

budget levels or allocation policies and to provide guidelines on appropriate scales for projects in the preliminary design stage.

In all cases, HIAP will be used as a design aid and not as a substitute for making decisions. This subservient role for the model was well received at the department of transportation during the trial applications—many had feared that benefit/cost analysis would be proposed and used as the final criterion for decision making. In fact, a major use of benefit/cost analysis in the project was in the identification of new alternatives. The need for professional judgment in preparation of data for HIAP and in analysis of the model results also became apparent in the applications. Once experience with the model was gained, HIAP became a very powerful tool for professional engineers and planners in the department.

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# New York State's Approach to Highway Jurisdictional Realignment

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The New York State Department of Transportation is currently undertaking a study of the jurisdictional realignment of state and local highway systems based on functional classification. This paper describes the approach that is being taken. The current approach is based largely on the desire to correct existing misassignments of highway jurisdiction to the extent practical and is largely shaped by several recent efforts to accomplish realignment. Application of this procedure to many other states appears feasible. This paper briefly summarizes past highway jurisdictional realignment efforts within New York, outlines a series of short-term objectives and long-range goals for the study effort, highlights the present status of this effort, and discusses the preliminary observations and conclusions that may be drawn from study efforts.

In the past few years, state and local transportation officials have become aware that in the near future they will be unable to address a substantial portion of identified highway needs due to declining resources (in terms of real dollars) for both highway capital construction and maintenance. This has led to significant changes of emphasis in philosophy and program planning at the state and local levels. By necessity, many elements of transportation plans developed in the late 1960s and early 1970s are now being postponed, reduced in scope, or totally abandoned. Capital construction programs are

now being redirected to recondition existing facilities rather than to plan for the development of new facilities. Such an approach increases the emphasis on the preservation of past investments and reduction of the cost of maintaining the existing highway system. Even at the federal level, which has traditionally emphasized new capital construction and reconstruction investments rather than aid for rehabilitation and operations, the tide seems to be changing.

This new direction has also drawn increased attention to a somewhat related area—highway jurisdiction. In some states the existing assignment of responsibility for maintenance and improvement of the public highway network may no longer be entirely logical or equitable. As a result, a number of states either have recently completed or are now undertaking studies that reexamine the validity of current jurisdictional assignments. In addition to eliminating inconsistencies, most states also hope that such an effort will result in potential cost savings through increased efficiencies. The New York State Department of Transportation is currently undertaking such an effort, via a somewhat unique yet straightforward approach.

## BACKGROUND

New York's state highway system was created in 1898. Originally, only rural routes of major statewide significance were included in the system. As in most other states, initial route selection was based on a number of general concerns, including system continuity, nature and magnitude of travel carried, geographic equity, and ability to support the system financially. Gradually, routes were added on an incremental basis without any periodic and systematic review and revision.

The state highway system consists of about 24 140 km (15 000 miles) or approximately 13 percent of the public highways within the state. Of this total, approximately 19 310 km (12 000 miles) are in rural areas and about 60 percent of that total are classified as rural arterials. Of the more than 4830 km (3000 miles) of state highways in urban areas, about 70 percent are classified as connecting links of rural arterials. Responsibility for the majority of these highways is assigned to the New York State Department of Transportation.

The remaining 150 000 km (93 000 miles) of public highways in the state are under the jurisdictional responsibility of one of the state's 57 counties outside of New York City, 62 cities, 930 towns, or 556 villages—most of which have independent highway or public works departments. The total amount of federal highways in the state does not exceed 150 km (93 miles); therefore, it is ignored for discussion purposes.

In the mid-1960s a joint study to realign rural highway responsibilities was initiated by the New York State Department of Public Works (forerunner to the state department of transportation) and New York State County Highway Superintendents' Association. At that time it was agreed that a statewide approach to jurisdictional realignment was necessary and that such an effort should also consider financial needs of each level of government necessary to adequately maintain and improve the highway network.

An initial statewide realignment proposal was developed at that time, but implementation was not pursued because of the pending development of the 1968 and 1990 functional classification systems, the state's master plan for transportation (1), and local governments' desire to have increased state financial assistance accompany any state-local realignment.

In 1973 a second proposal for highway realignment was completed and documented in the statewide master plan. This proposal called for the realignment of both urban and rural facilities in accordance with their 1990 highway functional classification. The master plan recommended that only routes that have an arterial functional classification should be state highways. It proposed that a net transfer of 5150 km (3200 miles) be made to local jurisdictions in rural areas and, in urban areas, a net transfer to the state of 6759 km (4200 miles) be undertaken. The proposal would have had a significant financial impact on the state and a number of municipalities, so it was also proposed that, before any transfers were actually made, a study should be undertaken to determine the financial, administrative, and technical capability of the state and local governments to maintain and improve the realigned system.

To date, such a detailed financial study has not been undertaken and the master plan realignment proposal has not been implemented. Primary factors for this appear to be (a) the negative financial impact of the proposed realignment plan on most rural areas, which would result from the proposed transfer of a substantial amount of state highways to rural municipalities; (b) the fiscal problems that have faced all levels of government

in New York State during the past few years; (c) limited department staff available to pursue implementation due to state-level budgetary reductions; and (d) the perception of state officials, legislators, and the public that a significant problem did not exist.

Completion of a 1980 highway functional classification study in 1976 once again focused attention on the present assignment of highway jurisdictional responsibilities within New York State. The 1980 functional system was developed initially by state and local officials to realign the federal-aid primary, secondary, and urban systems in accordance with the requirements of the Federal-Aid Highway Act of 1973. This system provided a convenient technical tool that could be readily used to identify apparent jurisdictional inconsistencies. Applying functional concepts to the existing state highway system identified approximately 1600 km (1000 miles) (nearly 7 percent of the total system) that do not primarily serve a statewide or regional travel function. Conversely, over 4000 km (2500 miles) of local highway appear to serve intercounty travel needs. The majority of the subject local highways that are outside of cities is currently under the jurisdiction of county governments.

Based on these overall findings and the recognition that state-local jurisdictional inconsistencies may be the cause of ineffective use of capital and maintenance resources, the New York State Department of Transportation revived its efforts to realign the state highway system during 1976.

## APPROACH TO JURISDICTIONAL REALIGNMENT

Before an approach to jurisdictional realignment can be selected, a determination must be made as to the objectives that one wishes to achieve. A number of lessons learned from New York's realignment efforts of the past were used to establish the following short-term objectives and long-range goals:

### Short-Term Objectives

1. Make state and local officials aware of the nature and magnitude of governmental jurisdictional inconsistencies;
2. Develop a fair and equitable solution that will not impact adversely on either the state or any of its municipalities (i. e., do not pit winners against losers);
3. Dispel the fears and negative attitudes that a number of municipalities in the state developed toward jurisdictional realignment as a result of previous state-wide realignment efforts;
4. Develop a cooperative and open state-local realignment process;
5. Demonstrate to those officials that may be skeptical that it is possible to accomplish something, even if it is not the ultimate or maximum realignment solution;
6. Minimize the short-term costs of realignment; and
7. Improve the continuity, efficiency, and effectiveness of state and local highway systems.

### Long-Range Goals

1. Establish logical and systematic assignments of highway jurisdiction at all levels of government that correspond to their general responsibilities;
2. Provide each level of government with the resources it needs to maintain and improve its highway system in an efficient and effective manner; and
3. Ensure that the residents of all levels of govern-

ment are treated in an equitable manner—in terms of service received and resources required to support the corresponding system.

Based on these goals and objectives, the New York State Department of Transportation selected a two-phase approach to total highway system realignment (see Figure 1). The first phase is directed at the realignment of the state highway system outside of cities. It is designed as a short-term trading effort, which principally involves the state and its counties and will have little or no adverse financial impact on any governmental unit. The efforts of the initial phase are intended to produce a more logical system that will provide the basis on which permanent solutions to several complex issues can be addressed in phase 2. These issues, which tend to require a longer-term effort because of their potentially significant socioeconomic impacts include

1. The possible extension of the state highway system within cities (currently few state routes other than expressways are continuous through cities),
2. Development of adequate state highway-aid programs to assist in the maintenance and improvement of local government highways, and
3. Realignment of highway systems at the municipal level as appropriate (optional).

#### Guidelines

The department has established a series of specific guidelines that explicitly relate to the achievement of the short-term objectives cited above. These guidelines, which have been established to facilitate the development of equitable state-local transfer proposals in each of the 57 counties, include the development of exchange proposals that utilize the 1980 functional classification system as the primary basis for identifying appropriate exchanges (2): "Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide." Functional classification criteria are available from other sources (2, 3). The state should be assigned the highest classified routes, the counties the next higher level routes, and the remaining routes should become the responsibility of cities, towns, and villages. Only limited involvement with cities, towns, and villages is required in the initial phase, since appropriate exchanges can generally be developed between the state and each county.

Contrary to the approach taken in the master plan (which assigned all arterials to the state and other routes to local government), no specific dividing line between

state and local government jurisdiction within a county will be established. Instead, the split will be determined by the extent of the existing state system within that county. This approach is intended to ensure that the financial impact on all levels of government is minimal; however, it will not rectify past inequities.

Proposed exchanges between state and local government are to be developed on a lane-kilometer for lane-kilometer basis. This guideline presumes that the costs of highway maintenance and improvement relate directly to the length and width of the roadway. However, since a number of other factors also have a significant influence on costs (e.g., differing road conditions, standards, magnitude, and size of structures), adjustments in the extent of highways to be transferred in order to offset potentially significant financial imbalances are also to be accounted for.

No exchanges between the state and its counties will be pursued by the state unless appropriate local officials agree on the extent and timing of the proposed transfers and a resolution in support of the proposal is passed by the appropriate legislative body. Routes are to be exchanged in their present condition. Improvements will only be made when they can compete on their own merits for available resources.

A similar set of guidelines will also be developed for the longer-term effort. Although not yet final, guidelines for jurisdictional realignment within cities are expected to be based on the same general principles that are being applied in other areas of the state. Functional classification will be the primary tool used to identify a fair and equitable state highway system in each city. It is expected that the majority of such routes will have a principal arterial (connecting link) functional classification, indicating that they serve through travel. Because the extent of existing state highways within cities is limited, it will generally not be possible to exchange highways on a lane-kilometer for lane-kilometer basis, as was done during phase 1. However, existing state highways not on the selected state system will most likely be returned to their city.

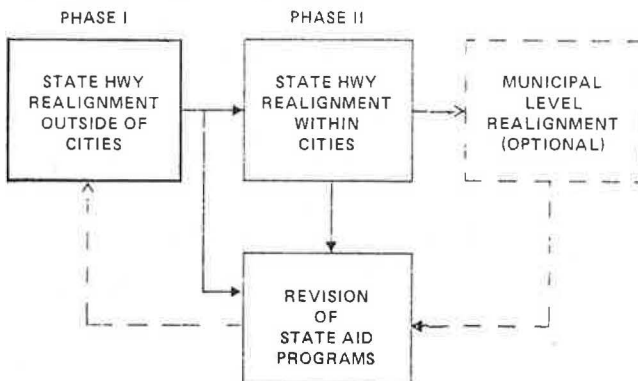
While it is anticipated that a system will be developed in each city to indicate routes for which the state should assume some level of responsibility, several options will be examined as part of the financial element of phase 2 to determine the most appropriate method to address this issue. Among these are

1. Outright state takeover of these routes for purposes of operations, maintenance, and capital improvement;
2. Outright state takeover but with contractual arrangements with each city for operations and maintenance purposes; and
3. Direct state assistance to cities to offset some of the costs associated with the designated state system.

#### Status

In the fall of 1977, the department selected Jefferson County to use the above guidelines as a pilot area for highway jurisdictional realignment. Jefferson County is principally rural, has a population of 90 000, and is located in northern New York. It contains the city of Watertown, which has a population of 30 000. After several months of negotiations between department, county, and city officials, agreement was reached on the exchange of approximately 116 lane-km (72 lane-miles) of state highway with minor collector and local functional classifications for 111 lane-km (69 lane-miles) of county highway having arterial and major collector classifications and

Figure 1. The realignment approach.





5 lane-km (3 lane-miles) of city streets having an arterial classification. Both local governments passed resolutions in support of this proposal. In the remaining 56 counties the department then developed preliminary transfer proposals and began to discuss them with appropriate local officials. A formal report (4) was prepared and distributed to state and local officials in support of this effort.

During 1978, preliminary agreements were achieved in about 30 counties and a decision was made in still another 10 counties that existing assignments of responsibility did not require modification. A major effort was undertaken to finalize phase 1 negotiations in the remaining 17 counties early in 1978 so that enabling legislation could be submitted to the state legislature for action in the spring of 1979 and phase 2 activities can formally commence.

#### PRELIMINARY OBSERVATIONS AND CONCLUSIONS

While jurisdictional realignment efforts are far from complete in New York State, some preliminary observations and conclusions can be drawn at this time from the experiences in phase 1.

The use of functional classification as a principal tool in highway system realignment is quite appropriate. The Federal Highway Administration (FHWA) has determined that many other states, including Arkansas, Colorado, Georgia, Indiana, Iowa, Michigan, Missouri, Nebraska, Washington, and West Virginia, are using it as a basis for system realignment (5, 6, 7). Although it is much simpler to equate specific functional classification levels to each level of government, it is also feasible to use the concepts of functional classification even though responsibility for routes in a certain classification level may be split between two levels of government after realignment. For example, in order to maintain a similar-sized rural state highway system in New York, the more important elements of the major collector system were assigned to the state and the remainder were assigned to the counties. After the existing extent of state highways and functional classification systems in other states is examined (8), a similar approach could probably be used.

While the lane-kilometer for lane-kilometer guideline was an effective rule of thumb for development of preliminary transfer proposals that have minimal financial impact, it should not be expected to supplant the need for careful evaluation of potential financial impact on a route-by-route basis. Because of variations in roadway and topographic conditions, geometric standards, travel demand, and structures, routes of equal length can have substantially different maintenance and capital needs associated with them. New York has found that a detailed needs analysis was not required to determine such differences. Rather, field inspections by state and local officials responsible for maintenance and improvement of these routes was sufficient to estimate such cost-related differences.

Jurisdictional realignment has always been a very sensitive issue in New York State, probably because past efforts would have created some winners and some losers. By adopting an approach that attempts to minimize the adverse financial impact of realignment, much of the controversy has disappeared. However, much of the incentive for placing a high priority on realignment has also evaporated. By its very nature, the initial phase will not address the question of past inequities. Solutions to such situations may, however, be incorporated in the second phase, when financial resources are to be reviewed and recommendations made for appropriate adjustments.

The principal concern expressed by state and local officials about New York's approach to realignment has been that the final product of phase 1 may not necessarily be a statewide solution since counties are not mandated to participate. Thus, a discontinuous state system may result. Adequate provisions have been taken, however, to ensure that this does not happen. Although the extent of system realignment may be less than it would be under a mandated plan, a number of significant advantages were achieved under the approach selected. These include the improved cooperation of local government and improved political feasibility for making many desirable changes that might not occur in an all-or-nothing approach.

The department has found that many of the routes in question do not cross county lines, and other candidates for exchange are obvious to all affected governmental units. The department insists that system continuity criteria be satisfied in all exchanges. Thus, proposals negotiated in one county are sometimes dependent on what happens in an adjacent county. This approach obviously requires a continual monitoring of realignment efforts in all areas and periodic adjustments to reflect changes made in adjacent counties. However, this has not caused significant problems.

The potential for cost savings due to realignment appears to be minimal. Some efficiencies will result from more direct routings and from a continuous system, but the principal advantages of realignment within New York appear to be in the following areas:

1. Improved planning and coordination,
2. More effective use of capital and maintenance resources, and
3. Improved equity through a more rational relation between highway assignments and general governmental responsibilities.

New York's approach, while not revolutionary in nature, appears to be appropriate to address jurisdictional realignment concerns in a timely manner that is mutually satisfactory to all affected governmental levels.

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# Subarea Diagnostic and Evaluative Procedures for Programming Short-Range Transportation Improvements

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The emphasis on low-cost, short-range transportation system management actions implies the need for more detailed data to support decision making at a smaller scale. Ideally, such data would be developed efficiently and in a manner conducive to identification of problems and opportunities and, ultimately, formulation and programming of improvements. At the same time, such data must permit planners to perform the necessary trade-offs of traditional mobility objectives against the increasingly important objectives of improved air quality, reduced energy consumption, and responsible fiscal management. This paper describes the development and case-study application of a diagnostic framework for subarea-level identification of problems and delineation of improvements. The necessary level of detail is provided by use of the thoroughfare planning system, a subarea focusing methodology. A framework is set forth for using such a tool to develop diagnostic measures pertaining to environmental as well as mobility objectives. The diagnostic measures obtained in a case-study application are described. Further, the use of these measures to formulate an improvements program within the case-study setting is reviewed, with particular attention to the packaging of individual candidate projects into distinct alternatives for evaluation and selection.

An essential responsibility of a metropolitan planning organization is to assist local governments in making transportation investment decisions. In the past, however, it has been difficult to provide adequate information to support local decisions. Regionwide analysis and evaluations of major highway and transit facilities simply are not detailed enough to address problems at a sub-regional scale. Much thought has been given to the development of planning methodologies that are geared to cost-effective analysis of subregional problems, and several recent developments appear promising (1, 2, 3). One such methodology is the thoroughfare planning system (TPS), developed by the North Central Texas Council of Governments in close cooperation with member governments. The TPS features a rich, hierarchically structured data base and an automatic subarea focusing capability. It provides low-cost analyses of transportation systems in substantially greater detail than was previously possible. The mechanics of TPS are adequately described elsewhere (4, 5). The subject of this paper is the application of subregional analysis in

decision-making contexts of increasing complexity.

Recent legislation and other considerations have created a situation in which the objectives of transportation planning, at all levels, are more complex and are often in conflict. Short-term, low-capital transportation system management (TSM) actions must be explored before resorting to capital-intensive alternatives. The implementation of TSM actions must consider the progress of long-range developments. Fiscal constraints and environmental concerns temper the traditional objective of increased mobility. These manifold objectives require a well-structured diagnostic and evaluative process to guide the identification of effective improvements to the transportation system.

This paper describes a framework for systematic and comprehensive review of a local transportation system. It focuses initially on travel patterns (rather than on specific facilities) in order to formulate a more cohesive and effective set of system enhancements, including systemwide actions as well as facility-specific improvements. A by-product of this approach is the ability to address questions of equity more readily—questions such as whether trips to and from a particular residential zone are adequately served in terms of mobility, energy efficiency, and other objectives.

## TPS

TPS is designed to answer many of the needs that arise from a shift in planning emphasis—from large-scale, capital-intensive projects to low-cost subregional projects, typified by TSM strategies. The ability to analyze small-scale problems quickly and inexpensively is essential. In the formulation of a local capital improvements program, for example, information is needed on an adequate range of options within the time constraints imposed by the decision-making process. The principal elements of the TPS include the following:

1. An approved regional thoroughfare plan, complete with design standards;