POLICIES AND PROCEDURES FOR PLANNING TRANSIT SYSTEMS IN SMALL URBAN AREAS

N. Craig Miller and John C. Goodknight, Florida Department of Transportation

This paper suggests an approach to transit planning for small urban areas. It represents the transit planning process as a series of key decisions and identifies the major issues associated with each decision, the major inputs required, and the role of each organization or participant in the planning process. For cities of the size discussed here (smaller than a standard metropolitan statistical area), a detailed inventory of travel information usually will not have been developed and a transit system may not exist. Several specific procedures are suggested that can effectively accomplish the goals of a conventional transit technical study and at the same time minimize costs by maximizing the use of readily available data resources and by replacing sophisticated quantitative procedures with rational qualitative techniques wherever possible.

•TRANSIT planning techniques for large metropolitan areas are not appropriate for small urban areas. They are costly, cumbersome, and to a large degree irrelevant. The sophisticated modeling, forecasting, and other analytical techniques do not provide the kind of information most pertinent to the decisions that must be made in improving or implementing a transit system in a small urban area.

This discussion suggests a transit planning approach that consists of a series of key decisions and identifies the major issues associated with each decision, the major inputs required, and the role of each organization or participant in the planning process. The comments reflect, to a great extent, the experience gained in preparing a transit plan for the city of Key West, Florida.

The financial status of most present transit operations suggests that a new or substantially improved transit system is not likely to be self-supporting. That should be recognized and some local commitment to support the system should be obtained before a detailed study of the feasibility of a transit system is begun.

Local motivation is likely to be oriented toward providing transit service for particular groups (i.e., low-income, elderly, or tourist). The goals and the extent to which the community is willing to commit local resources to attainting the goals should be established at the outset of a transit study.

The several factors discussed below suggest that for small urban areas only a limited amount of analytical detail is appropriate. The factors suggest a rather qualitative approach to the analysis of transit demands and emphasize the identification of specific requirements of the decision process and testing alternatives through actual implementation and continuing surveillance rather than through detailed analysis of demands, revenues, and the like.

1. Analytic techniques, no matter how sophisticated or detailed, do not provide completely accurate estimates of transit patronage. That is especially true for small cities that do not now have transit service.
2. The cost of the analytic determination of market potential should be less than the cost of making the determination by trial and error. For many of the smaller

Publication of this paper sponsored by Committee on Public Transportation Planning and Development.

cities, the set of feasible alternatives (i.e., routes, number of buses, and level of service) to be considered is limited, and the cost of testing the most promising alternatives by actually implementing the service is not great.

3. For a small system, the cost of an error is relatively small. If the number of routes put in service is too few, additional buses can be ordered at little added cost. An extra bus is not an extremely expensive item and can be sold, leased, or put to other uses.

4. Factors entering into the decisions pertinent to implementation of major transit improvements include social, political, economic, and technical considerations. The precision with which transit patronage and related estimates are made should be balanced in accordance with the role those estimates play in the various decisions.

DECISION PROCESS FOR TRANSIT SYSTEM IMPLEMENTATION

The following comments attempt to identify the major decisions required for implementing a transit system in a small city, the specific issues that must be addressed, the significant elements of information required, and the responsibility for providing the information and for making the decisions.

For small urban areas, participation in transit planning can be expected from 3 levels: federal, state, and local. Each urban area is unique with respect to local autonomy, availability of local planning resources and expertise, and other characteristics that can markedly affect the organization for transit planning at the local level. In many cases, there will also be an overlap of functions between local and state participants. Therefore, this discussion will attempt to identify participants by function rather than by a specific organizational structure.

Local Participation

Local control over the decision process and local participation in the data collection and analysis are essential. If the local community has transit planning expertise, it may be best equipped to perform the analysis. However, even if the local participation involves only laymen, the community's judgment regarding the needs and goals of the various sectors of the local community is essential to sound analysis of the transit alternatives. Local communities, through civic organizations, schools, job training centers, and the like also command considerable low-cost manpower resources for any data collection that may be necessary.

Local participation can take many forms. At one extreme, a strong mayor in a small city may have sufficient knowledge and "feel" for his constituents to speak for the entire community with respect to policies and decisions pertinent to the development of a transit system. Where he adequately represents the local sentiments, local participation involves mainly working directly with the mayor, his staff, and other city government officials and with consultants and other appropriate agencies or organizations.

At the other extreme, local participation may focus on involvement of the individuals within the community. They may be in the form of a "bus committee" composed of interested citizens, public officials, and leaders of civic organizations. It may involve direct participation by organizations and groups such as the chamber of commerce, businessmen, Boy Scouts, special interest groups, poor people, elderly people, school board, city commission, county commission, military officials, and so on.

State Participation

The state agency with transit planning responsibility provides a vital pool of expertise and data essential to transit planning and operation for small cities. These functions are essential not only for the initial implementation of a system but also for its continued maintenance and operation.

Most smaller urban areas cannot commit the resources necessary to maintain such a permanent staff. However, an agency such as a state department of transportation, a state public transportation commission, or a state planning agency will generally

have personnel available for those functions. Much of the data needed for these studies (i.e., census information, statewide travel patterns, urban and travel characteristics, and transportation system inventories) are readily available from the existing data files and can be accessed at minimal cost.

The state transportation planning agency also maintains considerable transportation and other inventory data files. From this viewpoint, the state is usually well equipped to assist with the continuing monitoring and reevaluation functions for transit planning and operations.

Once the appropriate mix of advocates is decided, specific responsibilities of those individuals may be agreed on. The role of each participant should be clearly defined in the decision-making process. Simultaneously, the role of the transportation planner and the study product should be clearly defined.

Study Financing

If properly approached, the small urban area should be able to commit sufficient human resources to the study to more than offset its share of the study costs. In states where departments of transportation or public transportation agencies exist, state participation may be obtained in conjunction with the Urban Mass Transportation Administration's study-grant program. The important issue here, however, is the maximization of the local commitment in manpower, not necessarily in dollars. Human resources can be more easily committed by local government, and that type of commitment has much more potential usefulness and value than cash when measured in terms of work output and local involvement. That kind of participation also "builds in" to the local government staff expertise and knowledge necessary to perform system-surveillance functions.

Community Values and Goals

Of primary importance before a transit study is begun is local recognition of the fact that a study is needed. Without concurrence in this, there is little doubt that use will be made of the conclusions reached by the study.

The first task to be addressed by the local participants in the study is setting goals. Transit goals can be conveniently divided into 2 interrelated categories: transit service and local financing. It is important for the tranportation planner to obtain a clear reading on the community's value system if he is to be responsive to public policy. In this case, the local participants should be asked to address questions such as, Who needs transit services the most? Who after that? What particular "choice" transit markets should be served? Where should a subsidy come from? What role should transit play in alleviating traffic congestion as opposed to providing services to the disadvantaged? What span of fares can be deemed appropriate? How much subsidy is too much? Questions such as those should provide the planner with an understanding of service-design goals and the associated financial constraints.

In this early phase, the planner should also attempt to obtain general knowledge of existing transportation problems and issues in the area. Sensitive issues should be carefully dissected by appropriate questioning to reveal any possible hidden but highly regarded transportation or social values. The callous disregard of such values in the study can very easily disintegrate the credibility of the plan and create a highly volatile and potentially uncontrollable situation.

It may be possible at this point to gain some insight into the general land use configuration, neighborhood patterns, socioeconomic conditions, and general level of traffic congestion within the urban system. A broad familiarity with these items will greatly facilitate later data analysis and validity checks.

Study Goals

An important goal for any transit study is to produce a well-defined program for transit improvements. Such a plan should delineate what should be purchased, when it should be purchased, how much it should cost, and who should pay for it. In effect,

a budget should be prepared, pinpointing what the capital needs are and where the resources required for those needs should be obtained.

The study should also yield an operations program that includes the information necessary to educate, as needed, those who will operate the system. It should also suggest a route structure, bus schedules, and system maintenance programs. A management surveillance system is considered by these authors to be a critical component of the total study package output. The suggested management surveillance system should include an organizational plan and an information network and should identify specific decisions or work tasks or both as they relate to elements within the organizational plan. Responsibilities should be clearly defined.

OPERATIONS PROGRAM

Management System

An almost standard practice today in the development of transit plans is the discussion of the advantages and disadvantages of the different mixes of public and private ownership and operation of bus systems. Specific local people available to the local public body should be assessed for their potential contribution and role in each alternative management system. Only in this way can a determination be made as to the appropriate use of private operational forces. Functional personnel needs may be categorized into six general areas: system management, bus drivers, route-schedule supervision, equipment maintenance, public information, and finance.

Opportunities for overlapping these functions should be explored in smaller systems to minimize personnel costs, but it is desirable to maintain the division of labor in larger operations. For example, revenue collection and accounting can be achieved by drivers' depositing and logging their daily revenues with an employee, such as a dispatcher, of the night police force. In the morning, the accounting department could pick up the cash and deposit it in the appropriate accounts and update the record system accordingly. Likewise, the system manager could double as the route-schedule supervisor for small systems.

Existing laws and administrative arrangements should also be explored thoroughly. If a regional authority is contemplated, relations among different bodies of elected officials should be understood and carefully accounted for. The advantages and disadvantages to each political entity should be weighed and presented very objectively when partnerships among public bodies are sought.

The overall role of the new body should also be consistent with the total transportation needs of the community. Multimodal agencies would appear to enjoy slightly more success in coordinating community transportation programs particularly where an airport or seaport might be located and successfully integrated with ground-transport systems. The advantages of cooperative multijurisdictional political entities over those that are fragmented and competing should be presented, particularly where harmful inter-political jealousies prevail and disrupt efforts to unify, coordinate, and integrate transportation programs and policies on a regional basis.

Essential in outlining a suitable management structure are the delineation of the hierarchy of decisions to be made and the assignment of functional organizational entities to an overall framework for decision-making. Particular ingredients to this task include specifying from what group or groups of people participants should be drawn to compose a particular decision-making body and what specific decisions each group should be charged with executing. Generally, key financial decisions should be made at the highest level, probably by local elected officials, while day-to-day operating policy should be formulated by a management executive or by a subordinate board or committee appointed by an elected body or elected by the recipients of transportation services. Specific lines of authority will, of course, have to be drawn in accordance with local goals and existing power relations.

In communities where little or no technical expertise is available for data analysis, the state transportation agency's human resources should be tapped for technical advice. However, to be useful, that advice must be solicited by the local decision structure. Therefore, it is important to establish what technical decisions might be required of

the local operating agency and to identify what the informational requirements of such decisions are. It is then necessary to identify who will act on it. Basically, these decisions are service-design questions related to changes in land use, ridership patterns, fare structure, socioeconomic activity, and operating subsidy requirements. These questions can take the following form: Should routes be extended? Should headways be reduced, or should new routes be added? The probable consequences of the alternative for each question are best displayed by technical experts. Note, however, that this should be not a decision by the expert but merely advice to the proper decision-making group within the total organizational framework.

It is also important to involve the local governmental agencies to the extent practical in technical analysis with the hope of eventually developing the expertise necessary at the local level to provide their own technical advice without external assistance. Initially a commitment from the local building and zoning department to provide land use information about major developments should be obtained. Likewise the operational managing component of the management system should be approached to provide ridership and revenue data periodically. Each data gatherer should be provided with forms for obtaining specific data in the desired formats and with the necessary instructions for form usage and reporting. In an environment adverse to additional work loads or even technical advice, a more generalized and behavioral management approach could be performed by merely interviewing those having knowledge of the types of information relevant to the decisions needed. In either case, the informational requirements, the informational sources, and the flow pattern should be clearly identified in relation to the uses to which this continuing surveillance mechanism will be applied.

The output of this portion of the transit study should be charts and tables delineating specific work tasks, work responsibilities, decision-making responsibilities, information flow, functional personnel requirements, and bureau relations to other organizational components.

Financial Plan and Budget

Essential to the successful implementation of any transportation plan is a detailed, accurate forecast of cash needs through time accompanied by the mechanism for funding those needs. It is also important to obtain the cash commitments from the questionable sources before their funds are unrealistically budgeted without their knowledge. In the case of a small transit system, financial needs take the form of capital outlay and operating costs.

Included under capital outlay are items such as bus purchasing and replacement program, bus-shelter program, route-map and schedule-display stations, spare-parts purchasing programs, and plant purchases. The operating costs should include a detailed breakdown of all fixed and variable costs. Variable costs are composed of manpower, revenue, vehicle maintenance, fuel, oil, and tires. Fixed costs can be broken down into administrative overhead, vehicle depreciation, and plant depreciation.

Resources generally available to meet the capital needs of transit systems may be obtained from the UMTA capital grants program. If a state transportation agency exists, additional funds may be obtained from that source. Once the external sources and their corresponding funding ratios are identified, the local financial requirement can be accurately forecast. At this point, an analysis of the current local budget may reveal some padding that could be applied toward transit improvements. However, the legality of using particular types of local funds should also be investigated. Should no funds be available from existing tax sources, the task of identifying alternative equitable forms of taxation should be explored. Among the more popular taxes for transit purposes are the utility tax, local sales tax, ad valorem tax, and air- or sea-departure head tax. Often an existing tax is not being levied to its fullest extent, in which case the alternative of increasing an existing tax source should be analyzed.

The possibility of securing funds from large businesses that will directly benefit from a transit service should also be assessed. Other potential revenue sources are military bases or school boards. Both of these public agencies could possibly share a portion of their transportation budgets with the local community in return for transit service.

When alternative forms of taxation are analyzed, the following questions should be carefully addressed: How would the costs of transit service be allocated among the users and other groups in the community for each tax structure? How well does the distribution of benefits match the distribution of wealth and the ability for these sources to pay? What specific advantages and disadvantages would be forthcoming for each taxed group? The decision to select an outside revenue source should be made locally.

SYSTEM DESIGN METHODOLOGY

Elements to be addressed in the design of a transit system include route structure, schedules, fare structure, vehicle size and quantity, plant location and requirements, and ridership estimates. From that list, it can be readily discerned that several interrelations exist among individual elements. For instance, number of routes and frequency of service (schedules) will dictate vehicle-quantity requirements. Likewise, schedules, fare structure, and route structure will influence ridership patterns, which in turn dictate vehicle size.

Ridership Estimates

In urban areas where origin-destination data exist, ridership estimates should be used to the fullest extent possible. The design year should be short range in order to design services for immediate implementation and with an effective surveillance mechanism designed to make adjustments simultaneously with growth. There is limited need for long-range planning of transit systems because small urban areas seldom require exclusive rights-of-way or substantially large financial outlays that are permanent or irreversible in nature.

Major interchanges of total trips between potential transit market areas should be identified and some portion of that market "split off" according to its propensity to use transit. If origin-destination data are available, the task of quantifying a reasonable range of transit usage is simplified. If not, some generalized, aggregate estimate can be used based on trip rates for similar communities or neighborhoods in urban areas where origin-destination data are available.

Census files or a general knowledge of the socioeconomic characteristics of the area can be used to identify particular markets for transit. Another good source is the local chamber of commerce.

In areas where transit services are in existence, an on-board ridership survey is a must. A boarding-and-alighting survey will also be useful in defining an optimum bus-shelter improvement program and display locations that are the most frequently associated with transit service. This latter statistic is important in that an existing service should be maintained to the extent feasible because principal ridership patterns are fixed and major route revisions may result in a loss of patronage.

Route Structure

Before the existing route structure is revised, a careful analysis should be conducted of the route for circuity, directness of service, coverage, accessibility to target markets, schedule adherence, and running speed. Of those measures, all are easily quantified except for coverage and accessibility to markets, even though all are subject to qualitative judgment.

Assessing the viability of an existing service to a particular market or attempting to design a new route requires a base map showing all streets suitable for transit routes (i.e., adequate widths, running speeds, turning radii, and abutting land use). Several overlays depicting the location of each market sector separately then give the analyst sufficient information to lay out several alternative routes.

Basic potential markets common to all urban areas are shopping centers, low-income housing and minority groups, low-income employment, elderly housing, health-care facilities, tourist attractions, hotels and motels, middle-income housing, high-density housing, employment centers, areas not served by school buses, and junior and senior high schools. Once those areas are plotted on overlays, alternative routes can be effectively analyzed subjectively for their coverage characteristics of these markets.

Finally, the selection of the routes to be implemented must be related to the particular market sector the transit system is intended to serve—consistent with local community goals. Use of graphic overlays superimposing various route structures over the various market areas provides a highly effective means for evaluating alternative system configurations.

Schedules

Once a generalized pattern of routes achieving suitable coverage is devised, the job of adding or deleting route segments in order to obtain 20-, 30-, 40-, 45-, or 60-min turnaround times or some combination that yields 15-, 20-, or 30-min headways with layover can be attacked. The headways will always produce schedules that maximize rider comprehension and memory retention. A maximum headway of 30 min has always been a good standard to follow.

Fare Structure

For most small urban areas, zonal fares are usually inappropriate and transfers are minimal. That simplifies the fare structure. Alternative fares should be assessed for their revenue-generating capability in order to estimate the operating deficit requirements. Again, fare structure is a policy decision and not a technical decision; therefore, alternatives are stressed as the form in which technical information should be presented to the appropriate decision-making group.

Among the alternatives that should be assessed are "free" service or area-wide 5-cent fare and fare plans for students, the elderly, the disadvantaged, and shoppers. Reduction of fare for shoppers and school children should be coordinated with approaches made toward the school board's transportation budget and business subsidies when outside revenues are sought.

Fleet and Plant

Once routes, schedules, fares, and patronage estimates have been completed and load-factor policies are established, vehicle quantity and size can be estimated in a straightforward manner. Plant requirements are a direct function of those 2 variables, and plant location is a function of route structure, land use, adequacy of existing maintenance facilities, and real estate costs. In most cases, existing municipal or county vehicle maintenance facilities could be expanded to provide the required services. An estimate of these financial needs will provide the basic inputs to the operations program and capital grant application.

SUMMARY

In summary, this paper has 4 essential messages. First, "desophisticate" the planning process, cut costs, and do not spend $40,000 to study a $40,000 capital improvement! Second, be issue-oriented. Address questions that are important and relevant to the local community. Be responsive to its needs. Third, be action-oriented. Develop a prescription on Monday morning for what action needs to be taken by whom. Delineate specific work tasks that should be attacked immediately and get the ball rolling. It is time that planners begin to play a more meaningful role in forging the link between planning and implementation. Fourth, be management-oriented. Do not just draw an organizational chart or discuss generalized alternative forms of management. Address the issues in terms of function and responsibility. Design an information system that will permit the recommended organization to effectively monitor, control, and manage system performance. Pinpoint data collection needs, and obtain commitments to secure that information. Identify decision-makers and the flow of the information to them. If we can ensure that an effective surveillance and control mechanism is installed in the management system, then we can be assured that the system will continue to be responsive to changing needs and we can forego any long-range forecasting as a part of the small urban area transit study.