

Alternative Methods for Developing Transportation Improvement Programs for Urban Areas

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Three approaches for preparing a transportation improvement program (TIP) are examined. The first involves ratification by the metropolitan planning organization of programming decisions made by state and local transportation-implementing agencies. The second would rely on the collective judgment of an urban-area committee or forum to choose projects for implementation. The third would also use such a forum but would provide the committee with a formalized decision-making structure whereby programming decisions would be based on an expressed determination of priorities. Such a structure is described in detail: Projects are first submitted by implementing agencies. They are then reviewed for consistency with the transportation plan and those found to be consistent are placed on needs lists by type of project. The projects from the needs lists are placed in groups of similar relative priority. The groups are arrayed in priority order by funding source. The available money in each type of funding is then applied against the groups to be funded from that source arrayed in priority order. Projects in whole groups covered by available funds are inserted directly in the TIP. An analysis is made of the intermediate connective transportation system that will result. The results of this analysis are combined with other considerations, and projects from the unfunded groups are selected to use the remainder of the available funds.

On September 17, 1975, the Federal Highway Administration (FHWA) and the Urban Mass Transportation Administration (UMTA) published rules that require the preparation on an annual basis of a transportation improvement program (TIP) as a basis for federal financial assistance in support of highway and transit projects [40 Federal Register 42 976-42 984 (1975)]. It is intended by these agencies that the TIP list all transportation projects proposed for federal assistance and planned to be undertaken in the ensuing 3- to 5-year period. The TIP must also identify those projects proposed for implementation in the first year; this is identified as the annual element. The federal regulations indicate that the TIP is to be developed by local officials acting through the metropolitan planning organization (MPO).

There appear to be three distinct approaches possible for the preparation of a TIP. In the first, each individual implementing agency makes its own programming decisions based on its understanding of either an explicit or an implicit allocation of federal funds and then presents its list of projects to be programmed to the MPO. The MPO reviews the projects for consistency with the adopted-plan elements, submits the projects to an urban-area advisory committee composed of local officials or their representatives (who serve on a population-representative basis within the area), endorses the combined lists of all projects after receiving the advisory committee recommendations, and transmits a report thereon to the state and federal funding agencies. This method was used in the preparation of the first TIPs for the Kenosha, Milwaukee, and Racine urban areas in southeastern Wisconsin. In essence, this approach represents a ratification by advisory committees and the MPO of programming decisions made by state and local transportation-implementing agencies. The method has several advantages, including its workability as demonstrated over the past 3 years and its preservation of individual agency prerogatives in the programming of transportation-system development projects.

Another advantage is the relative ease with which the annual program can be updated through periodic amendments, because the method is unencumbered by an explicit process of determining areawide priorities. The major disadvantage of this approach is that the annual aggregation of individual agency-proposed projects does not necessarily result in the best program of transportation-system improvement for the area as a whole. The method, to be workable, depends on allocating the available federal aids such as Federal-Aid Urban (FAU) Highway System funds and formula-aid funds available under section 5 of the Urban Mass Transportation Administration Act of 1964 to the various local units of government on a formula basis. At the present time in Wisconsin, the state and federal governments have established allocation formulas for nearly all available aids, except for those such as the capital grants available under section 5 of the act, for which the competition is nationwide.

In the second approach, an attempt is made to lend a distinctive urban-area system perspective to the process. In this method, the implementing agencies submit lists of candidate projects to the area advisory committee, which acts as the MPO forum. Such lists are unconstrained by any preexisting formula-allocation process. The committee then, through one or more sessions, debates the merits of each project and, based on the results of the debate, formulates an annual TIP. This method relies almost entirely on the collective judgment of the committee members. For such a method to be effective, it is also necessary for the committee to have a significant amount of discretionary federal aid, such as FAU and section 5 funds, available to it for, in effect, distribution to those implementing agencies whose projects are placed in the TIP. At present, given the current federal-aid structure in southeastern Wisconsin, all federal-aid monies are allocated by formula, leaving no discretionary monies for the committee to distribute.

A possible third approach is to use the advisory committee as a forum for the preparation of the TIP (as in the second method) but provide that committee with a formal decision-making structure by which it can make programming recommendations based on an expressed reconciliation of competing and often conflicting needs and interests. The balance of this paper discusses in detail a possible decision-making structure that could be used to implement this method.

BASIC CONCEPTS AND PRINCIPLES

This alternative method for developing a comprehensive TIP involves five basic concepts or principles of improvement programming:

1. The programming of the implementation of transportation facilities should be consistent with and supportive of the orderly overall development of the area, including the development of essential public utilities and services and of a sound land-use pattern. Practically, it is also important that the transportation-system development program and the development programs in other functional areas affecting the urban area (such as sewers, water, other utilities, and municipal services) be coordinated to

Figure 1. Flow of projects through TIP process.

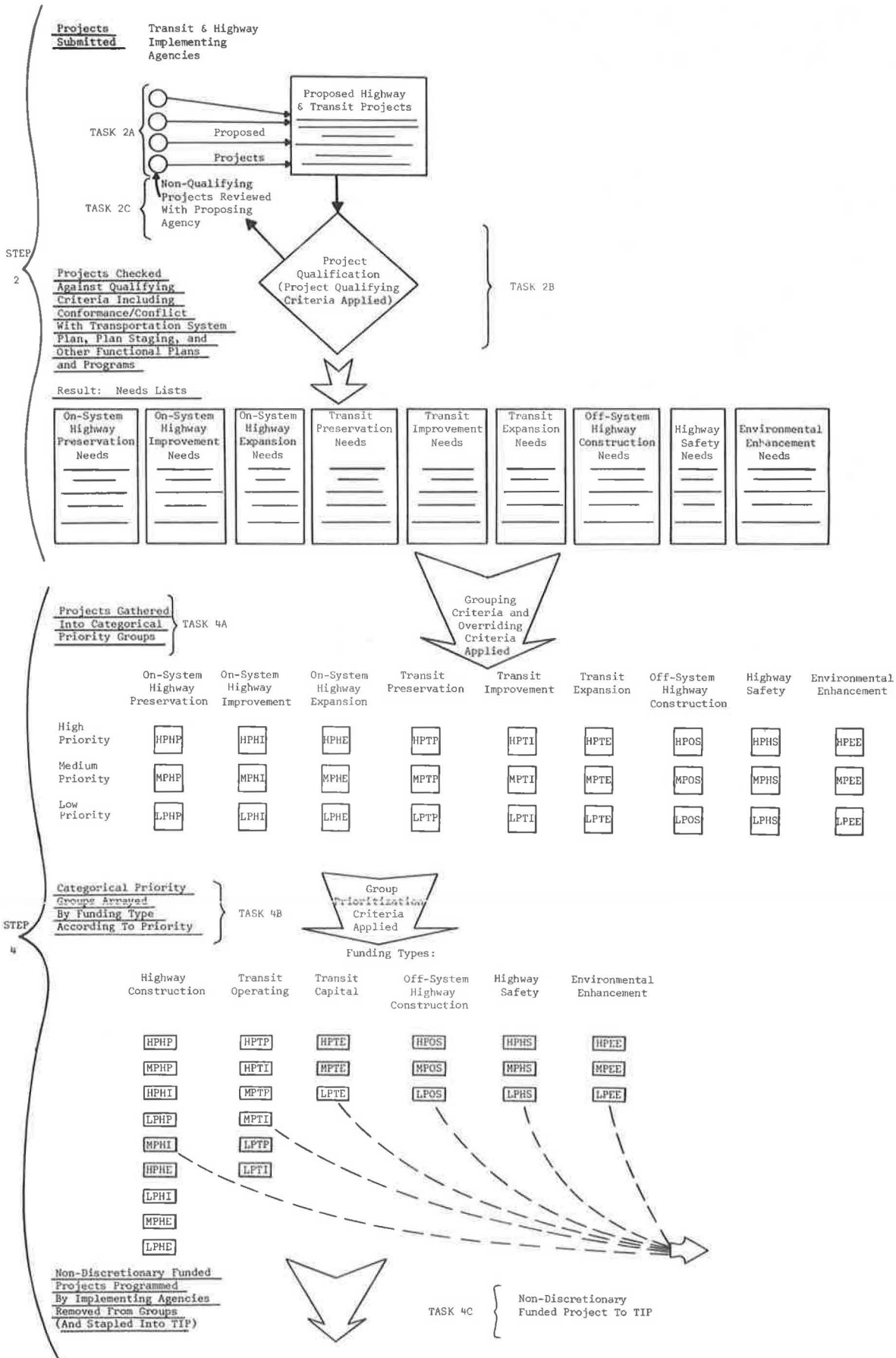
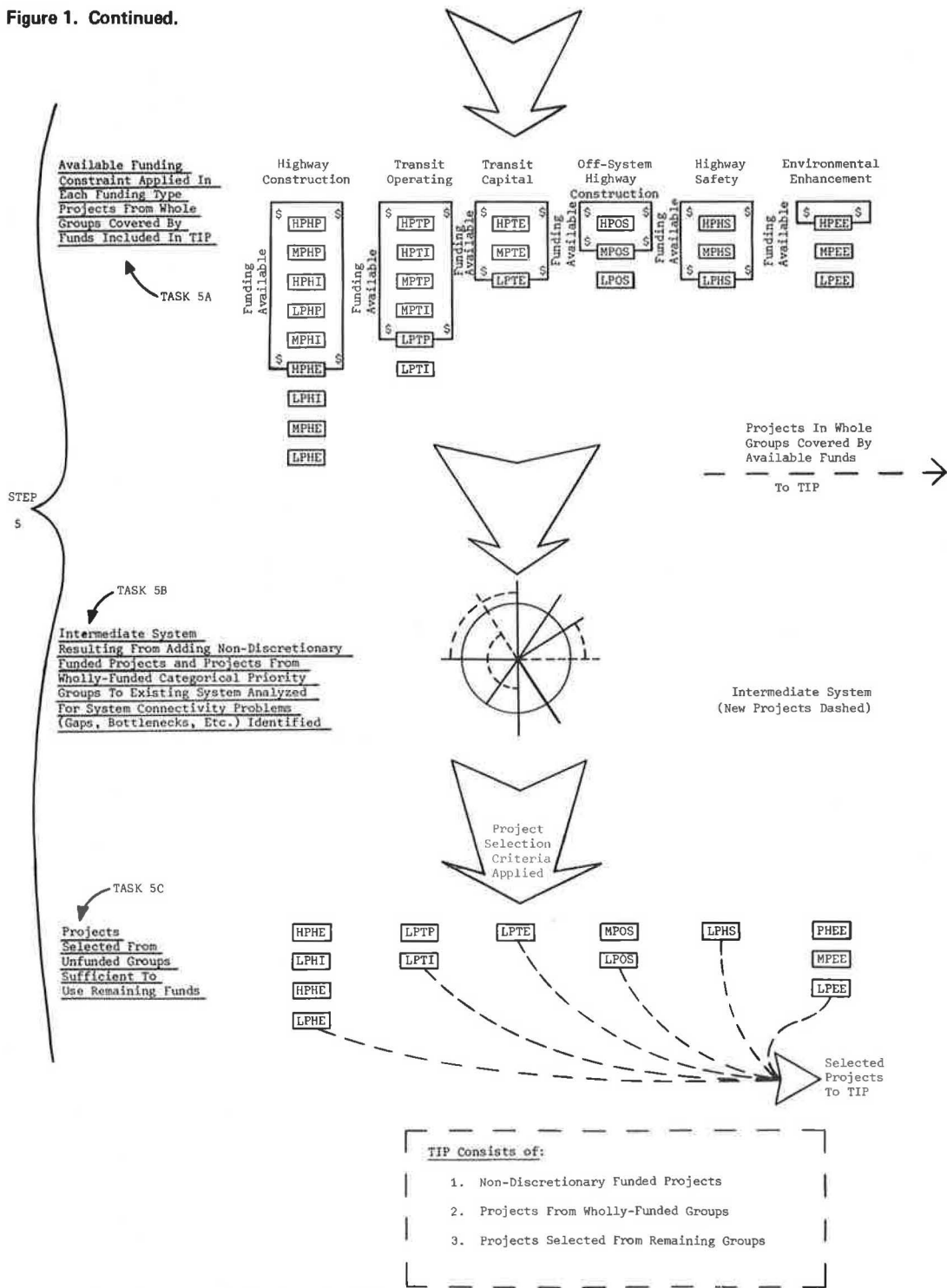


Figure 1. Continued.



Note: Steps 1 and 3 are not explicitly shown in this figure.

the maximum extent possible in the interests of effectiveness and efficiency and the promotion of a sound regional development pattern.

2. The projects should be aggregated into categorical-priority groups of similar or related projects, which groups can then be rank ordered by priority. This enables those involved in the programming decision making to focus on the most important and difficult decisions required--i.e., grouping those projects that should obviously be included or excluded from any program and avoiding dealing in detail with each and every proposed project. The concept of the categorical-priority group not only facilitates the programming process but also allows local officials to preserve their implementation prerogatives by not explicitly listing local priorities on a project-by-project basis but rather gathering projects of similar priority into groups.

3. The programming should be based on a recognition and assessment of the relative worth of various projects. The relative worth of projects should be determined by some quantitative analysis.

4. The programming should acknowledge realistic funding constraints that will affect plan recommendations and only set forth for implementation those projects that can be reasonably expected to be accomplished during the program period and, taken together, do not require funding greater than that which can be reasonably expected to be available.

5. The workability and utility of the intermediate transportation system that will result from implementing the programmed projects should be considered as one stage to realization of the regional transportation-system plan that has been adopted.

In addition to these five basic principles, it is important to place the programming step in proper perspective relative to the overall planning and development process. Conceptually, the programming process presupposes that there is basic agreement on an adopted transportation-system plan. Accordingly, the programming procedure is not intended to determine whether or not a particular transportation project should be undertaken--that having been determined in the process of preparing and adopting a plan--but rather must be directed to the question of the timing of the particular project vis-à-vis the other projects included in the plan.

DESCRIPTION OF ALTERNATIVE METHODOLOGY

Based on these five concepts or principles, and the acknowledgment of the constraints on transportation system improvement due to current funding practices, and the interests of the jurisdictions represented within each urban area, this alternative methodology was developed for preparing TIPs for each of the urban areas in southeastern Wisconsin.

Figure 1 presents an overview of the alternative method from an orientation of the flow of proposed projects through the process. The projects are first submitted by the implementing agencies, then reviewed for plan consistency and project type and, finally, those passing review are placed on needs lists by type. The projects from each type of project needs list are placed in categorical-priority groups by relative priority--high, medium, or low. The categorical-priority groups are then arrayed in priority order by type of funding, because some funding programs fund more than one type of project. Non-discretionary-funded projects (those projects funded by money not allocated by the urban-area committee) identified by the responsible agencies are removed from the groups and inserted directly in the TIP. The amount of available money in each type of funding is then applied against the categorical-priority groups

of remaining projects under that type of funding arrayed in priority order. Projects from whole groups covered by available funds are inserted directly in the TIP. An analysis is then made of the intermediate connective transportation system that would result from adding the non-discretionary-funded projects and the projects from the wholly funded groups to the existing transportation system. This analysis is envisioned as being largely graphic in nature, whereby such problems as transit or highway system gaps and potential bottlenecks could be identified on a map, but could also extend to a quantitative analysis through traffic assignments to the proposed highway system or analysis of the resulting transit-equipment inventory.

The results of this analysis are combined with other considerations, and projects from unfunded groups are selected to use up the remainder of the available funds. These selected projects, the projects from the wholly funded groups, and the non-discretionary-funded projects then constitute the TIP. The methodology can also be used to identify either the annual element or the 3- to 5-year element of the TIP from appropriate lists of candidate projects.

This method would be implemented through 14 individual tasks under five main steps. Each of the steps and tasks is explained below, and steps 2, 4, and 5 are shown in Figure 1.

Step 1: Development of Criteria

Identification of the information that will be used to make the judgments about projects is required in the formulation of the TIP. This step is required at the very start because the items of information identified as important about each project must be included with the project description submitted by the agency proposing the project. The development of all three types of criteria is essentially a policy decision and, therefore, requires policy-level involvement by the committee.

Task 1A: Development of Project-Grouping Criteria

The second programming principle provides the reasoning for project grouping in the programming process. In task 1A, the criteria, or rules by which projects will be put into groups, are developed. At the present state of evolution of the methodology, the use of 27 categorical-priority groups is proposed: high-, medium-, and low-priority preservation, improvement, and expansion for both on-system highway and transit and for off-system, safety, and environmental enhancement for highways. The project categories are defined as

1. On-system highway preservation: projects that result in little or no increase in the traffic-carrying capacity of the existing highway system but are necessary to maintain existing capacity and structural adequacy of the facility for which the project is proposed;

2. On-system highway improvement: projects that significantly increase the capacity of existing streets or highways (by definition, the conversion of a road from rural to urban is an improvement--even though there might be only marginal capacity improvement);

3. On-system highway expansion: projects that significantly increase the capacity of the transportation system through development of new or extended streets or highways;

4. Transit preservation: projects that are necessary to maintain the current quality and level of service of the existing transit system;

Table 1. Example of criteria for determination of project priorities: transit-expansion projects.

Criterion	Weight (points)
Where project sponsor is not local unit of government, an assurance that project implements local plans and has local support, as indicated by a letter from local government(s)	100
That a project directly provides or improves coordination between two or more transit systems as indicated by evaluation of the project submittal	50
Design provision for other modes	
Highway	25
Bicycle	25
Pedestrian	25
Service to special groups as indicated by evaluation of project submittal	
Elderly persons	75
Handicapped persons	100
Racial minorities	50
Functional criterion: type of service (total of 200 points available) as indicated by evaluation of the project submittal	
Primary	200
Secondary	150
Tertiary	100
Other	varies
Number of people served: proposed daily ridership	200
Surrogate for cost-effectiveness: passenger travel provided/cost of project	200

5. Transit improvement: projects that improve the quality and level of service of the existing transit system;

6. Transit expansion: projects that either expand the existing transit system or create new transit systems or subsystems;

7. Highway off-system: projects on streets or highways that are not on a currently designated federal-aid system;

8. Highway safety: projects that will improve or eliminate existing unsafe conditions on the federal-aid highway system as it currently exists; and

9. Environmental enhancement: projects that will materially reduce air, noise, or visual pollution, but not significantly affect system operations.

Once a proposed project is categorized, it is necessary to determine to which priority group it belongs. It is proposed to apply a set of weighted criteria to determine priorities for each category of projects. Table 1 is an example of possible project criteria for determining priorities for the transit-expansion-project category and possible associated criteria weights.

In brief, each project receives a rating under each criterion. This rating, which can be either zero or one for yes-no criteria or an actual number for such criteria as the average daily ridership on the proposed project, is then normalized (reduced to a scale of 0.0 to 1.0) and multiplied by the weight for that criterion to obtain the score under that criterion. For each project, the criteria scores are added to obtain the total project score.

For each criterion, two criterion-threshold values are identified: a high-priority criterion threshold and a medium-priority criterion threshold. Each criterion-threshold represents the minimum value of the criterion score required to identify the project as high or medium priority under that particular criterion. The high-priority criterion thresholds for all criteria are added to obtain the high-priority project-score threshold. Similarly, the medium-priority criterion thresholds are added to obtain the medium-priority project-score threshold. Projects that have total project scores greater than the high-priority project-score threshold are then categorized

as high priority. Projects that have total project scores less than the high-priority project-score threshold but greater than the medium-priority project-score threshold are categorized as medium priority. Projects that have total project scores less than the medium-priority project-score threshold are categorized as low priority. The table below gives possible criterion and project thresholds for the transit-expansion-project category.

Criterion	Threshold (points)	
	Medium Priority	High Priority
Local support	0	100
Intersystem coordination	0	50
Design for other modes	25	50
Service to special groups	75	100
Type of service	100	150
Number of people served	50	125
Cost-effectiveness	50	125
Transit-expansion project threshold	300	700

(It is emphasized that the criteria and the values for criteria weights given in Table 1, and the threshold values given above are merely examples. The actual criteria and values to be used in the programming process for the transit-expansion category and all other project categories would be determined in task 1A.)

In addition to the development of project priority by the rating and weighting scheme discussed above, there are some other considerations that must enter into determining the project priorities. Special consideration must be given to a project that must be implemented because of a court order, to convert a situation of noncompliance with building or health codes, or to prevent an imminent catastrophe (e.g., the collapse of a bridge). Generally, a project sponsor must demonstrate, to the satisfaction of the committee, that his or her project should qualify under these so-called overriding criteria. If the committee agrees, the project must be given high priority within its project category, regardless of its project score.

The proposed methodology will work only if it is agreed at the beginning that there are such things as high, medium, and low priorities and that some projects should be placed in each group; i.e., not all projects are high priority. Although it is possible to identify additional criteria and not rely on an information-aggregation scheme (the rating and weighting technique illustrated), the process must be capable of dealing with a large number of projects (approximately 330 in the 1977 TIP for southeastern Wisconsin), and information must be gathered and processed about each project. The decisions about the type and amount of information to be gathered and used in judging the projects and about how that information is to be aggregated are made in this task.

Task 1B: Development of Criteria for Determining Group Priorities

After the categorical-priority groups are developed (by using the criteria developed in task 1A), they must be put in priority order by funding category. This involves, for example, making judgments about the relative importances of on-system highway preservation, improvement, and expansion projects that compete for the same funds. Task 1B involves the development of decision rules for making these judgments; e.g., are medium-priority highway-preservation projects more important than high-priority highway-improvement projects?

Table 2. Example of qualifying criteria.

Category	Example	Qualifying Criteria
On-system highway projects	On-system highway preservation On-system highway improvement On-system highway expansion On-system highway safety On-system highway environmental enhancement	Project must currently be on a federal-aid system; project must either be in conformance with and serve to implement or be not in conflict with adopted areawide development plans; project must be drawn from an adopted plan, either long-range or transportation system management
Transit projects	Transit preservation Transit improvement Transit expansion	Project must either be in conformance with and serve to implement or be not in conflict with adopted areawide development plans; project must be drawn from an adopted plan, either long-range or transportation system management; project sponsor must be designated recipient of federal financial assistance for transit or present written project sign-off from appropriate designated recipient
Off-system projects	Off-system highway projects	Project must not be a currently designated federal-aid system; project must not be in conflict with adopted areawide development plans; project must be drawn from an adopted plan, either long-range or transportation system management

Task 1C: Development of Project-Selection Criteria

When the projects have been arrayed according to priority by funding category and the constraints of available funds in each category applied, it is probable that the available funds will not cover exactly whole categorical-priority groups of projects and that some money will be available to fund some projects from unfunded priority groups. Task 1C requires the identification of the information to be used in selecting projects from the unfunded groups to use up the available money. The most important criterion is to select projects that, when added to (a) the existing transportation system, (b) those projects in the wholly funded categorical-priority groups, and (c) the non-discretionary-funded projects, provide for an intermediate connective transportation system for the urban area. Other possible criteria include (a) whether or not a project contributes to improved transportation for elderly or handicapped people or both; (b) whether a project is labor intensive; and (c) whether a project would, given the projects in the whole groups covered by funds and the non-discretionary-funded projects, contribute to a better geographic and jurisdictional dispersion of funds or projects throughout the urban area.

Once the three different sets of criteria (grouping, determination of group priorities, and selection) have been determined, information about the proposed projects can be gathered from the project sponsor at the time of initial project proposal.

Step 2: Identification of Needs

The purpose of this step is to develop a set of transportation needs by type of project for the urban area consistent with the regional transportation-system plan and other functional plans and programs in the urban area.

Task 2A: Project Submittal and Proposal by Implementing Agencies

This task requires that each transportation-implementing agency in the urban area examine the staging of the regional transportation-system plan, the county jurisdictional highway plans, the transit development program, and the elements of the transportation-system management plan and identify the projects for which it has implementation responsibility that it can implement within the 5-year programming period if funds are available. These projects are then submitted to the MPO, together with such project descriptive information as is necessary in light of the criteria developed in step 1.

Task 2B: Analysis of Conformance and Conflict of Projects With Regional Transportation System Plan

Before projects are admitted to the needs list, they should be reviewed by the MPO to determine consistency with the regional plan. Changes in UMTA and FHWA procedures make submission of the TIP by the MPO and metropolitan A-95 clearinghouse equivalent to positive A-95 review of each transit and highway project in the TIP. Therefore, an A-95-type review must be made on the TIP projects at some point in the process; it is proposed that this be done before they are admitted to the needs list. Formal A-95 endorsement, however, would be confined to those projects selected for inclusion in the annual element of the TIP. The projects would first be categorized into one of the nine project categories and then the appropriate qualifying criteria (such as those shown in Table 2) are applied. The projects that pass the review compose the nine categorized needs lists.

Task 2C: (If Needed) Review of Nonconforming or Conflicting Projects

As with any A-95-type review, there should be an opportunity for reconciliation of differences between the review agency and the implementing agency.

Step 3: Estimation of Funds

To formulate a realistic program of transportation improvements, it is necessary to estimate the availability of transportation funds.

Task 3A: Estimation of Availability of Nondiscretionary Funds by Mode and Funding Category

In the context of developing the TIP through an areawide forum structured by the MPO, "discretionary" funds are defined as those federal monies that can be allocated to projects to be set forth by the areawide forum (the committee) and "nondiscretionary" funds as those that are allocated to projects by some other mechanism. Nondiscretionary funds are estimated first because the units of state or local government that make the project fund-allocation decisions must make those decisions and inform the urban-area committee of those projects they wish to pursue and have included in the TIP. The availability of some funds can be estimated simply by examining the relevant allocation formula (such as urban system funds or section 5 funds), but others are much more difficult to estimate. The availability of federal-aid interstate and primary highway system and section 3 funds, for example, varies so widely from one year to another

for an area that even an analysis of historical trends may be of limited usefulness. Also, some, if not all, of these funds are the subject of delicate ongoing political negotiations; anything done by the committee in estimating fund availability must be extremely sensitive to these continuing deliberations.

Task 3B: Estimation of Availability of Discretionary Funds by Mode and Funding Category

In this task, the amount of money available for allocation is determined in each funding category with special emphasis placed on program restrictions (e.g., highway expansion only or transit operating only).

Step 4: Grouping and Determination of Priorities

Projects from each needs list are placed into categorical-priority groups that are then arranged in priority order by type of funding.

Task 4A: Categorization of Projects

In this task, all projects are assigned to one of the 27 categorical-priority groups by using the project-grouping criteria developed in task 1A.

Task 4B: Determination of Priorities of Groups Eligible Under Each Funding Category

For each type of funding (e.g., FAU, Transit Capital, Discretionary Transit Formula), the groups of projects eligible for funding under that category are placed in priority order by using the criteria for determining the group priorities developed in task 1B.

Task 4C: Removal From Groups of Some Projects

Projects identified by the implementing agencies to be implemented with the nondiscretionary funds as estimated in task 3A are removed from further consideration for the discretionary funds allocated by the committee. These projects are placed directly into the TIP.

Step 5: Project Group and Individual Project Selection

Groups of projects and individual projects are selected to the extent that the available funds allow in each funding category.

Task 5A: Application of Available Discretionary Funds in Each Funding Category

The constraint of available funds in each funding type is applied to the groups of projects listed in priority order under that category. Projects from wholly funded groups are included directly in the TIP.

Task 5B: Analysis of Intermediate System That Will Result From Adding Projects to Existing System

The system that would result from adding the non-discretionary-funded projects and projects from wholly funded groups to the existing transportation system is studied, and problems such as system connectivity are identified.

Task 5C: Selection of Projects From Unfunded Groups to Use Remaining Money

Projects to use up the remainder of the available funds in each category are selected from the unfunded groups. At the conclusion of this step, the projects to be set forth in the TIP are identified as consisting of the nondiscretionary elements identified in task 4C, the projects from whole groups covered by available discretionary funds identified in task 5A, and those projects selected from unfunded groups and covered by available discretionary funds as identified in this task.

CONCLUSIONS

One alternative method is outlined for preparing an areawide TIP that could be substituted for the method currently being used in southeastern Wisconsin and elsewhere. The implementation of such a method, however, requires two important changes:

1. At present in southeastern Wisconsin, all possible federal transportation funds that could be distributed through such a method are allocated by formula directly to the implementing agencies. The advisory committee has no control over the selection of projects for funding. It would be necessary to change the system so that at least some federal funds would be placed at the discretion of the committee in each urban area. Initially, it may be possible to include in the discretionary category the federal-aid urban highway funds and the section 5 transit funds. Ultimately, if the process proved beneficial, perhaps more categories of federal-aid funds could be placed at the discretion of the committee.

2. Transportation-system implementing agencies would have to change their approach to the preparation of the TIP. At present, such agencies submit final lists of projects directly from their capital budgets that they have scaled to anticipated available funds. Instead, it would be necessary for implementing agencies to identify likely candidate projects for consideration by the committee. Thus, such agencies should not be compelled to submit only those projects that might match available funds. If this process were to be implemented, it would also be necessary to closely coordinate the preparation of the TIP and the development of individual agency budgets so that any decisions made at the areawide level through the committee could be reflected in the local budget process.

ADDITIONAL RESEARCH

In 1978, the Southeastern Wisconsin Regional Planning Commission gathered the information about each proposed project in the 1978 TIP that would be necessary to apply the third alternative method. It is their intention to test the method and the associated criteria, weights, and threshold values through an application to the 1978 TIP projects. Some criteria may have to be discarded; others may have to be added; and the ratings, weights, and threshold values may have to be adjusted. Additional research to establish a technical basis for determining criteria weights may have to be pursued for some criteria. In addition, the possibility of developing a set of criteria, weights, and threshold values such that they could be used to compare projects from different categories will be explored, although that is anticipated to be a significant task. Nevertheless, such an application should help to determine the workability (or lack thereof) of this alternative method for preparing a TIP.

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Evaluation and Application of a Priority Programming System in Maryland

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This paper presents the process and results of evaluation, selection, and implementation (on a test-case basis) of a priority programming methodology for the Maryland Department of Transportation that was part of a National Cooperative Highway Research Program project. The methodologies that were evaluated for application to the state of Maryland included (a) the priority programming system (PPS), (b) the highway investment analysis package, (c) the objective priority programming procedure, and (d) the transportation resource allocation model. Other programming techniques were considered but eliminated through a screening process. Criteria were formulated to assist in the evaluation. PPS is a computerized tool for the estimation of the road-user benefits of individual highway improvements as a function of when the improvement is implemented and the subsequent scheduling of implementation of sets of improvements so that total user benefits are maximized. Benefits can be broadly defined (e.g., social, economic, environmental, or travel) costs or focused on user (travel-time, accident, operating) costs depending on the preferences of the state. The PPS was successfully used for the determination of priorities in a test case of 26 of the largest primary state highway projects. The paper concludes by discussing from the Maryland perspective the ways that the PPS in particular and priority programming tools in general can be used in addressing transportation issues of statewide concern.

Transportation agencies face a complex decision-making environment that includes multiple actions and strategies to improve mobility and, given other societal concerns, finite resources. Individual or packaged actions taken by these agencies require a dynamic evaluation process to consider a wide range of issues and potential actions, information about numerous impacts, and a large number of different viewpoints. Such a process for identifying and resolving state-level issues is illustrated in Figure 1 (1). As indicated, techniques and tools to provide this information can vary from surveys to monitoring and models. There is increasing pressure to have tools that are quick to use and sensitive to the issues.

Many states are now also confronted with issues related to revenue shortfalls; the development of multimodal transportation policies, plans and programs; and a host of other concerns.

In 10 of the 13 states consulted in a National Cooperative Highway Research Program (NCHRP) project (1,2), the determination of transportation priorities was identified as a major concern. In the high-

way mode, it was of concern in 7 states and, in respect to nonhighway modes (transit, rail, and airports), it was of concern in no more than 3 of the states. The multimodal and mode-specific issues come at a time when programmed transportation projects are quite large. This requires hard decisions related to state-level transportation programming that will work toward achieving mobility goals within available resources.

The state transportation departments need a tool to assist them in working with the legislatures, governors' offices, and affected communities in making an objective and rational transportation-priority program. Often different parts of the same organization perceive entirely different transportation program-expenditure cycles. It is necessary to draw these different viewpoints into a common perception so that a more pragmatic approach can be taken in presenting transportation programs to the public, elected officials, state legislatures, and the governors' offices.

This paper discusses an experience of evaluating, selecting, and applying transportation-priority programming methods in Maryland. An actual test case of applying the priority programming system (PPS) developed by the Ministry of Transportation and Communications in Ontario to 26 of the largest primary-highway projects in the state was undertaken for purposes of developing project priorities. This paper discusses the findings of this work and the implications for other state-level transportation-priority programming efforts.

EVALUATION OF PRIORITY PROGRAMMING TOOLS

With the knowledge of issues and views of the various states in mind, an evaluation was made of alternative priority programming tools for assisting the state of Maryland. Because of strong multimodal trade-off pressures, the development of priorities was a significant issue in the development of a 5-year program budget, a long-range master plan, and mode-specific planning and programming processes. The idea was to select a tool to be used, apply it to a test case, document the experience, and through NCHRP disseminate the results to potential users in other states. This section discusses the tools examined, the cri-