necessary rationalization of the transportation system, a review of planning objectives, and a redefinition of existing and short-range transportation problems. Alternative solutions to these problems can be investigated in this annual update of the short-range plan, or new studies can be recommended to deal with these problems. The seven major steps in the short-range planning process, which is applicable to the annual plan update and the separate studies it may recommend, are described below.

Formulation of Transportation System Objectives

One of the most critical phases of a planning process is to develop explicit statements of objectives. These statements must relate to both transportation and land use. Their primary purpose should be to establish some basic ground rules and guidance for development and choice in the short-range plan. Design standards and measures of effectiveness would be developed to measure quantitatively the attainment of each objective formulated. Design standards would specify minimum or desirable levels of performance and impacts of the transportation system and would principally be used for problem definition, whereas measures of effectiveness would only specify the detailed criteria that represent each objective quantitatively and would be used in the evaluation of alternative problem solutions.

Transportation planning is a cyclic and iterative process, and it is important that the findings and recommendations of previous studies be used as a point of departure for subsequent planning, particularly with respect to the development of planning objectives. Objectives and standards that have been developed in previous long-range planning efforts, however, may have to be modified for the purposes of short-range planning. These modifications should lead to objectives that are more specific in their measurement of effects on local areas and also helpful in the evaluation of operational and managerial options. The development of objectives should involve interaction with, and review by, other planning and implementing agencies, concerned public officials, and private citizens.

Background Information and Inventory

The next step in the process is to compile information on previous planning efforts and the current level of system performance as input to developing a short-range transportation plan. These previous efforts would include the current TSM or short-range plan and its recommended operational and management improvements and the current long-range plan, which would include both facilities and operational improvements. Other background information and inventories would include the results of other past planning efforts, demonstration projects, and all system-monitoring information.

Problem Definition

Problem definition follows the compilation of background information and inventories. There are two basic sources of statements of problem definition. The first of these would be other planning and implementing agencies and possibly private citizens; the second would be deficiencies identified in analysis of system-monitoring information. A large number of problems may be identified at this stage. These statements would then be categorized by level—regional, urbanized area, subarea, corridor, or spot—and then combined to ensure a minimum amount of overlap. A decision would then be made as to whether each problem would be analyzed—that is, whether alternative solutions would be generated and evaluated and the best alternative selected—in the annual update of the short-range plan or in a separate study.

Preparation of Alternative Solutions

The next step in each short-range planning effort would be to identify a series of alternative actions that relate

Figure 3. Timing of activities in the short-range planning process.

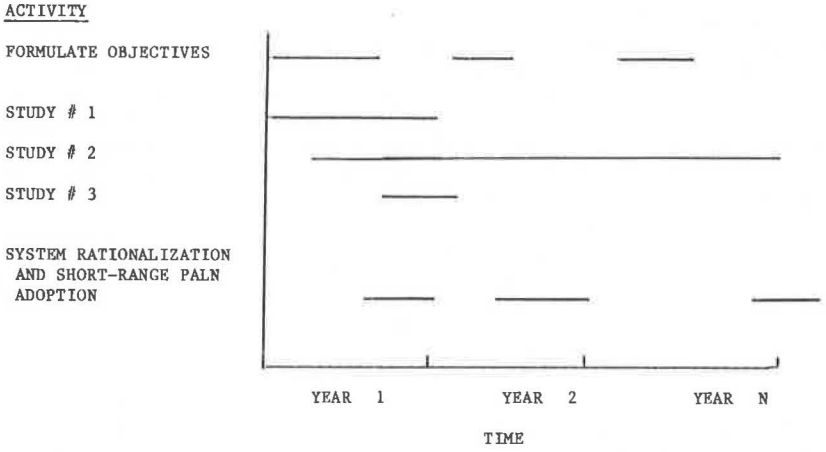


Table 1. Techniques for evaluating alternatives at various project levels.

Impact	Technique	Project Level: Region	Urbanized Area	Urbanized Subarea	Freeway Corridor	Arterial Corridor	Local
Cost	Statistical cost estimates	*	*	*	*		
	Engineering cost estimates			*	*	*	*
Feasibility and design	Technical feasibility	*	*	*	*	*	*
	Technical design	*	*	*	*	*	*
Environment	Environmental impact statement	*	+	+	+	-	
	Negative declaration		-	+	+	*	-
	Not a major action				-	+	*
Community	Advisory committee	*	*	+	-	-	-
	Public hearing information meeting	*	*	+	+	-	-
Mobility	Regional simulation	*	*				
	Focusing		-	+	*		
	Windowing			+		*	
	Microassignment				+	+	+
	Capacity analysis						*
	Indirect effects		+				

Note: * = most likely; + = likely; - = possible.

to the solution of the identified problems. These actions would be derived from the long-range plan or would involve the generation of new TSM improvements, including managerial and operational actions. The alternatives examined could be combined into alternative strategies for dealing with the problems.

Evaluation of Alternative Solutions

Each alternative action and strategy would then be evaluated at the level at which the problem has been identified and at the next higher level as a check for transportation system consistency. Evaluation would be based on examining each alternative's attainment of defined planning objectives by comparing their "scores" on measures of effectiveness for each objective. The evaluation could be structured in a cost-effectiveness framework to highlight the trade-offs between alternative actions, costs, impacts, and mobility. The gains in mobility achieved at the expense of additional negative impacts and costs would be explicitly defined through such an analysis.

It can be expected that different evaluation procedures and measures would be used at different levels of evaluation. For example, an evaluation of environmental effects at a spot or corridor level may require the appropriate implementing agency to prepare an environmental impact statement. Table 1 gives the types of techniques that are currently available for evaluation of alternatives at the different levels. Each of these techniques would quantify measures of performance of alternative actions as defined from the agreed-on planning objectives and standards.

The evaluation process could also produce information on the sequence of steps that should be used to deal with a particular problem. It can be postulated that low-capital improvements in the operation or management of a transportation facility or service should be implemented before major capital investment is made in new or improved facilities. Only after it has been demonstrated that these improvements cannot solve the problems toward which they have been directed should the alternative new or improved facility solutions be implemented. This type of transportation investment policy—that is, ensuring that existing transportation facilities and services operate at their maximum efficiency before any extensive new capital investment is undertaken—could be supported by the proposed short-range planning process. In addition, the sequential implementation of alternative system management or operational strategies could be considered in this planning process.

System Rationalization

After the evaluation of alternative actions and strategies in relation to individual problem statements, the next step is system rationalization. The purpose of this effort would be to ensure that the individual actions recommended for each problem fit together to form a cohesive, rational, and efficient transportation system. Actions can be identified as independent (those that can

be combined with any other actions because they do not interact), complementary (those that can be grouped with other actions in a positive way), or conflicting (those that involve a choice between competing projects). The process of system rationalization would involve the identification of actions by type and the subsequent packaging of actions into a logical system.

Adoption of Plan

The final phase of the process would be adoption of the plan and movement toward implementation. Actions recommended in the planning process should be included in the transportation improvement program.

SUMMARY AND CONCLUSIONS

The revised urban transportation planning process proposed in this paper is intended to better consider and interrelate existing, short-range, middle-range, and long-range transportation needs. In addition, the process is intended to be more unbiased and comprehensive than the conventional planning process because it would consider both systems management and facility improvements as alternatives to short- and long-range problems. Because the facility alternatives considered in the short-range planning process will be those that have been recommended in the long-range plan, an explicit link between short- and long-range planning will be established. It is hoped that this link will allow short-range plan recommendations to provide the sole coordinated planning input into the transportation improvement program. The drawback to this approach is that certain facilities that are necessary to meet long-range needs will not be advanced for implementation until they are also the most appropriate alternative for short-range needs.

This revised transportation planning process has been proposed and is now being considered for implementation in southeastern Wisconsin. It has been partially implemented in that a number of studies have been initiated to examine specific transportation problems and the first annual update of the TSM plan for the region has been completed. Among the studies under way is a subarea study that focuses on alternative TSM actions and facility improvements that can be made in an area where long-planned freeways have been removed from the long-range plan. Another study will examine the benefits and costs of freeway operational control in the Milwaukee area in response to freeway congestion. An effort is also under way to coordinate and promote studies of facility improvements at the "stub ends" of all uncompleted freeways in Milwaukee County. The purpose of these proposed stub-end improvements is to provide better freeway connections to surface arterials, better utilization of existing freeway facilities, and a reduction in congestion and other negative impacts in neighborhoods adjacent to the stub ends of freeways. In addition to these studies, others are now being conducted that point toward improvement in taxicab and transit service in the Milwaukee area and better operation of streets and highways through analysis of major arterial corridors.

ACKNOWLEDGMENT

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Long-Range Transportation Planning in Southeastern Wisconsin

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The evolution of long-range transportation system planning at one planning agency, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), is examined. Some conclusions about the continued role of long-range planning are drawn, and some directions for further evolution of such planning are suggested. After a brief historical review of long-range transportation system planning at SEWRPC, five recent criticisms of the planning process in southeastern Wisconsin and elsewhere are identified: (a) the need for short-range emphasis; (b) an inability to deal with uncertainty; (c) disregard of fiscal constraints; (d) excessive orientation toward facilities; and (e) neglect of local plan impacts. The eight fundamental principles of transportation planning used by SEWRPC are reviewed in light of these criticisms. Although they are found to be basically sound, they are shown to require expansion to (a) include a provision for subregional planning, (b) deal with uncertainty and explain the approach taken by SEWRPC and a possible method that is under development, (c) alter the planning process to consider all alternatives including system operation and management initiatives, and (d) develop an integrated transportation planning process that effectively brings together long-range and short-range transportation system planning and programming.

In the three or more years since the publication of the joint regulations on transportation improvement programming (TIP) and transportation system management (TSM) planning (1), probably no single conceptual issue has, or perhaps should have, occupied the attention of the transportation planning profession as has the proper continuing role (if any) of long-range transportation system planning. Yet, as metropolitan planning organizations (MPOs) across the country attempt to work out their individual responses to this issue, one thing is clear: The development of the role of long-range planning is and will continue to be an evolutionary, not revolution-