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Planning

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| 11 | Transportation Administration |
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Foreword

As society has become more urbanized and as transportation facilities have become sophisticated, the transportation planning process has necessarily become more complex. In order to be able to meet growing transportation planning needs, a number of states are presently creating statewide transportation plans. All urban areas of over 50,000 population now have or are in the process of completing urban transportation plans. A number of regional transportation planning agencies have been created throughout the country to plan an integrated, multi-modal transportation system. States such as New York, California, Connecticut, and Wisconsin are developing a statewide comprehensive transportation plan.

In this RECORD, representatives of the New York State Office of Planning and Development in the Department of Transportation report on the status of their program on statewide transportation planning. New York State has created a Department of Transportation with the responsibility for planning and administering the state's programs relating to highways, waterways, and aviation. Recognizing the growing importance of planning, the transportation planning functions have been separated into a line function within the Department in the Office of Planning and Development, headed by an assistant commissioner.

Statewide planning involves all modes of transportation, including water, ground, air, pipeline, and transit. It is concerned with both intercity transportation and transportation within the urban environment. There is consideration both of the movement of people and the movement of goods by public and private carriers. Statewide planning includes an assessment of the demands of transportation, the volume, value, density, rates, regulations, and travel times. Under New York State's statewide transportation plan, information and data from urban transportation planning studies are being integrated in the master statewide plan.

The transportation planning process for New York State is described in this RECORD, including discussions of the goals of transportation, the needs and sources of inventory, research analysis and modeling for transportation planning, the techniques for forecasting travel demand, the procedure for developing plans and alternatives, and the implementation and monitoring of the plan once devised. A report is made of the first year's activities, including developing policies, priority programs, requirements for implementing actions, and needed future programs. One of the papers discusses the data requirements for statewide transportation planning. Included in the requirements are consistency of data, data needs, inventory facilities, persons and goods travel, economic factors, and transportation regulations and policies.

The statewide planning process is still in its developmental stages in New York State, but the description given in this RECORD will be of value to other states that may be considering creation of a statewide transportation plan.

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Introduction

J. K. MLADINOV, Assistant Commissioner, New York State Department of Transportation

•STATEWIDE transportation planning is already receiving attention in many states, and it will be commanding attention in many more during the coming years. Because of differences in scale and complexity, New York State may have to be concerned with more travel modes and more considerations in its statewide transportation planning than might be the case for other states. Likewise, New York State is approaching the subject with a greater sense of urgency than may exist in other states—again, as a result of the differences in scale, complexity, need, and degree of recognition of the need that exists at the political leadership level.

Although its Department of Transportation was created and its active involvement in statewide transportation began only a little more than a year ago, New York State has made significant progress, I believe, in this largely uncharted field of statewide transportation planning. This set of papers reviews our work and thinking during the past year and the resulting direction that we have set. I hope these papers attract critical appraisal and comment, since we will thereby have the benefit of the experience and expertise of the readers of this Highway Research Record.

At the outset, let me explain what we mean by the term "statewide transportation planning." Because the responsibility of the New York State Department of Transportation involves all modes of travel, this term obviously must include all of the travel modes that together make up an interrelated statewide transportation system. It is that total system with which we are concerned: not just intercity travel and the intercity transportation system, but urban travel and the urban transportation system; not just the travel of people, but also the movement of freight; not just publicly owned, operated, or regulated modes, but also the private carriers; not just ground travel, but also waterborne and airborne travel; and not separate plans for each of the separate modes but a comprehensive plan for an overall, all-inclusive transportation system made up of highly interrelated modal subsystems and involving modal interfaces in accommodating travel from point of origin to point of destination, whether of people or of goods.

To me this definition is awe-inspiring. It makes the private automobile-public transit modal split process used in urban transportation planning (still considered a landmark achievement, though not yet done to our complete satisfaction) seem quite simple in comparison with the complex modal split relationships at play in the movement of freight, for example, where factors such as rates, regulations, and delivery time are more influential than they are for the movement of people in urban areas. And for the movement of freight, the factors that apply differ from commodity to commodity and have differing levels of importance depending on the type of commodity or the policies of private businesses.

In addition, think of how different the movements of commodities are from person travel. Units of commodity flow need to reflect at least two factors—weight as well as bulk—since the two are equally important in translating commodity flow into trips. Again, the units of commodity attracted to a site will differ from the units of production—in amount, in character, in travel mode orientation, and in value. There is no analogous situation in person travel.

In part, our definition of statewide transportation planning stems from the enabling legislation that established the New York State Department of Transportation a little

more than a year ago and ordered the development of a statewide master plan for transportation. A vital part of an overall transportation program proposed by Governor Rockefeller to the Legislature and the people, this legislation had almost unanimous and bipartisan support. However, the transportation planning staff commitment to this all-encompassing framework for statewide transportation planning developed independently of the enabling legislation and predated it.

We recognize that the task ahead is indeed a large one. It requires an approach that is imaginative, creative, and pioneering. It calls for transportation expertise broader than that needed in urban transportation planning, where a more limited number of modes and modal competition exists and where goods movements are conventionally of much less importance and impact. Statewide transportation planning involves more than merely extending and applying urban transportation planning techniques. A rationale and an approach must be established, and new procedures and techniques must be developed. Statewide transportation planning poses a greater challenge to the profession than has urban transportation planning.

The four papers that follow will discuss in more detail what we have done in New York State and what we propose to do in many of these areas. Kenneth Shiatte, Director of the Planning and Research Bureau, describes how the Department of Transportation is organized for its role as a transportation agency rather than a highway agency and how it is set up to carry out its statewide transportation planning mandate. Robert Breuer, who heads the Statewide Planning Section, describes what is included in the statewide transportation planning process and program. The results of our first year's effort, contained in the report, "Policies and Plans for Transportation in New York State," is reviewed by Clifford Elkins, a member of the Statewide Transportation Planning team. And finally, John Shafer, who heads the Data Services Section, discusses the task of developing survey techniques for all modes of travel on a statewide basis so that data are obtained in a consistent and interrelated form.

Organization for Statewide Transportation Planning

KENNETH W. SHIATTE, Director, Planning and Research Bureau, New York State
Department of Transportation

•A LITTLE OVER a year ago the New York State Department of Transportation was created by an act of the 1967 Legislature. The Act itself did not represent a sudden decision but reflected the shifts in the nature of the State's program and organization that have been occurring over the past decade to meet changing and growing transportation needs. Like its federal counterpart, the New York Department of Transportation is not a totally new organization but one that brings together under one commissioner several separate functional transportation agencies. These include the Bureau of Aviation from the Department of Commerce, the State Traffic Commission from the Department of Motor Vehicles, the Office of Transportation from the Executive Department, and the highway and waterway responsibilities of the Department of Public Works.

In addition to creating the Department of Transportation, the 1967 Legislature also instructed the new Department to develop a balanced, long-range comprehensive statewide master plan for all modes of transportation. The timing of this mandate as well as the reorganization can be largely attributed to a \$2.5 billion bond issue (\$1.25 billion for highways, \$1.0 billion for transit, and \$0.25 billion for airports) approved by New York voters in November 1967.

The management of a program of this scope with financial resources of this magnitude (the current annual transportation program is \$1.23 billion) required a modern, responsive organization, and special studies were undertaken to insure that the new structure was designed to serve the transportation program objectives. The Department was organized, as Figure 1 shows, into four staff offices—Management and Finance; Manpower and Employee Relations; Legal Affairs; and Public Affairs—and six divisions—Planning; Development; Design and Construction; Maintenance; Traffic Engineering and Safety; and Real Property. Perhaps most significant in this organization is that the role of planning has been expanded and placed in a line rather than a staff function. Also significant is the break with tradition in regard to field or district offices. In this organization, those responsible for each of the major functional areas in the ten district offices located throughout the State report directly to the appropriate division in the main office.

Because of the close coordination required for their programs, the Planning and Development Divisions were brought together in the Office of Planning and Development. Basically, the Planning Division is responsible for developing urban and statewide transportation plans and the Development Division for administering programs and funds for airport and transit facilities. Following is a brief summary of the responsibilities of the bureaus in these two divisions (those of the Planning and Research Bureau will be discussed at greater length later):

1. Planning and Research Bureau—Preparing long-range multimodal transportation plan for the entire state including its urban areas.

2. Project Analysis Bureau—Undertaking highway sufficiency studies, project review, and project programming; maintaining liaison between the main office and the district offices. The Bureau's present emphasis on the highway program is due mainly to the size of that program—over \$500 million per year in new construction—and the

need for specialization and continuity. In the coming months the Bureau is expected to take on responsibilities for programs relating to other modes.

3. Data Services Bureau—Designing surveys; collecting, storing, and retrieving all data necessary to transportation planning studies; providing cartographic services.

4. Project Development Bureau—Implementing the statewide plan through public transportation projects; administering the \$1.25 billion earmarked for public transportation projects in the \$2.5 billion transportation bond issue; evaluating project applications for funds; providing managerial and technical assistance for air, rail, and motor carriers (bus and truck); monitoring project progress.

5. Resource Development Bureau—Acquiring and maintaining knowledge of new technology to insure imaginative solutions to transportation project implementation; developing demonstration project programs to test new ideas, materials, and equipment; developing action programs to implement state transportation plans and policies; conducting economic analysis and research to assure that projects and programs meet transportation goals.

This sketchy review of the organization of the Department of Transportation and particularly the Office of Planning and Development will serve as background to the discussion of the Planning and Research Bureau. Developing, monitoring, and, when necessary, updating a statewide master plan for transportation is one of the responsibilities assigned to this Bureau.

ORGANIZATION FOR STATEWIDE PLANNING

Comprehensive statewide transportation planning presents a new challenge to most transportation planners who for the past several years have dealt with urban, or at most regional, problems. Although a planning process can be outlined that appears to

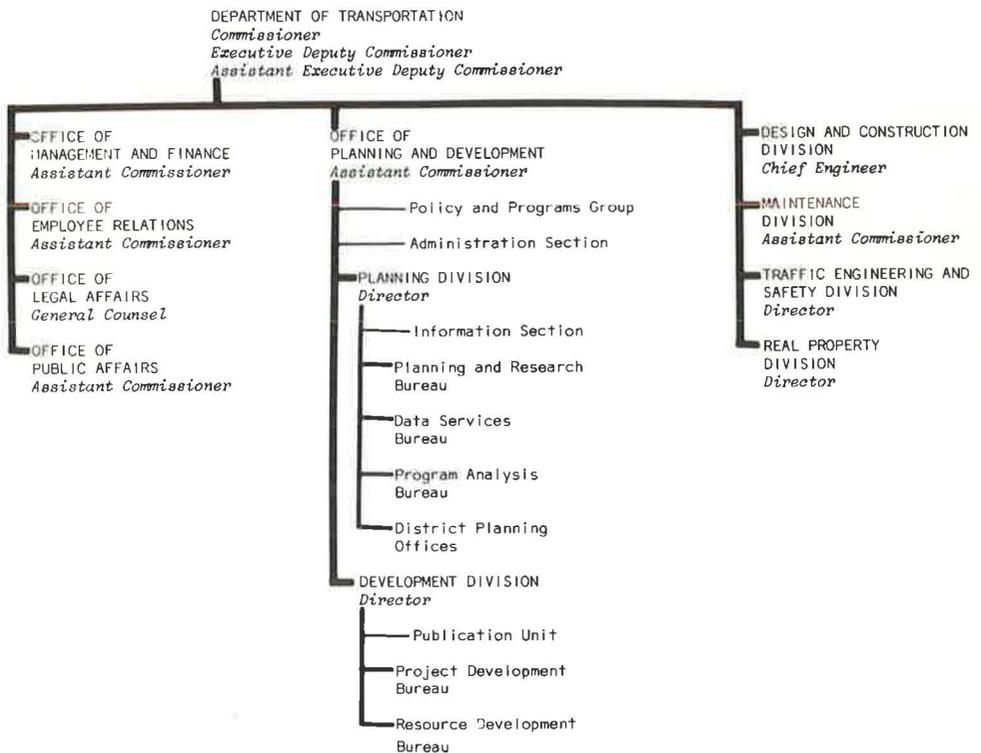


Figure 1. Organization of the New York State Department of Transportation.

be relatively simple, such as that shown in Figure 2, its major steps are diverse and complex, encompassing transportation goals and policies not previously examined. They require new developmental and environmental considerations, a comparison of multi-modal transportation systems, and the examination of different requirements for person and goods travel.

An organization to undertake this kind of planning can neither be created overnight nor be expected to produce instantaneously a detailed plan. The organization must be built on that which currently exists, and the plan must be developed in succeeding increments or levels of detail.

New York State has had a centralized staff for urban transportation planning since 1962. Consisting of planners, transportation analysts, economists, engineers, mathematicians, sociologists, and computer programmers, this interdisciplinary staff carries out the inventory, research, planning, and evaluation work essential to preparing transportation plans for the State's urban areas. It is this staff and this program that provides the base for building the statewide planning effort.

Although there are essential similarities in the two programs, the scale and scope of statewide planning presents problems not encountered in urban studies. For example, the matter of inventories raises the question of how they should be conducted on a statewide level. What should the sample size be? Or more importantly, how does one establish an accurate universe from which to sample? There is also the problem of developing forecasts of travel by people and goods, not only in the aggregate but by mode. This is a tough enough problem at the urban level, let alone at the state level. In addition, the entire battery of tools has to be modified and new ones developed for analytical activities such as simulating travel, estimating the impact of regulatory policies on one mode versus another, and devising objective measures of goal attainment. This latter requirement becomes particularly important when transportation facilities are viewed as only one environmental element that must be fully integrated with other elements such as recreational, educational, employment, and residential facilities.

Statewide planning will require attention to many other matters not entirely similar to those in urban planning. Throughout the planning process, the staff will have to prepare specific products at all levels of detail ranging from reports on an area's need for a general aviation airport to traffic requirements within a particular intercity corridor. Other agencies will be preparing plans that the staff must review to assure that transportation plans are carefully coordinated with them. Coordination is particularly important in the establishment of goals as well as the methods by which goal achievement is measured.

Statewide planning does, however, have a fundamental similarity to urban planning as to other types of planning in that it must be a continuing effort and its staff and program must be so organized. Actually, no single document can ever be a "master" plan, and hopefully no plan will ever be a "final" plan. Conditions change, planning techniques and tools become more precise, social values evolve, government programs vary in emphasis, technology brings progress and obsolescence. Planning attempts to maintain some order and direction in the midst of this constant change. It is, therefore, an activity that can never be considered complete.

The Planning and Research Bureau was organized on this premise. Its organizational structure, now expanded to include the statewide planning effort, is shown in Figure 3. In addition to planning and research functions, it formerly was responsible for data services as well. The many demands for these services, which included the design and conduct of surveys, preparation of data for computer processing, and storage and retrieval of data summaries, led to the creation of a separate Data Services Bureau. This new bureau provides data services for transportation planning as well as other functions within the Department of Transportation and for other state and local agencies.

The Research and Applied Systems Section, as its name implies, is responsible for basic planning research and the computer programming support required by that research. The section also provides the economic, population, and travel forecasts that are used in urban transportation planning. The emphasis in its work program is now

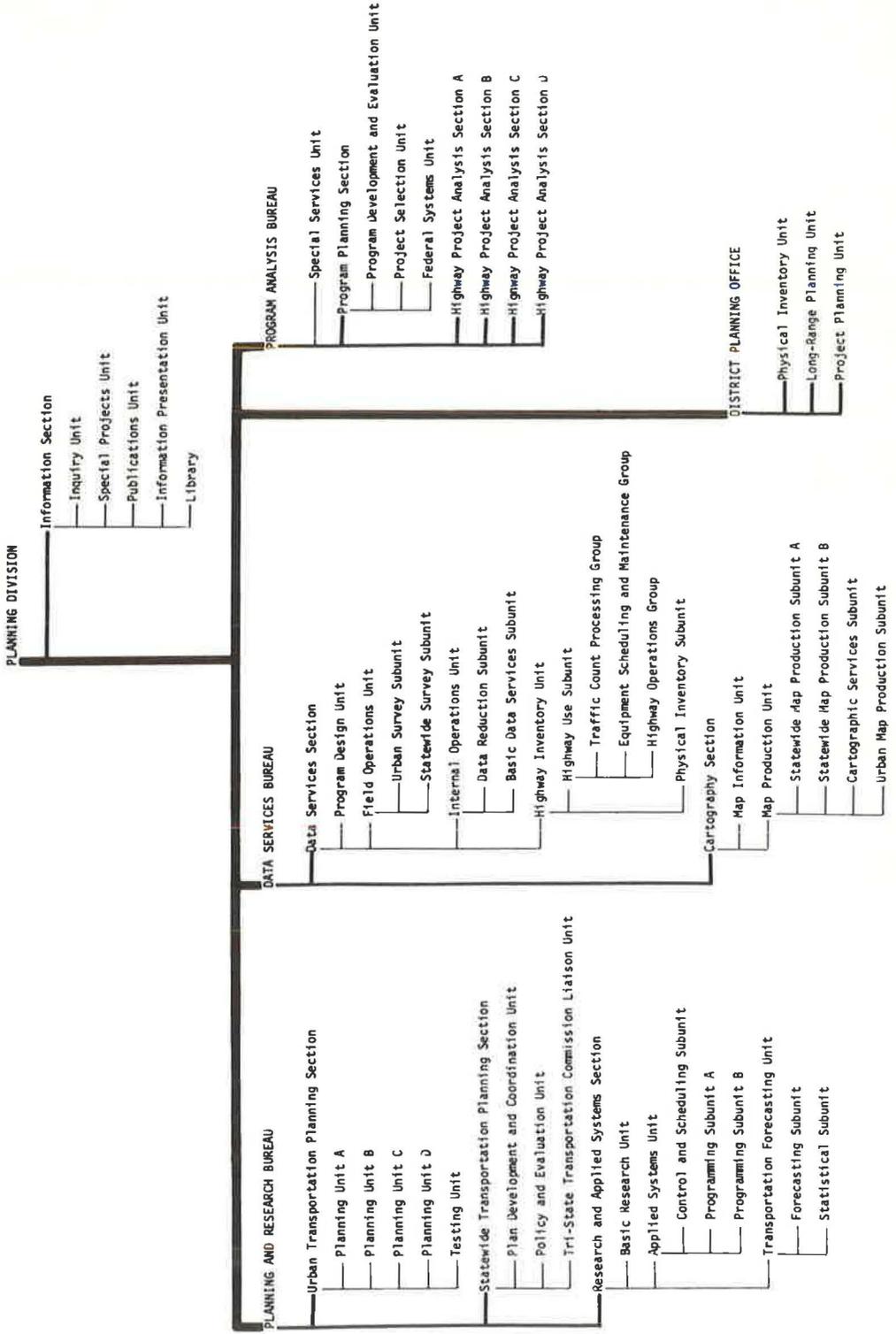


Figure 2. Organization of the Planning Division.

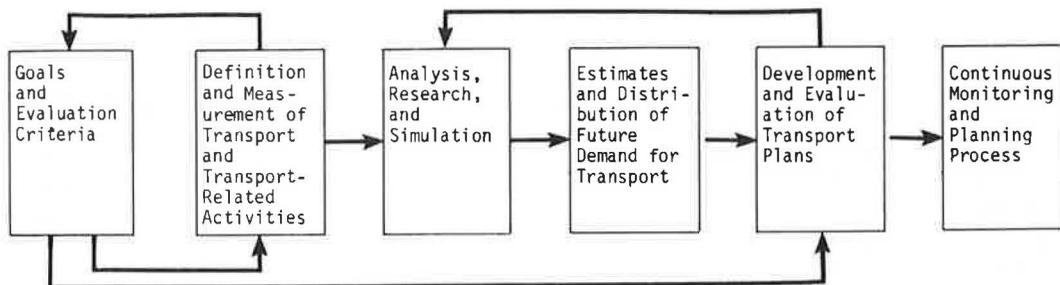


Figure 3. Comprehensive transportation planning process.

shifting from urban research to that having application to statewide planning, such as quantification of measures of goal attainment, multimodal travel simulation, and models to simulate the effect of governmental policy decisions.

The Urban Transportation Planning Section is responsible for developing, in cooperation with local agencies, transportation plans for each of the State's urban areas. Until recently, attention was focused on those areas with over 50,000 population. These studies are now going into the continuing phase, and new studies are being initiated for urban areas of over 25,000 population. Eventually, plans will be prepared for all areas with a central population of 5,000. The section is organized into four interdisciplinary planning teams, each responsible for specific urban areas. A fifth unit, the Testing Unit, specializes in travel simulation, providing this essential service to each planning team.

The Statewide Transportation Planning Section was added to the Bureau within the last year and was charged specifically with the responsibility of carrying out the legislative mandate to prepare and maintain a statewide master plan for transportation. At present the section has twelve interdisciplinary professional positions, grouped within three basic units. The Policy and Evaluation Unit is primarily concerned with the development of goals, planning principles, and evaluation. The Plan Development and Coordination Unit is primarily concerned with developing forecasts and plans, and programming plans in coordination with other agencies. The basic concept in structuring these two units is to place those functions relating specifically to plan design in a unit separate from functions dealing with criteria and evaluation. In some respects, this was a practical necessity because of the requirement to produce an initial plan within the organization's first year that could be used to guide immediate decision-making and, at the same time, to develop the foundation and goals for the more inclusive, longer term effort.

COORDINATION AMONG VARIOUS PLANNING PROGRAMS

Because transportation facilities serve people in transporting themselves or their goods within the environment, they cannot be planned or built without regard for this primary objective. An organization for transportation planning, therefore, must be structured so that internally its program achieves this objective and externally it interrelates with programs of other planning agencies to assure that they are complementary and coordinated. Coordination among various planning programs, however, is not always easy. Some of the more common causes of conflict are the following:

1. Differences in Scheduling—Each program has its own features that dictate the critical points of its schedule. For example, the schedule for a program to build a highway must include time to secure the necessary legislation, prepare preliminary designs, hold public hearings, prepare final designs, acquire right-of-way, and finally construct the facility. These activities can require from five to ten years, and their coordination with other projects is most critical at the beginning of this period.

2. Lack of Common Knowledge—Closely associated with scheduling conflicts are those that arise when different planning agencies do not have sufficient knowledge about each other's processes and particular problems. Whatever the agency, there is a tendency for it to consider its own program to be the crucial one and to expect other programs to exercise flexibility and accommodation to it.

3. Accommodation Instead of Coordination—This, of course, leads to another point of conflict: the assumption that accommodation can be substituted for coordination. Transportation planners, for example, cannot merely accommodate a facility to a travel corridor, when scarce land and resources demand joint use of rights-of-way and development where all facilities are operationally and visually harmonious.

4. Differences in Level of Detail—Different plans are prepared at different levels of detail. Certainly regional planning would not have the detail and refinement that block or neighborhood planning would have. Moreover, regional planning will likely span several political jurisdictions, creating inevitable conflicts when one political unit may be burdened more heavily in the provision of a regional facility than is another. Although coordination and cooperation from the beginning will help alleviate many of these kinds of problems, they may well require a hierarchy of decision-making powers that does not now exist.

5. Lack of Impartial Review Board—That such a decision-making structure does not exist is indicated by this conflict cause. An impartial review board would not only be able to resolve many conflicts due to political and jurisdictional disputes, but would aid in helping each agency keep a clearer perspective on the scope and importance of its own program. Unresolved conflicts are costly; so are duplication and ill-conceived programs. An impartial review board for interrelating planning programs should be considered an essential element.

Although it is not an official decision-making group, a Technical Coordinating Committee has been organized for New York's statewide transportation planning. Represented on the committee are all state departments, commissions, and authorities that have programs related to transportation. These include the Office of Planning Coordination, Department of Commerce, Niagara Frontier Transportation Authority, Division of Housing and Community Renewal, Human Relations Commission, Tri-State Transportation Commission, and others. Representatives of the U. S. Departments of Transportation and Housing and Urban Development serve as ex officio members. Many of the agencies represented on the Committee directly serve regional areas or have field operations within local areas. Thus, coordination with local governments is assured.

In June 1968 the Department of Transportation held its first public hearing on statewide transportation needs. In addition to government leaders, participants included private owners and operators of various transportation modes, educators, labor union leaders, natural resources and environmental specialists, and chairmen of transportation user groups. The response to this first hearing was enthusiastic, and others will likely be scheduled in the future. This is an excellent way to hear all the many points of view and special interests so that each can be served and differences can be worked out as the planning of the State's transportation system continues.

As a further means of coordinating transportation planning with other programs, New York State has established guidelines for creating an Advisory Committee for statewide planning, which will be organized during 1969. This committee will have wider representation than has the Technical Committee and will draw its membership from private industry and private associations as well as governmental agencies.

CONCLUSION

Officially, New York State has had a statewide transportation planning program for slightly more than a year. Before this official act, the Department's planning staff had already begun to focus attention on some of the problems that differ in statewide planning from those in urban planning. The statewide planning effort was, therefore, built on existing organization, methodology, and technology. The staff continues to grow—

both in number and in its knowledge of the total process and the intricacies and relationships of its parts. Methodology continues to be modified, adapted, and in many cases created.

We have learned a great deal during this first year. From an administrative point of view, notable lessons include the following:

1. There is a tendency to underestimate the magnitude and complexity of the work to be accomplished.
2. In such a broad, all-encompassing program, many more crises, both big and small, occur than can readily be anticipated.
3. Finding and recruiting the many specialists required to staff the organization properly is more difficult than expected.

The last is perhaps the most important of all, for the worth of the program will ultimately be due to the people who shape it and carry it out. Certainly the responsibility to develop a plan for a balanced transportation system for a major state is a heavy one, but also one having challenge and excitement. We look forward to sharing experiences with other states such as Pennsylvania, Connecticut, California, and Wisconsin that have also launched statewide planning programs. The start of these programs across the country suggests that solutions to transportation problems must be sought beyond local or regional bounds. Nor do the problems stop at state lines. Although designed primarily to serve an individual state and its people and economy, these programs will serve other states, and indeed the entire nation, as well.

Statewide Transportation Planning Program

ROBERT BREUER, Principal Transportation Analyst, Planning and Research Bureau,
New York State Department of Transportation

•NEARLY EVERYONE by now is familiar with the comprehensive transportation planning process. It is reflected in the 1962 Federal Highway Act, and has been followed in urban transportation programs throughout the United States. It has six important steps:

1. Statement of objectives;
2. Inventory of existing conditions;
3. Development of interrelationships based on inventory data;
4. Forecast related to travel-generating bases;
5. Development and evaluation of alternative plans; and
6. Implementation of plans.

These steps can be contrasted with the transportation planning of the past, which typically would include an inventory of existing volumes and deficiencies followed by a trend forecast of future volumes and resulting deficiencies. The resultant "plan" was a straightforward description and cost estimate of the projects for the alleviation of these anticipated deficiencies. Planning for most other intercity modes—rail, aviation, and ports—was of a similar nature. There was no intensive effort toward development of alternative plans, nor was there an objective statement of goals and the criteria by which these alternative plans would be weighed. There was little or no modal and intermodal system impact estimation.

The comprehensive transportation planning process is as applicable to the statewide transportation problems as it is to those of urban areas. There are several reasons for the persistence of traditional methods. First, transportation needs cover a broad spectrum, and the various modes—aviation, rail, water, roads, and pipelines—are quite specialized. Therefore, the goals of transportation improvement cannot be stated easily; assumptions that are valid for single modes are often inadequate when applied to two or more different modes. Second, the scale of planning for statewide transportation needs is vastly greater than for an urban area; the State of New York, for example, has an area of some 50,000 square miles, and the number of alternative amounts, combinations, and locations for transportation investments can approach the infinite. Finally, there is a vast amount that is unknown when it comes to describing intercity and rural transportation in common terms. To illustrate this more fully, the elements of the comprehensive planning process will be discussed, and some of the considerations that arise and must be effectively dealt with in their application to statewide transportation modes will be highlighted.

COMPREHENSIVE TRANSPORTATION PLANNING PROCESS APPLIED TO STATEWIDE PLANNING

Goals

Goals for transportation give direction to planning and become the basis for evaluating alternative courses of action. Establishing goals for intercity travel networks, however, is a task fraught with complications because of the variety of interests involved. These include users who want reduced travel time and cost but increased con-

venience and comfort; suppliers, both private and government, who are concerned with reliability and safety as well as the costs of building and operating facilities and providing services; and members of the public who are concerned with the environmental effects of transportation systems.

As in urban planning, goals should reflect the attitudes of people and their expectations for a transportation system. Traditionally, the cost of a transportation network has been based on a simple average value for the cost of a person's travel time. This, however, does not appear quite applicable for statewide transportation planning. People have varying incomes and abilities to pay for transportation. They will, therefore, travel for different reasons and by varying distances and modes. Differences also occur in the shipment of goods. Shippers of perishable food products will select a different transportation mode than will a shipper of lumber.

Inventories

Urban transportation planning starts with an accurate data base describing the activities that generate travel, the facilities that connect these activities, and the travel that occurs on these facilities. A similar base is needed for statewide transportation planning, although questions such as "How much?", "How detailed?", and "How to gather?" are yet to be answered.

Consider the amount of data that could be recorded for an intercity trip. The total trip—door-to-door—may consist of time going from the origin to an intercity terminal; from the terminal to another city via some intercity mode such as rail, air, or bus; from the terminal at the other city to another mode, such as from the air terminal to a taxi, limousine, or transit vehicle; and, possibly, from this mode to another that would carry the tripmaker to his destination. The data recorded for this trip should describe the total trip including the terminal, distribution, and intercity interconnection aspects.

Some secondary sources of data on intercity travel are available, although many of them have significant inadequacies. The Civil Aeronautics Board compiles data on intercity origins and destinations from a sample of air travel tickets; however, analogous data do not exist for rail and bus travel. Moreover, information provided by rail, plane, and bus schedules does not provide complete information about the entire door-to-door trip. None of the existing travel data are matched to the characteristics of the travelers or the travel-generating activities, knowledge of which is essential to future generation and simulation investigation.

Research, Analysis, and Simulation

During the past two decades relationships have been established from data obtained in urban transportation planning between land use and travel (accessibility and urban development), trip distribution and travel assignment, and travel by public transit and automobile. These relationships have been used to develop simulation models and other tools for analysis. Analogous tools are needed to simulate the choice of intercity modes, considering significant travel factors such as frequency, distance, speed, purpose, and number in the traveling party. Consideration must also be given to technological changes, both revolutionary, such as tube flight and guided automobiles, and evolutionary, such as jumbo jets or oil tankers. Each type of change would have significant effects on routes, fares, and schedules.

Forecasts

In statewide planning, as in urban planning, forecasting and planning are intertwined. Without some knowledge of the amount and location of future population, employment, and other activities, the amount and location of transportation facilities cannot be determined very accurately. This will require information from other state planning agencies regarding their policies for development to which accessibility by transportation facilities must be provided. In New York's 14 Appalachia counties, for example, intensive efforts are to be made to upgrade their social and economic status. Trans-

portation will be a critical factor and must be closely coordinated with parallel industrial, recreational, educational, and other resource development programs.

Plan Development and Evaluation

Developing alternative plans for statewide transportation may be significantly different from the similar process which the state has been following for many years for urban planning or for highway planning. For the latter, it is primarily a matter of locating routes on maps. But for a multi-mode statewide transportation system, schedules and rates are equally as important as routes, if not more so. Statewide transportation plans must include, therefore, policies on regulation and taxation that affect the provision and use of privately supplied transportation services.

Implementation

In the comprehensive planning process, implementation includes the detailed design of projects and their construction and operation. The Development Division and the District Planning Offices along with the Planning Division have the responsibility within the Department to see that transportation plans are implemented. Recommending and reviewing state and national policies and legislation as they affect any transportation mode, evaluating plans by local or regional agencies and administering state and federal funds for many transportation projects, testing products of new technology in demonstration projects, and continually reviewing and evaluating the construction and maintenance programs of the Department—these are some of the activities necessary to the implementation of the statewide transportation plan.

PHASING THE STATEWIDE TRANSPORTATION PLANNING PROGRAM

In phasing the work program of the statewide transportation study, it would have been ideal to have had the luxury of both staff and time to develop the appropriate methodology for each step in the planning process. Pressures to meet established deadlines, however, did not permit such a leisurely pace. Other pressures existed as well. The Transportation Capital Facilities Bond Issue of 1967 made \$2.5 billion available for road, transit, and aviation projects. A number of construction programs were already under way, and local transportation groups were pressing for allocation of these funds for projects within their areas. The statewide planning program, therefore, was required to produce a long-range plan quickly so that local projects could be evaluated against statewide needs and development. Just as planning has no future terminal point, neither has it a starting point; it must always accept and deal with what exists or is already under way. This fact was recognized as the basic premise of the phasing of the program for statewide planning.

The result was a program phased to provide a variety of products timed to meet various needs. Phase I was a one-year effort, ending in September 1968; Phase II will extend for another two years, and Phase III will follow.

Phase I

In Phase I, a fairly comprehensive review was undertaken of the history and current status of all intercity and rural transportation modes in New York State, and the amount of travel by people and goods on these modes. Surveys also began to obtain data on services and facilities, primarily to lay groundwork for extensive transportation usage surveys to be conducted in Phase II.

An important part of Phase I was the establishment of transportation planning goals that reflect comprehensive values and objectives, that are applicable to all modal networks and services, and that provide a basis for evaluating plans and alternatives. This work was undertaken by a Goals Task Force having representatives of the Department of Transportation and the Office of Planning Coordination. The report of the Task Force will be released shortly and will indicate, among other things, directions for research by both agencies toward the development of measurable criteria for goal achievement in both plan and program evaluation.

The major product of Phase I is the report, "Policies and Plans for Transportation in New York State," completed in September 1968 as required by the New York State Legislature when it established the Department of Transportation. The report reflects the comprehensive planning process discussed above and presents policies, plans, and programs that are usable for immediate decision-making and have the necessary flexibility for more detailed application in the future.

Phase II

Phase II, now under way, is concerned with goals and evaluation measures, inventories, analyses, research and simulation, forecasts, plan development and evaluation, and implementation. During the first year, several factors that have affected the work in Phase II became apparent. In the following discussion, these aspects of planning are introduced by the characteristics unique to statewide planning.

There is a hierarchical sequence that statewide plan development must follow according to the scale of the decision to be made. In other words, the development of a plan for a balanced statewide transportation system requires a myriad of decisions to be made at every level in the social structure, including government and private industry. Many of these decisions must be made simultaneously and independently of each other. The state, therefore, has the responsibility to see that each decision-making group has available to it the assumptions, forecasts, policies, and standards that the other groups have. The state is the force that collects and guides these decisions through the decision hierarchy so that differences are resolved, agreements are reached, and an acceptable, workable plan evolves.

This also requires that statewide forecasts of regional transportation demands and service needs be consistent with forecasts and policies for growth and development in all other areas. The Technical Coordinating Committee has been established to insure the coordination of these efforts.

Statewide transportation planners must reckon with forces that transcend regional, and even state, boundaries. These forces affect markets, size and speed of vehicles, taxing and pricing, new modes, and changes in existing modes. Private transportation manufacturers and operators are particularly involved in these matters, although government legislative and operating agencies are involved as well. The Advisory Committee to the statewide transportation study, to be established soon, will provide a channel for communication among these parties.

Along with planning at the state scale there must be regional studies to determine the precise location and type of facilities and services. These studies will have a framework to guide them (the output of the state scale plan), policies, standards, forecasts, and system impacts. Planning at this scale calls for detailed knowledge of local origins and destinations and of service needs. It must also be sensitive to small-scale environmental relationships. Coordination with local transportation and local comprehensive planning is essential and will require a cooperative effort by both state and local agencies.

Phase III

To commence some two years from now, Phase III will insure that plans and projects are monitored to determine if they are being effectively implemented. In addition, it will include a continuing program to insure that a variety of factors are reviewed and updated periodically. These include the following:

1. Population and economy;
2. Goals and values, especially those reflected in legislative and executive policies;
3. Applications of technology and research;
4. Significant national events such as mergers, labor contracts, and interest and tax policies; and
5. Variations in transportation network development.

CONCLUSION

Although statewide transportation planning is more complex and at a broader scale than urban planning, the same planning process can be generally followed by both. Planning goals, accurate data base, predictable relationships, reliable forecasts, evaluation of alternatives, and implementation, review, and updating—these are the essential ingredients. The process is well under way in New York State.

We expect that during the program's second year our methodology and capabilities will improve and the state's balanced transportation system will be moved from concept closer to reality.

First Year's Work in Statewide Transportation Planning in New York State

CLIFFORD ELKINS, Associate Transportation Analyst, Planning and
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•THE MAJOR PART of the first year's work in statewide transportation planning in New York State is summarized in the report, "Plans and Policies for Transportation in New York State." It will be used to guide decisions that must be made immediately while intermediate- and long-range programs are being developed. A brief review of this report, therefore, will also serve as a review of this first year's work. The organization of the report, shown in Figure 1, also represents the general organization of the work. This includes an examination of each transportation mode as to its historical development, function, and scale, its prospects and problems, and the policies and programs to guide its growth and insure its balance with other modes.

GOALS

The goals reflect the work of the Goals Task Force and are related to users, providers, and members of the community. In summary, the goals are as follows:

1. For Users
 - a. Reduce accidents
 - b. Increase mobility
 - c. Insure dependability of transportation
 - d. Reduce user cost
 - e. Reduce user time
 - f. Reduce effort, increase comfort
 - g. Enhance visual features of transportation facilities
2. For Providers
 - a. Reduce construction costs
 - b. Reduce maintenance costs
 - c. Reduce operating costs
3. For the Community
 - a. Reduce pollution from transportation sources
 - b. Increase accessibility
 - c. Reduce disruption, dislocation, and negative effects caused by construction of transportation facilities
 - d. Encourage desirable physical or economic development patterns

Both the goals and the patterns of development, shown in Figure 2, which the State Office of Planning Coordination has proposed, importantly influence the development of the plans and policies. Transportation facilities and service help to shape the development, which is also served by transportation and within which economic and social goals of transportation are evaluated.

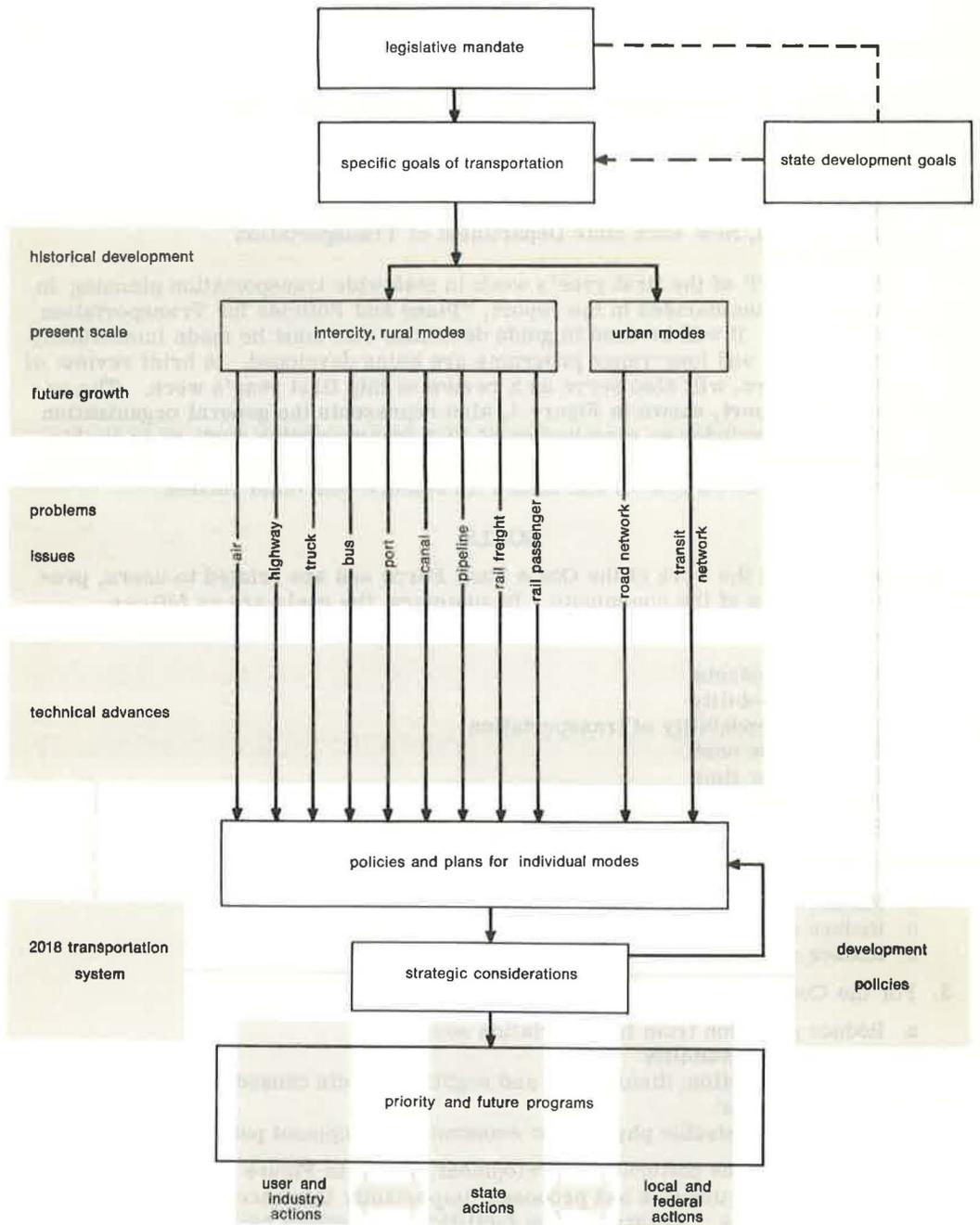


Figure 1. Process by which transportation policies and plans are developed, coordinated, and implemented.

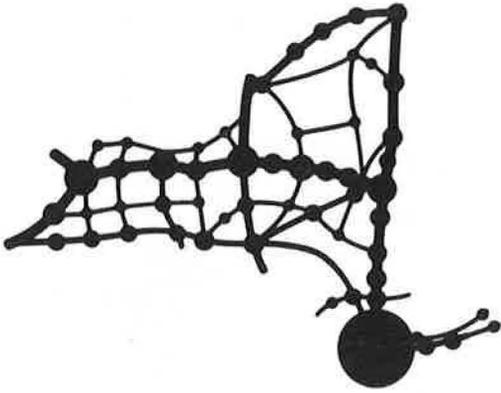


Figure 2. Growth and expansion in New York State.

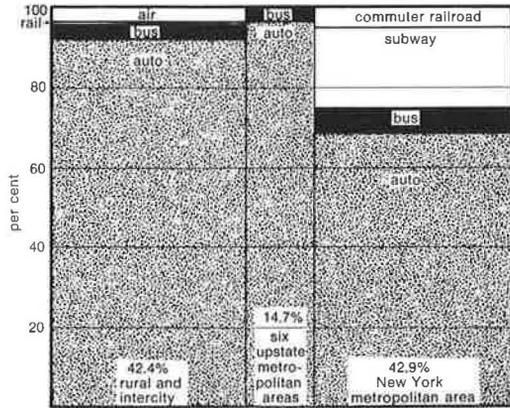


Figure 3. Distribution of person-miles of urban and intercity travel in New York State by mode—1965.

TRAVEL

Figure 3 shows the distribution of person-miles of urban and intercity travel by each mode in 1965. Less than half (42 percent) of all person travel takes place outside of the seven major urban areas. Ninety percent of this travel throughout the state is by automobile, in contrast to that in New York City alone, where just over 40 percent is by automobile.

In 1965, 296 million tons of goods were generated and consumed by New York's industries and residents. The impact of these on the transportation modes is shown in Figure 4. Over 40 percent of the ton-miles was shipped by rail, and over 50 percent by water. The latter does not include international shipping. For some analyses, ton-miles of travel do not fully reveal the importance of the mode. For example, air shipments appear insignificant, yet they are very high in value, and the ability to move goods quickly makes this means of transportation very important to the economy.

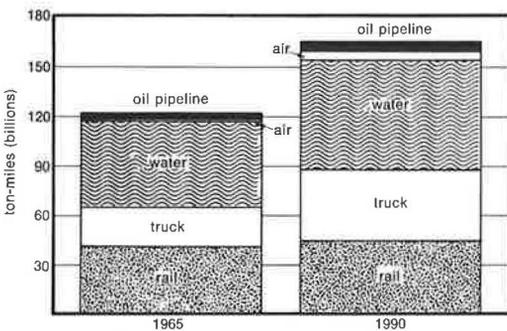
Figure 4 also shows ton-miles of goods in New York State projected to 1990. These projections are based on population and economic forecasts from secondary sources, evaluation of the impact of technology, and a small measure of intuitive judgment.

PERSON TRAVEL

Aviation

Figures 5 and 6 indicate the rapid growth that has taken place in aviation passenger transportation between 1933 and 1968. This tremendous growth has occurred in both scheduled air carrier and general aviation and has produced conditions of severe congestion on runways, in airspace, within terminals, and on ground access facilities.

Figure 7 shows communities where studies will be undertaken to determine where additional general aviation facilities should be built. These and two new jetports, which the report recommends, will relieve the congestion and provide



note: Water does not include international shipping.

Figure 4. Ton-miles of goods originating and terminating in New York State by mode—1965 and 1990.



Figure 5. Scheduled air routes—1933.

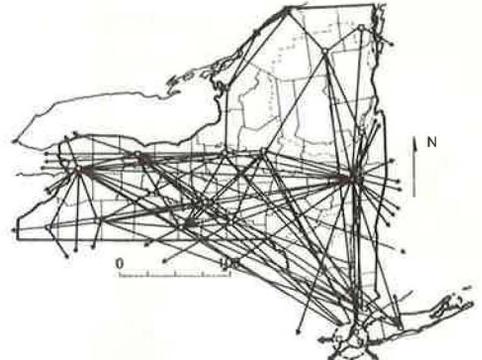


Figure 6. Scheduled air routes—1968.

better distribution of air facilities. The jetports are proposed for the New York City area and western New York State.

Railroads

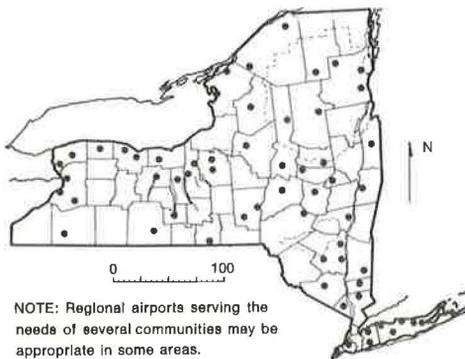
New York State's current rail passenger service is illustrated in Figure 8, which shows by bandwidths the frequency of non-commuter passenger trains. The six major upstate urban areas lie along the corridor shown.

Efficient and comfortable rail passenger service with terminals located within or in close proximity to city centers would offer additional relief to congested air corridors. The report, therefore, recommends a program to test high-speed train service between Albany and New York City and the expansion of this service to Utica, Syracuse, and Buffalo as success is demonstrated.

Bus

The importance of bus travel in New York State is better assessed in terms not of relative size, but in relation to how the travelers would have fared if there were no intercity buses. Intercity buses often provide the only means of public transportation to small cities.

The efficiency of bus travel is sometimes reduced because the location of the terminal relative to expressway access points forces intercity buses to lose valuable time in congested street traffic. In addition, terminals frequently do not have adequate facilities for passenger loading and automobile parking, nor is it convenient for passengers to transfer between bus lines. Intercity bus frequencies in New York State during 1968 are shown in Figure 9.



NOTE: Regional airports serving the needs of several communities may be appropriate in some areas.

Figure 7. Communities identified as having needs for new general aviation facilities.

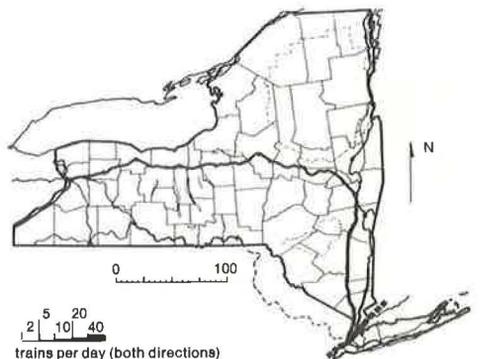


Figure 8. Non-commuter passenger train frequencies—1968.

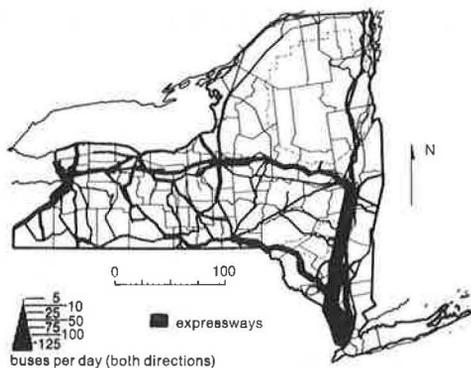


Figure 9. Intercity bus frequencies—1968.

Terminal location and coordination among intercity and intracity transportation are areas that the report recommends for special study and solution.

GOODS MOVEMENT

Aviation

Goods movement by air is expected to increase during the coming years, further adding to congestion already critically hampering the efficiency of air travel. The report, therefore, recommends a center to handle exclusively air freight in the mid-Hudson River Valley.

Railroads

In rail freight transportation, technological and management advances emphasize the need for careful planning. The report suggests several areas that need special study in New York State. These include the impact of rail mergers on the total transportation system, the consequences of multimodal ownership by rail carriers, and the establishment of freight rates that will allow optimal market utilization for rail shippers and an adequate financial base for continued development and expansion by rail operators.

Ports

New York State's ports need to expand and modernize their facilities with automated loading and unloading equipment as well as equipment which will efficiently transfer containerized goods to and from land modes. Access of land modes to ports is also seen as a necessary program to encourage water transportation. In addition to these improvements to New York's existing eight ports, the report recommends a new port, to be located in the mid-Hudson River Valley.

Canal

The Barge Canal is the only major canal network—some 524 miles—in the United States owned, operated, and maintained by a state. The tonnage volumes on the Canal have not varied substantially during the past 100 years, some three million tons per year. In 1967, 77 percent of the tonnage moved on the Canal was petroleum and petroleum products. The Canal is also used as a recreational, agricultural, and conservation facility. During the coming years, its role in the transportation system will be carefully examined.

Pipelines

New York State has an extensive network of pipelines carrying natural gas, refined petroleum products, and crude oil. In the future, they may also carry solid materials. The Department of Transportation considers pipelines to be an important mode in New York's transportation system and recommends a program of expansion and safety improvements.

Trucks

Trucks carry over half of all the tons of goods received and shipped in New York State. They are particularly suited for short-haul shipments and for goods movement within urban areas. Freight rates for truck shipments and regulations on size and weight of trucks are singled out by this report as matters that need to be examined. In addition, the location of truck terminals must be integrated with the total transportation system so that there is access to points of origin and destination and to other trans-

portation modes. Improvements planned for the intercity expressway network will also be of benefit to truck shippers and operators.

CONCLUSION

The first-year report also reviews the work and the recommended plans of the urban transportation studies in upstate New York as well as that for the New York metropolitan area being conducted by the Tri-State Transportation Commission. In addition, a very long-range speculative look was taken of transportation 50 years from now when tube transport, vertical and short take-off and landing aircraft, high-speed trains, and automatic guideways for automobiles may be fully operational. At the end of the first year, then, we have reviewed the past, examined the present, and charted a preliminary course for the future. We must now delineate that future course more precisely as we discover workable solutions to problems that prevent the efficient operation of New York's transportation system.

Data Services for Statewide Transportation

JOHN SHAFER, Principal Transportation Analyst, Planning and Research Bureau,
New York State Department of Transportation

•THE STARTING POINT in the comprehensive transportation planning process is the definition and measurement of related activities. Immediate, short-term plans can utilize secondary source data. However, long-term plans must rely on the actual measurement of spatial and temporal parameters such as trip length and frequency and location and volume of travel for each mode under study.

SCALE AND CONSISTENCY OF STATEWIDE PLANNING DATA

The utility of data in reaching solutions depends on the ability of the user to know what data he needs and how they must be brought to bear on the problem to be solved. It would be wasteful for a government agency to move forward with a huge data-gathering program without first establishing the need for and the uses of the data to be gathered. The first task is to design a rational inventory program so that the data obtained will be consistent in scale with the uses for which they are intended.

Data scale can be thought of in another way. In statewide transportation planning, certain information will be used to examine intercity travel such as that by air passengers. On the other hand, for urban planning, data may be gathered for use in studying the problems involved in moving to and from air or rail terminals.

Unforeseen needs for data may arise even though the inventory was designed as carefully as possible. For example, the evaluation phase of most urban studies requires data in more detail than the original inventory provided. Therefore, in New York State we are attempting to design statewide inventories that anticipate the many ways, in addition to statewide planning, in which this information can be used.

In statewide planning, data must also be consistent for each of the different modes. Trips by goods traveling from terminal to terminal and by people from door-to-door will involve several modes. A consistency in data definition and format is essential for the difficult task of relating intermodal data to choice, user, and other aspects of intercity travel demand and supply.

INVENTORIES

The inventories that are to be taken for statewide transportation planning (Fig. 1) are described in the "Prospectus for a Statewide Transportation Planning Process" (1968) and summarized in the following.

Facilities

The first inventory involves establishment of a network representing all existing transportation facilities and points of interchanges among modes. The purpose of this is twofold: (a) to understand the potential and limitations of existing facilities, and (b) to provide a basis for systematic simulation of the capabilities and inadequacies of proposed facility improvements.

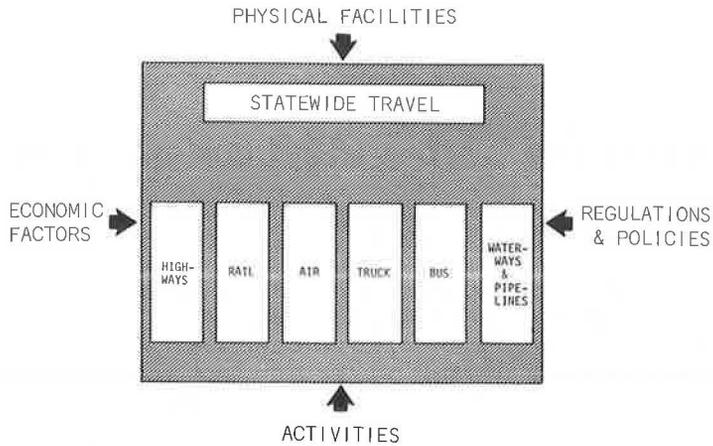


Figure 1. General inventories for statewide transportation planning.

The traveled way, conveyance, level of service, and terminal facilities will be identified and quantified for each mode. These will include such items as the following:

1. Traveled way
 - a. Highway—mileage, speed, accidents, width, condition.
 - b. Rail—length, location and number of tracks, control.
2. Conveyance
 - a. Air—number and type of commercial and private aircraft.
 - b. Bus—number and condition.
3. Level of service
 - a. Highway—freedom of movement, ton-miles of truck available.
 - b. Rail—schedule of freight and passenger trains, seat and ton-miles available.
4. Terminal facilities
 - a. Rail—location and capacity to handle equipment at passenger and freight yards.
 - b. Air—capability at airports of handling persons and goods, speed of passage through terminal.
 - c. Waterway and pipeline—mechanical facilities to handle cargo.

Person Travel

Measurement of person travel (Fig. 2) must produce an adequate representation of its amount and distribution, both temporal and spatial. In addition, this measurement of travel must relate the characteristics of the trip, the traveler, and the transportation system. The process of measuring person travel, therefore, is one of developing sampling techniques, selecting a temporal profile to provide weekday, weekend, and long holiday weekend distributions, and relating tripmaking and mode selection to socioeconomic characteristics of households.

Statewide person travel on the highway network can be stratified into three categories—through, interstate, and intrastate. In New York, plans are under way to conduct roadside interviews at points on major border crossings for interstate and long-distance travel. These interviews will collect information on the magnitude and characteristics of out-of-state and long-distance travel. In addition, numerous home interviews will be conducted outside urban areas to gather data on intrastate person travel. This will result in a trip generation study in which the reasons for travel are related to population and activities that attract or generate travel. Follow-up interviews will gather seasonal and weekend information.

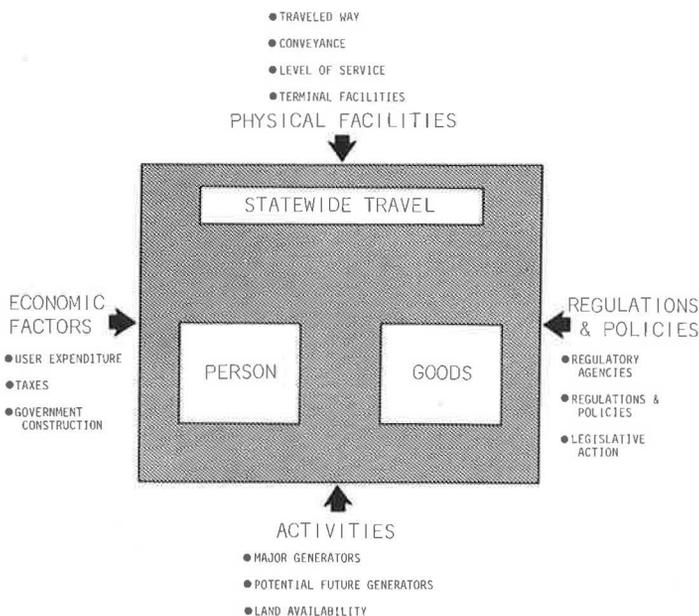


Figure 2. Inventories of person and goods travel by mode.

Because such a large portion of intrastate travel is interurban, the statewide home interviews will be supplemented with updated home interview data in the urban study areas. The returns in increased sample size and accuracy will result in a much greater understanding of total statewide travel. Some of the basic data needed from these home interviews to establish a base for statewide planning include household characteristics such as location, income, family size, and auto ownership, and trip characteristics such as purpose, rate, size of party, and origin-destination. One need not be an expert in statistics to appreciate the sample size necessary to assure any measure of accuracy in each of the many data "cells" or even by a geographic stratification.

Although much of the data on the magnitude and characteristics of common-carrier passenger travel in New York State can be obtained from secondary sources, supplemental interviews will be taken on the carrier vehicles themselves to obtain more accurate and complete information concerning local points of origin and destination, purpose of travel, and socioeconomic characteristics, travel times and costs, and the relationship of choice of mode to cost and quality of transportation services. Currently there is an air passenger survey under way in western New York gathering this type of information.

Goods Travel

The measurement of the flow of goods to and from as well as within New York State will also be inventoried. This will produce a representation of the volume and distribution of goods transport. Sources of data by mode will be as follows:

1. Rail and common-carrier truck—A sample of waybills at major freight terminals will be taken to determine commodity flow patterns throughout the state.
2. Private-carrier truck—Permit file of New York State Department of Tax and Finance will be used to select sample for survey of movements of private carriers, as well as sources for water, pipeline, and air carriers.

A necessary part of these surveys will be the cooperation of the common carrier industry, which may well be more responsive to a broad systematic inventory than to a one-shot effort, especially when resulting data will be useful and available to them.

Economic Factors

The basic purpose of the inventory of economic factors is to determine total transportation investment, employment, and rate of return. To determine the role of transportation in the economy of New York State, transportation expenditures and investment must be analyzed by relating statewide consumption of goods and services to national expenditure rates. An inventory will be made of selected common carriers by examining revenue and rate of return as well as government expenditures and taxing structures for transportation modes.

An inventory will also be undertaken of the size and value of the manufacturing industry, including plants, employees, value of shipments, and capital expenditures. This will aid in assessing the value of these industries to the state's economic stability and provide data on the merits of relocation and expansion.

Transport Regulations and Policies

An understanding of the regulations governing the transportation system is equally as important as knowledge regarding the system's physical features. This inventory will use secondary source material as well as interviews with transportation policymakers. The major aspects of this data-gathering are the review and catalog of existing regulatory agencies, regulations, and policies; the means for implementing regulations; and the manner in which policies are formulated and interpreted.

Activities

To forecast travel requires information on the location and intensity of sited activities. In addition, long-range planning requires an understanding of the location of potential opportunities for future activity. Therefore, an identification and quantification must be made of land available for development within the state for these major travel-generating activities. Figure 3 shows the percentage of used and usable land in each U. S. G. S. quadrangle in New York State.

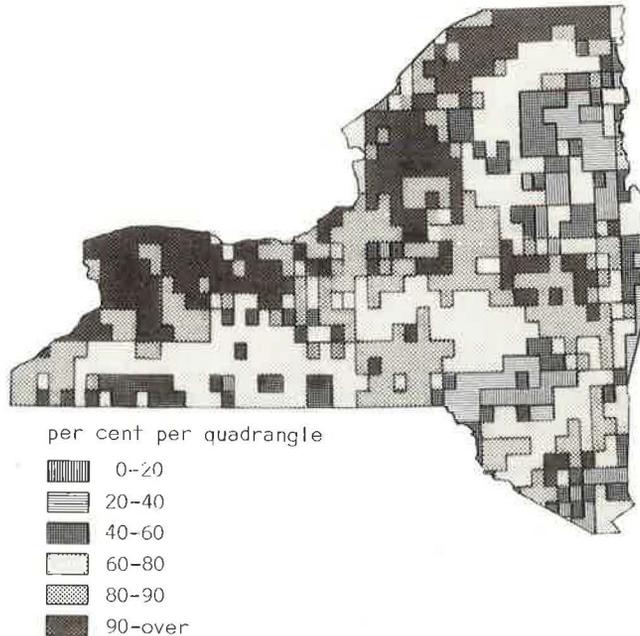


Figure 3. Used and usable land by U.S.G.S. quadrangle in New York State.

INTEGRATION OF STATEWIDE AND URBAN STUDY DATA

The inventory phases of the studies in the six major upstate urban areas were completed some time ago. Therefore, a vast resource of information exists for these activity concentrations, including detailed data on the transportation network, land use and geographic coding controls, and a complete travel file containing the results of home interview, cordon, and commercial vehicle surveys. Efforts are now being made to update information on both the physical highway network and the regional traffic flows in most of these urban areas. In addition, both the detailed land use files and the travel files will soon be updated. This, then, leads to two major points concerning the relationships of statewide and urban data files:

1. There is a vast amount of data already available from the urban studies that can be utilized in the statewide study. For example, much of the trip generation studies that were done with urban data can be used for the developing areas of the state. In addition, the geographic coding of block and parcel data in the urban areas can be converted to Universal Transverse Mercator coordinates for the coordination of all areas both in and out of the state. One use of this would be the calculation of trip lengths and times, not only from terminal to terminal at the statewide level, but also the terminal link with home at the urban level. This information is necessary because many statewide trips end in urban areas. Another use of the urban files would be the study of land uses around major airports to evaluate zoning controls and to seek other solutions to the increasing noise problem.

2. The knowledge gained in the urban studies with regard to sampling techniques and statistical accuracy will prove beneficial and provide certain economies in developing procedures for statewide inventories.

UPDATING PROCESS

Statewide planning, like that in urban areas, involves long-term and expensive public works projects. A certain amount of flexibility is therefore necessary in order to update and carry on a continuing planning process after the initial phases are completed. In addition to long-term flexibility, there must also be the capability of incorporating recurring changes in pertinent items of data. For example, air passenger seat miles can be obtained from the schedules of airlines. However, airline schedules frequently change, and the design of coding formats must allow the insertion of these changes so that the planning data base is kept up to date.

INVENTORIES AND DATA SOURCES BY MODE

In the remainder of this paper, we shall look at each mode separately and give the status of each modal inventory along with some examples of the graphics developed to display inventory data. The sheer magnitude and complexity of the data demand sample illustrative visuals, both computer- and hand-prepared, to make the data manageable during the evaluation and planning phase.

Highways

The highway network for statewide planning has been established as shown in Figure 4. This network consists of those federal, state, and county routes that carry the majority of the travel by all highway modes. It is the network that will be used for statewide assignment and simulation purposes. In addition, the physical characteristics of this network have been inventoried for use in analyzing capacity and level of service of the major network segments. Traffic counts available for all major highways in the state compared with the capacity calculations obtained in a physical inventory give the volume/capacity ratio or level of service afforded by a route.

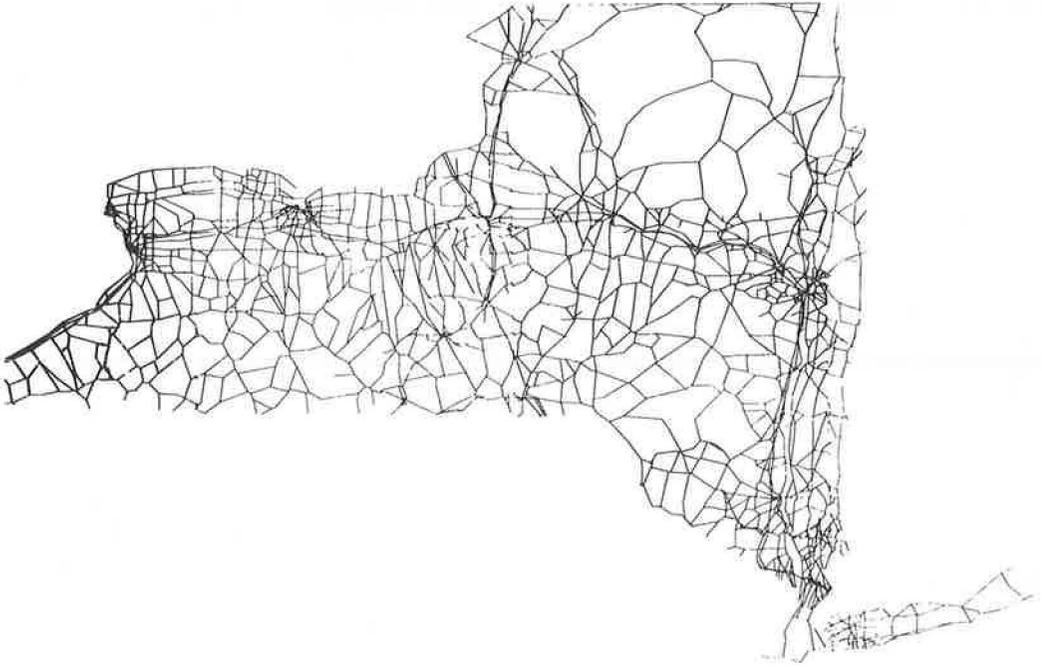


Figure 4. Highway network selected for transportation planning in New York.

Figure 5 shows those highway segments that are operating at an unacceptable level of service in the Poughkeepsie area north of New York City. For this same area we can illustrate many other physical parameters, such as the number of lanes. The highway data already obtained can also be used for intermodal examinations, as illustrated by Figure 6, which shows the access time from all points in the state to the nearest major commercial airport.

These illustrations are extremely helpful in examining the type of airport access available to all the residents of the state. However, key segments of the data are missing, such as origins and destinations, purposes, trip lengths, and important socioeconomic data for reason and mode choice determinations, and these will soon be obtained in the statewide cordon and home interviews.

Rail

The physical inventory of the railroad network consisted of researching various secondary sources such as the Public Service Commission reports and the "Official Guide of Railways." Coding manuals are now complete along with formats for both the physical network and passenger use surveys, which will involve gathering data on the entire rail network, the amount and type of equipment, schedules, and seat- and ton-miles of railroad service available. The railroad network tape format contains some 400 characters of information. Additional field surveys will include passenger travel, goods movements, special terminal information of passenger and goods handling, and other items pertinent to railroad service and use evaluations.

Air

The airline inventories are similar to those for railroads and are somewhat farther along. Secondary sources such as schedules issued by the airlines have been coded using expanded formats similar to those for the railroads. Now available are tables

Figure 5. Congested areas where traffic volumes exceed roadway capacity shown by computer-drawn bands.

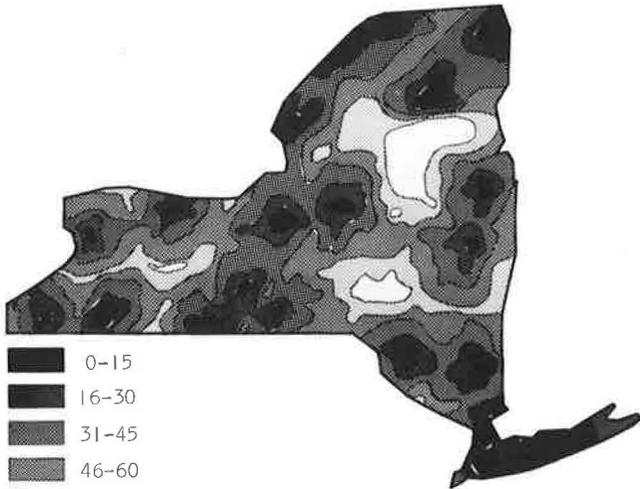
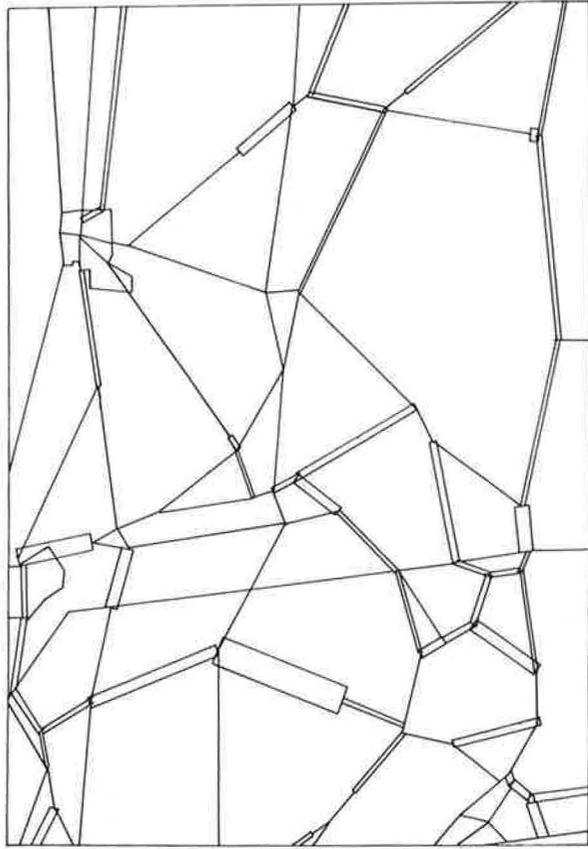


Figure 6. Travel time to nearest airport in New York State.

- 0-15
- 16-30
- 31-45
- 46-60
- 61-75
- 76-over

minutes to nearest airport

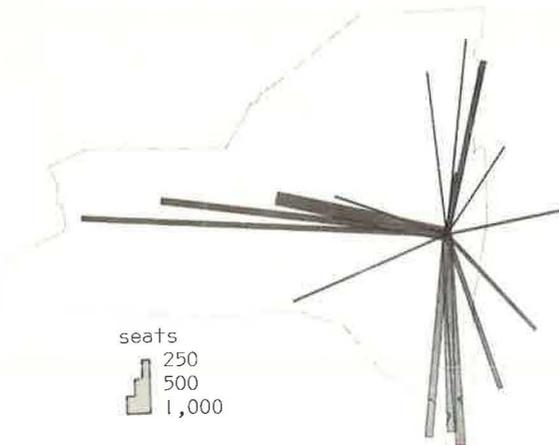


Figure 7. Airplane seats available daily from Albany County Airport.

that show the air service provided to travelers in the state including seats available, number of flights between cities, equipment types, facilities to handle persons and goods, and land uses adjacent to major airports. Work is also under way on general aviation inventories.

Figure 7 is computer-drawn and shows the number of seats available daily from Albany County Airport nonstop to all other cities; connecting flights are not shown. The frequent non-stop service to airports in Syracuse and New York City is evident, as are the few to Buffalo, only 300 miles away. Figures 8 and 9 illustrate some of the data on the temporal distribution of airline service. Figure 8 shows the expected distribution of service at Albany with morning and

evening peaks. In contrast is the service available to the industrial city of Buffalo shown in Figure 9. Service is light during the rush hours and very heavy around noon. When these facts are made known, it becomes possible to determine whether or not this is a reasonable or desirable situation. Why is service in these two cities so different and should it be?

Truck

Goods movement by trucks is by either common or private carriers. Information on both is essential. The New York State Department of Tax and Finance will be used as a source of information on private carriers when this inventory is started.

Secondary source publications issued by the American Trucking Association were used to obtain data about common carriers. The certificates of public convenience and necessity issued to the carriers from the Interstate Commerce Commission and the Public Service Commission were also used to computerize the carriers' operational rights.

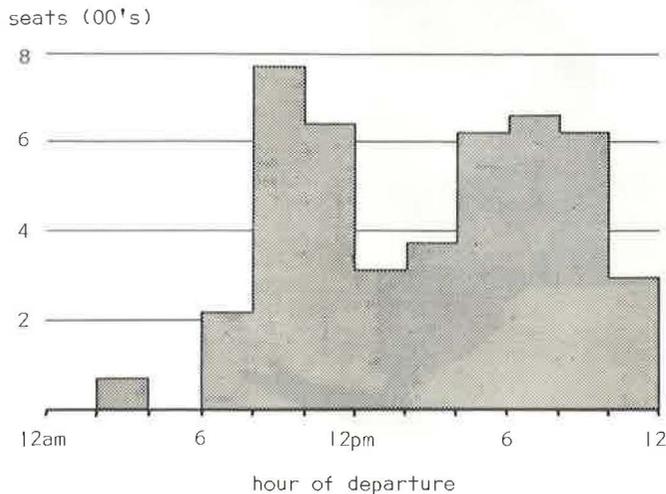


Figure 8. Daily airline seats available from Albany by hour of departure.

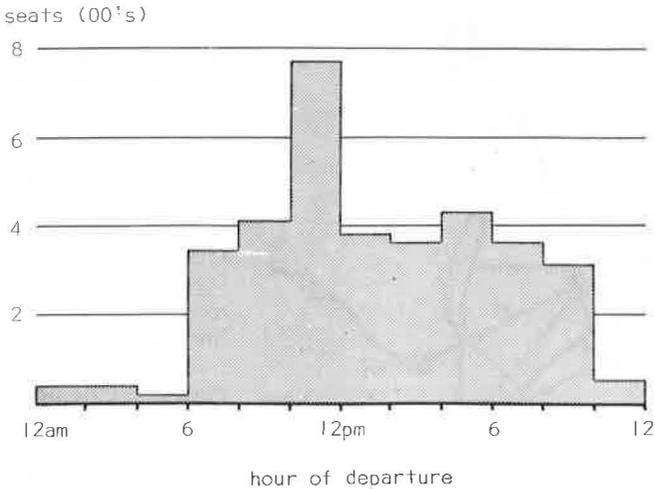


Figure 9. Daily airline seats available from Buffalo by hour of departure.

A pilot survey was made for a large-scale study of the common motor-carrier operation in New York. It involved the extraction of a sample of freight bills from a large carrier with both interstate and intrastate operating rights and with terminals maintained in ten states. The sample was taken from the Albany terminal on all out-bound traffic for a number of days. This pilot sample was used to test formats, programs, methodology, and record-keeping in obtaining samples as well as the output data, with a view to a study on a larger scale with a set universe. This full inventory of the goods movement by truck will be undertaken immediately after the common-carrier passenger movements have been ascertained.

Figure 10 is an example of the output from this pilot truck inventory; it shows the weight of total commodities shipped from Albany to major destination points within the state. This could also be stratified by the various commodities. Other items of data could be displayed graphically, such as the number of trucks over 5 tons and their des-

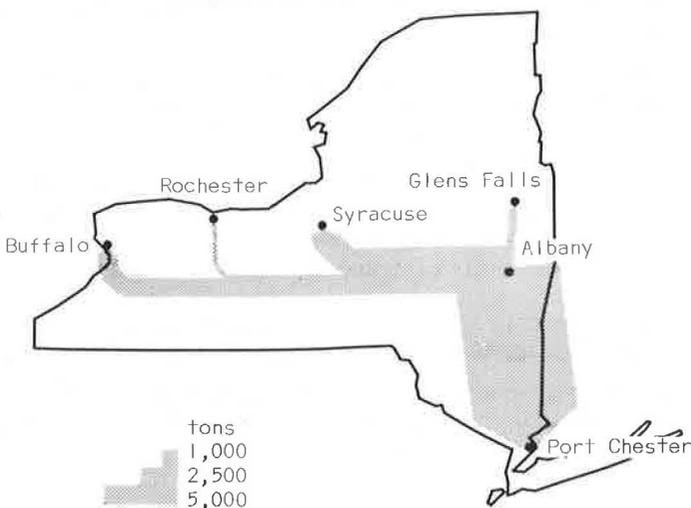


Figure 10. Tons of goods shipped from Albany by motor carrier.

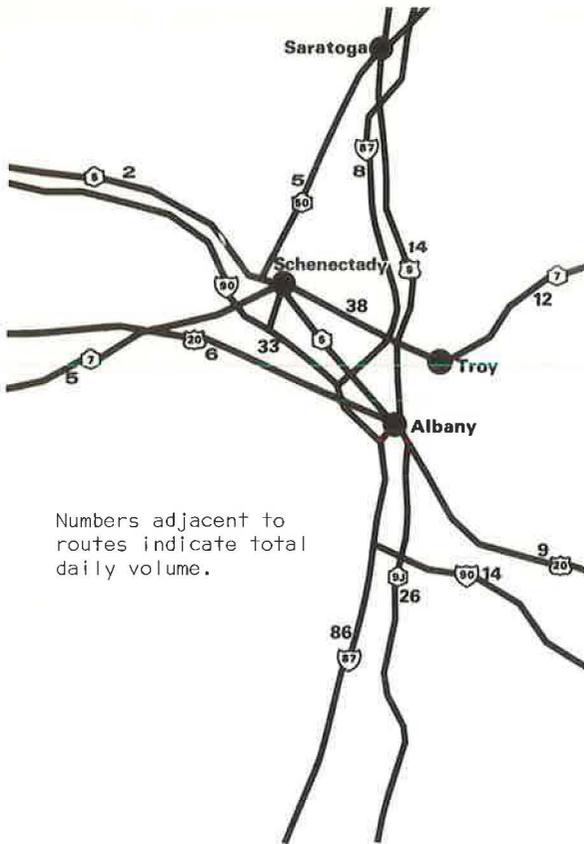


Figure 11. Daily intercity bus volumes on major routes near Albany.

tinations from Albany, equipment capacities, prices of commodities, and shipment times.

Bus

The coding of all intercity bus movements is currently under way. These include schedules, stops, frequency of service, equipment, fares, capacity, and speed for the major carriers. Figure 11 shows the number of intercity buses on major routes near Albany. Eventually, the computer will produce displays of information of this type for the entire statewide network. It will then be possible to differentiate between areas of inadequate and adequate bus service. These displays would also assist the Public Service Commission to differentiate quickly between the various carriers' service rights.

CONCLUSION

In summary, the inventories are now being taken of the physical description of the networks, service, and equipment, including the development of coding and computer formats. The design of questionnaires and sample selection procedures to survey the actual use of these modes is also under way. Close cooperation

is maintained between the Data Services Section, which gathers the data, and the Statewide Planning Section, which uses the data.

A program to provide data services to statewide transportation planning must give attention to at least three areas:

1. Consistency must be maintained in the data-gathering phase and the scale of the data should be compatible with the planning intent. Millions of bits of data are not much good if they neither can nor will be used. In addition, there must be consistency of definitions of data among the different transportation modes. This will permit efficient examination of the total intermodal travel of persons and goods.

2. The various data needs for statewide transportation planning necessitate the gathering of a tremendous volume of information. Because of its magnitude, the inventory program must be carefully designed and carried out to insure a workable data base at a reasonable cost.

3. The magnitude of the data also requires quickly prepared, simple graphics. Formats for tabulation must be carefully designed with consistent and meaningful terminology.

In many of these areas, procedures and methodology have been developed and need only to be applied to statewide transportation planning. Many others represent new ground that must be explored and charted.