

A PLANNING PERSPECTIVE ON EVALUATING URBAN PUBLIC TRANSPORTATION

Kenneth W. Heathington, Transportation Research Center, University of Tennessee

TRADITIONALLY, the major emphasis of urban transportation planning has been on the planning and design of facilities. These facilities include all types of highways, such as local collector streets, arterials, expressways, and the Interstate System. Admittedly, urban transportation planning incorporated transit planning to some degree. However, transit planning was not a major emphasis in the majority of urban transportation studies. The major planning emphasis has been placed on the movement of automobiles within urban areas.

This highway orientation prevailed perhaps because public transportation was mainly in the private sector until only recently. Highway departments simply did not have substantial responsibilities for transit planning. There were, of course, a few public transportation systems in the public sector for many years, such as the Chicago Transit Authority. However, this was not the general pattern of operation throughout the United States. In the 1960s, public transportation began to shift from the private sector into the public sector. State highway departments began to convert into departments of transportation. These new departments of transportation have been given the responsibility for planning transportation systems for all modes. In some cases former highway planners are now required to plan for transit operations.

One of the basic questions that must be answered is whether the techniques of planning that have traditionally been used in highway facility planning can be applied to transit planning. It would seem that there is a substantial difference between a public transportation system and a highway system, and thus the methods of planning and evaluation will be different for the two modes of operation. Public transportation seems to be more clearly aligned with the principles of business than with the principles of highway facilities. If that is the case, the method of evaluation will, of course, be quite different.

Some of the basic differences, as viewed by the author, between highway and transit planning will be illustrated. It is believed that these differences must be recognized and accounted for if successful public transportation operations are to be achieved in the majority of urban areas.

SOME BASIC DIFFERENCES IN HIGHWAY AND TRANSIT PLANNING

The differences between highway and transit planning highlighted in this presentation are not intended to be all-inclusive. It is readily recognized that many more differences could be illustrated. However, if the differences shown here could be adequately accounted for, much improvement could be made in the planning of public transportation systems.

1. Highway planning is facility-oriented. Traditionally, highway planning has been oriented toward the planning and design of a facility. The objectives for that facility generally have been well defined and the levels of service to be used for the design have been established. A decision was made early in the planning process as to whether a particular facility would be an arterial street, an expressway, an Interstate, or whatever, so appropriate standards could be applied to its design. In the planning it was readily accepted that the facility could not change its location once it was built, would not be subject to shutdowns by labor, and would not be subject to many of the

constraints that apply to transit operations. The planning for a facility that is fixed and immovable is relatively straightforward. There have been adequate standards established that can be applied to the design of almost any facility. The problems encountered with the operations of a facility generally result from a lessening of the design standards in the final plan because of a compromise that has been made. The problems generally do not result from purely inadequate design.

Transit is not a fixed facility. It can and should change. The objectives for a transit system may change over a brief period of time. The demands made on the transit system by politicians, users, etc., quite frequently vary. A transit property has to be more dynamic, temporally and spatially, than does a highway facility. Thus, the plan requires that flexibility be designed into the system.

2. Highway planning and design are engineering-oriented. A highway facility is generally approached with the same type of logic that is used to design a building or any other permanent facility. Certain design standards have been accepted in the field and will be applied by any engineer trained in that area. By having uniformly acceptable standards, an engineer designing a controlled-access facility in the northeast would apply essentially the same standards as a designer planning a facility in the southwest. There generally has not been a need for taking into consideration different consumer preferences or behaviors relative to the design of a facility.

In the planning of a transit system, consumer preferences and behaviors must be considered. These consumer preferences and behaviors change with time and with geographical areas within the United States. The markets for transit are quite different from one part of the country to another. It is difficult to apply the same detailed design standards to all transit properties. A transit operation is simply different from a fixed facility such as a building or highway.

3. Highway planning is long-range planning-oriented. Highway planning has traditionally focused on long-range planning. One cannot plan, design, and construct a highway facility in a short period of time. The lead time is now approaching 10 years from the time a facility is conceived until the time that facility can be opened to traffic. Also, highway planning is long-range in that, once a facility is built, it is not intended that drastic changes be made in it within a short period of time. The highway facility generally will be located in the same position and have similar characteristics for a period of at least 15 to 20 years and, of course, can be there for an indefinite period.

Transit planning, with the exception of a rail facility or one operating on a dedicated right-of-way, does not require as much of a long-range orientation. Travel patterns change as well as consumer preferences. The market for a particular type of transit service may change in a period of 2 to 3 years. There should be a continual reordering of operations so that appropriate markets can be taken into account in the operation of a transit system. There are far more non-rail systems than there are rail. Thus, it would seem that the majority of transit operations are more susceptible to short-range or intermediate-range planning. Drastic changes are often made in systems in a period of 3 to 7 years. Flexibility must be a part of transit operations. An unchangeable long-range plan may be a detriment to transit rather than an asset.

4. It is generally accepted that a new highway facility cannot be attained easily. The public generally concedes that it takes several years to plan, design, and construct a highway facility. There is not a tremendous amount of pressure to construct a new facility in a period of months. However, the public does not view transit operations as being such that drastic changes could not occur almost instantly. Transit managers have to be cognizant of the fact that the public may expect a change in transit operations as a consumer might expect a business to carry a new product or offer a new service.

5. The highway planner or designer is not expected to change consumer behavior. Those professionals who have planned and designed highway facilities have been able to do so without having to change consumer behavior. In most cases there has been a sufficient demand for the facility so that attracting patronage is not an essential element of the design. In the transit field, however, it is expected that the transit system should be able to attract a substantial amount of patronage. This, of course, in many instances requires a change in consumer behavior. Thus, while the highway planner can forego such considerations, the transit planner must be fully cognizant of this requirement.

6. A continuing funding source for highways has been available. With the Highway Trust Fund and with the dedication of user taxes at the state level, a continuing funding source for highways has been available for many years. The highway planner and designer have not had to be concerned with the manner in which funds would be raised to support the construction of a facility. In general, one can say that there have been adequate funds available for most highway work. This, of course, has not been the case for transit. It is far more difficult to plan and design an operation in which the majority of expenses connected with that operation must be available from the consumer on a direct collection basis.

7. There is not a constant reevaluation of highway facilities in terms of cost or services provided. Once a highway facility has been constructed, there is not too much that can be done to make substantial changes in it. Therefore, an extensive reevaluation is generally not made of each highway facility.

In the transit area an evaluation is made at least yearly, since many transit properties operate with a financial deficit. The funds for that deficit often come from general revenue sources. Each year, as the budget for an urban municipality is prepared, funds are often included to subsidize transit operations. Each year there is a rejustification for supporting public transportation, and thus a reevaluation is made annually. One might argue that this reevaluation is not as good as it should be; however, it is at least considered on an annual basis in many instances.

8. The highway facility crosses political boundaries with minor difficulties. Generally, a highway facility has little difficulty in crossing political boundaries. A facility may cross many political boundaries and be readily accepted by each political structure. This certainly is not the case with transit. Many times each political entity attempts to provide its own transit operations without any coordination with the transit operations of other political entities. It then becomes extremely difficult for a person to travel by transit throughout the urban area. Often there are problems with the transfer of funds between operating properties over two or more political entities. This is not the case with highway facilities. The user taxes are collected from the automobile user at whatever place he makes the purchases. Operating across political boundaries is a much simpler procedure in the highway field than in the transit area.

9. Highway facilities have few regulators such as public service commissions. A highway facility generally is under the control of a local or state highway body. As such, there is no public service commission to which a facility must report or whose jurisdiction presides over a facility. In the case of a transit operation, regulations play an extensive role in the activities in which a transit operation may become engaged. Often, routes cannot be added, dropped, or modified without specific approval. Other activities such as goods movement or charter service cannot be engaged in without expressed approval. Often these approvals are extremely difficult to obtain and require long periods of time and substantial legal expenses.

10. Operational or maintenance costs are a small percentage of capital costs of highway facilities. In general, operational and maintenance costs are not a prime consideration in the planning and design of a highway facility, although this may change in the near future. It is true that maintenance costs are reviewed in terms of pavement design and certain other factors. However, these costs are such a small percentage of the total capital outlay that they are not taken into account as they are with transit. For most transit properties the capital costs are minor relative to the annual operating costs. The exceptions, of course, are PRT or rail systems. Since most bus systems are extremely labor-intensive, the annual operating costs must be given prime consideration.

11. Highway facilities are considered successful if they adequately serve the peak-period volume. Highway facilities are generally designed for peak-period volumes. Although average daily traffic is forecast, design considerations are made for peak periods. No one seems to be too concerned if there happens to be very little traffic on a highway in the off-peak periods. This is not true for transit. Transit has extremely large volumes in the peak periods but, like highways, experiences a substantial drop in the off-peak periods. Since the marginal cost of operating transit continues

to be quite high for the off-peak periods, a transit property often is not considered successful unless it is able to attract substantial riders in these off-peak periods. Transit generally serves the peak-period volumes as well as highway facilities serve peak demand. However, transit is not considered successful simply because it adequately serves the peak periods, as are highway facilities.

12. Demand forecasts for highway facilities are of secondary importance. There has been a tremendous amount of sophistication built into forecasting the demand for highway facilities. However, if one seriously analyzes the manner in which those forecasts are used, it is questionable whether the forecasts are in actuality as important as the amount of effort put into them. There are several reasons for this. First, most highway facilities generally have substantial traffic and are not lacking in demand. Second, once the forecasts are made it is many years before the facility is actually built and ridership can be recorded. There does not appear to be too much concern over the difference between the forecasts for a highway facility and volumes that are actually recorded unless the demand is much higher than that forecast. Third, once the highway is constructed, if the volume is not sufficient to justify the facility there is really nothing that can be done about it. The facility is built and it will not be reduced to accommodate a lesser demand.

In the transit field forecasts are much more critical. These forecasts are continually reviewed from the very beginning of operations. Ridership is compared almost on a daily basis. There is always concern as to whether ridership is decreasing, increasing, or being maintained at a constant level. Thus, the forecast for ridership on a transit system seems to be far more critical than for a highway facility.

13. A highway facility is available at all times for a potential user and the marginal operating costs are minor for this availability. The marginal cost for operating a highway facility for 24 hours in a day is relatively minor. A highway facility, unless there is an emergency situation, is always open to a potential user. This is not true for a transit property. Many of the transit services are only available for 12 or 18 hours per day. In a few limited areas there is 24-hour service available. The marginal cost for providing additional hours of service in the transit field is quite high.

14. In highway planning, the concept of "more of the same is better" has prevailed; i.e., four lanes are better than two and six lanes are better than four. It is recognized that the larger the highway facility the easier it is to accommodate a given volume of traffic. Often forecasts are stretched so that a little larger facility can be constructed. Some transportation planners feel that "more of the same is better" also applies to the transit field. Some argue that 20-minute headways are better than 30-minute headways, and that 10-minute headways are better than 20-minute headways. This is simply not true in its simplest form. It may be that the transit service is not meeting the consumer needs, and more of an inadequate service does not necessarily encourage a consumer to use the system.

15. A highway facility is generally not expected to be a revenue-producing agent; i.e., toll roads have not received universal acceptance. Toll roads have not received widespread application in the United States. For many years revenue from some toll roads was insufficient to retire the bonds that were issued to build the facilities. In general the revenue that produced a highway facility was derived from a trust fund and was not expected to be derived from an individual paying a fare for a specific given service. This, of course, is not true for transit. The fare box has been expected to provide a substantial portion, if not all, of the revenue required for operations and capital expenditures for transit.

16. Labor constraints generally do not apply to highway facilities. Generally, the operations of a highway are not dependent on labor contracts, negotiations, or disputes. Generally, a highway facility cannot be closed to public use because of disputes with labor. This, of course, is completely reversed in the transit field. Labor dictates a substantial portion of what management is capable of doing in the transit area and has a significant impact on operations in the transit field.

17. Mathematical models are used in highway planning as a substitution for product testing. In the highway field mathematical models are used to test the operations and performance of a facility. In the business world a given company will produce a

product and test it on the market. This is not practical in the highway field because of the cost related to the testing of many different designs. Other techniques, such as computer simulation and statistical modeling, have been used to estimate the performance of a given design. In the transit field there is a greater need for product testing. In the case of non-rail systems, product testing can be achieved without unreasonable costs.

18. Mathematical models used in highway planning are not truly behavioral in structure. The mathematical models used, whether in trip generation, distribution, assignment, or modal split, have not really been behaviorally oriented. While some would argue that there was a desire for behavioral models and that some models attempted to be behavioral in nature, a perusal of the models will indicate that few, if any, are truly behavioral in nature. With a facility that cannot readily change, such as a highway facility, one might argue that the behavioral aspects of the models may not be as important as in the transit field. However, in the transit field, where one can change the system and change the operations to meet consumer demands, it is imperative that behavioral characteristics be incorporated in the models.

19. Highway planning is not required to be market-oriented. In the planning of a highway facility, the planner is not required to be concerned with the market opportunities of the highway. In general the planner is not concerned with whether the user is a senior citizen desiring a reduced rate, a handicapped person that must have special consideration given to him, a young individual traveling without parents or any other special type of user. The highway planner is not required to examine the market opportunities and design the facility to attract a particular market.

This, of course, is completely different in the transit field. A transit operation attracts or serves particular markets. Often the transit system attempts to serve the entire population. This probably should not be done. The transit system most likely should be oriented toward defining the markets that have a good probability of being attracted. Markets that cannot be attracted to transit probably should be forgotten and expenses should not be incurred in trying to attract those markets.

20. Management of a highway facility is not considered to be critical to successful operation. The management of a highway facility has little to do with its ability to serve its users. In fact, management is not really considered in highway planning. In the case of transit, management is, perhaps, the most critical element in the operation. Inadequate management can cause the system to be completely unsuccessful. Insufficient attention has been given to management by transportation planners when planning a transit system. The same is true for grantors at the federal and state levels.

PUBLIC TRANSPORTATION AS A PUBLIC SERVICE

There are some who argue that public transportation provides a public service, much like a fire department, a police department, a parks and recreation department, or a public utility. This argument is being used to generate support for operating subsidies. If one looks at that argument closely, one finds that it is not true in many cases. Public transportation is different from a fire department, a police department, or a public utility. A fire or police department is expected to service the demand. No one expects these departments to generate demand for their services. While it does have social responsibilities, the manner in which public transportation is designed and operated makes it more closely resemble a business operation than a public service. Public transportation is expected to generate demand for its services.

There are differences between public transportation and a public utility such as electricity, gas, water, or sewage. Generally, with a public utility there is no competition. Public utilities are permitted to charge individual customer rates that make the business an economically viable one. Because there is no competition with public utilities and because there is a large forced demand for the services, one can maintain economic viability without necessarily maintaining efficiency in the system.

It is trite to say that there is a tremendous amount of competition between public

transportation and other modes of travel. Public transportation has pressure to keep fares low, thus making economic viability difficult to maintain. Public transportation is not in the same class as a public utility.

RESEARCH TO ASSIST IN EVALUATING PUBLIC TRANSPORTATION

There is a need for research to completely define the differences between transit planning and highway planning. This is absolutely essential if adequate planning is to prevail in the transit area. Methodologies must be developed that will account for differences between facility planning and transit planning. Simply establishing levels of service will not of itself solve the problems in public transportation.

There is still considerable concern about operating deficits in the transit field. It would be inconsistent to argue that these concerns with operating deficits will disappear in the immediate future. Local governments have taken one of three approaches to solving the operating deficit problem. One approach has been to increase the service and thus, it is hoped, increase ridership. A second approach has been to reduce services and thus curtail expenditures. The third approach has been to go to the federal government and request that operating subsidies be provided in addition to capital grant subsidies. None of the three approaches has been successful.

Evaluation procedures must be established that can be applied to public transportation and, at the same time, be accepted professionally and by the public at large. In the past there have been minor attempts to establish broad uniform guidelines in planning public transportation systems, but no uniform standards have been universally adopted from one system to another. Each system has been evaluated on its own merits, when they could be defined. Success generally has been defined in terms of the economic viability of a given system—not in terms of any specific goals or objectives. As various systems became unprofitable business ventures and public ownership became the trend, economic viability could no longer be used as the sole criterion for evaluation. Most systems in which it was used were unsuccessful. If one cannot use economic viability as a criterion for evaluation, then some other means must be developed to evaluate public transportation. If one chooses economic viability as the only criterion for evaluation, then the implication is that there is only one objective in public transportation, i.e., economic profit.

For a meaningful evaluation of public transportation to occur, all levels of government must (a) establish specific and quantifiable goals and objectives for public transportation; (b) select alternative means of accomplishing the objectives; (c) define the criteria that will be used to evaluate an alternative in terms of meeting the objectives; (d) firmly establish the constraints under which the objectives are to be accomplished; and (e) develop the methodologies to be used in evaluation of each alternative. Only after each proposed alternative for public transportation has been evaluated can one determine if the objectives can be attained within the constraints imposed on the system. Unless these steps are completed there can never be a meaningful evaluation of public transportation systems that are not economically viable.

Objectives

The objectives for public transportation should be specific and not general. Often one sees an objective or goal stated as "to improve public transportation". A goal or objective stated in that vague manner is absolutely meaningless and an evaluation cannot be made relative to it. If one defines an objective of public transportation as "to reduce air pollution from automobiles in a given corridor by 25 percent by a change in travel from auto to transit", one can easily evaluate the public transportation alternative as to whether it is meeting the stated objective. Objectives that can be quantified must be defined. It is readily recognized that this is a very difficult task, but nevertheless it has to be accomplished.

Areas in which objectives must be established for public transportation at all

governmental levels have been previously suggested in another paper (1). A summary of these will be made here. There are many more areas in which objectives must be established other than those listed in this presentation, but these are fundamental to the evaluation process and must be accomplished before meaningful alternatives can be established. The following questions must be addressed by all levels of government before proper objectives can be established and meaningful evaluation procedures developed. These questions are certainly not all-inclusive, but they do represent a beginning.

1. Should every city regardless of size and location have a public transportation system supported by federal funds? It would be difficult to find even a small town in the United States that did not have a road with some federal moneys in it. However, there are many cities without airport facilities or ports. The demand for facilities would seem to dictate the amount of financial assistance. It would seem that any area should be able to secure financial assistance in some form at all levels of government to assist with public transportation, if the demand for service is evident.

2. Must each area, regardless of size, sustain a public transportation system, including the subsidization of private systems? Definitely not. It should, of course, depend on local priorities.

3. What type of system should be supported by federal funds for any given size city? Should support for a PRT system be limited to only the large urban areas or should one be federally funded in Morgantown, West Virginia? Generally, every city has some highway facilities supported by federal funds. However, every city does not qualify for an Interstate highway, a controlled-access facility, or even a divided four-lane road supported by government funding. Air and water facilities are not available in every city, nor is it likely that they ever will be. It seems unreasonable at present to make every area a potential candidate for all types of public transportation systems.

4. Should every urban area, regardless of size, attempt to have the latest technology in all forms of public transportation? No. All cities do not have the latest technology in many fields, whether it be computers or sewage treatment plants. Economics dictate that many systems in many fields are beyond the reach of certain communities.

5. Can funding for some cities be limited to highway-oriented transit, i.e., bus systems? At the present time, this seems to be a reasonable objective that should be established at all levels of government.

6. From a governmental viewpoint, should public transportation have an objective of social responsibility and/or one of reducing traffic congestion and related problems? It is preferred that the objective include both terms, but especially the reduction of traffic congestion.

7. Should government funds be allocated to systems that only provide a social service to the community? If funding is required for systems that do not reduce traffic congestion and related problems, perhaps other agencies that have definite social services responsibility should be the appropriate ones to provide financial support. This concept would certainly apply at the federal and state levels of government. If meeting a social need is desirable at the local level, then it becomes acceptable for the local government to fund this transportation social need. The objective then becomes a social one rather than a transportation one, and the funding for such a system is in competition with other non-transportation programs at the local government level. The objectives can then be subject to review, through the elective process, by those who receive and pay for the services of such a system. This is not really true for the state and federal levels of government. The support should be oriented to the individual rather than system-oriented.

8. Should financial support be available for both capital and operating subsidies? Unless stronger arguments are presented than have been to date for operating subsidies, only capital funding should be available from the federal level. By permitting only this type of funding, the true priority for public transportation at the state and local levels can be determined. If the state and local levels refuse to support public transportation systems, it is certainly questionable whether the federal government

should do so. This type of funding arrangement is consistent with current highway programs in that federal moneys are not used for maintenance (i.e., operating requirements). These maintenance funds are derived from state and local revenues. The local levels of government should determine their priorities for all municipal services and allocate funds accordingly.

9. Should funding proceed from the federal level to the state level or go directly to an urban area? This is a serious question that needs to be resolved. If the state government is willing to play an active and progressive role in public transportation, it would seem appropriate for the funding to proceed through the state level of government. This allows local policy to be compatible with overall state programs in public transportation. Federal money should not be used in transportation to alienate state and local transportation agencies from one another. Considering that in the majority of cases transportation planning is a combination of state and local efforts, it seems appropriate to continue a program that would lead to systems integration.

10. Can standards be applied to determine the amount of financial participation that would equitably allocate resources? This is a very difficult task but it must be done. The longer it is delayed, the more inequitable will be the distribution of funding that takes place. These guidelines or standards would apply to management, marketing, and other activities just as much as to levels of service. These standards may not be of a traditional form.

11. Can demand for transit services be used as a guide for minimum system standards as is the case of traffic demand for highway facilities? There seems to be no logical basis by which to determine the feasibility of resource investment other than the demand for service. Only when there is a good demand for service does public transportation assist in solving transportation problems. Low ridership on extremely costly systems serves only a few useful purposes—none of which is transportation-related.

12. Should attempts be made to establish public transportation systems on a regional rather than on a political basis? Yes. Almost without exception, the more successful public transportation systems, in terms of demand for service, have been designed to operate over many political boundaries. It is extremely difficult for a single system controlled by one political division to be successful, particularly if the political division is one of a much larger urban complex.

Surely objectives at all levels of government can be developed relative to these 12 objectives. If these cannot be defined in a quantifiable manner, meaningful evaluation procedures can never be developed, and an equitable distribution of funds for public transportation will never be made.

Alternative Systems

Once the objectives are established, appropriate public transportation systems can be planned and implemented. Meaningful alternatives can be developed only after the objectives have been clearly and quantifiably established. A planner should not attempt to develop alternative public transportation systems based on implied objectives. Unless the objectives for an urban area can be clearly defined, alternatives should not be developed. Unless an urban area is willing to establish objectives, the alternatives that will be proposed will most likely not be successful. Even when objectives are well defined, there may not be an alternative that can accomplish those objectives.

Criteria to be Used in Evaluation

The highway system is evaluated according to the level of service provided to the individual motorist. This concept is difficult to use in evaluating public transportation systems. The fact that traditional public transportation is in reality mass transportation makes it difficult to measure or evaluate on an individual basis. Some new

innovations in public transportation lend themselves more to evaluation on an individual basis than do traditional systems.

As is well known, the highway field has used minimum design standards for facilities for many years. These standards were applicable to secondary, primary, controlled-access, and Interstate facilities. A given facility was evaluated to a certain extent in terms of the standards that were placed on it—the higher the standards, the more important the facility. Some argue that standards should be developed for the transit industry. It is difficult to make a direct analogy between highway design standards and standards within the transit industry; the main reason is that the design standards in the highway field are for a facility and the standards in the transit field would be for operations. If no attempt is made to apply a direct relationship between highway standards and transit standards, then it may be appropriate to argue that the general concept of standards could be beneficial to the transit industry. However, establishing standards will not be the total solution to the problems in public transportation. When considering standards in the transit field, strong attention must be given to management, marketing, etc., and not just to the daily operation. A transit system is a business, not a fixed facility.

In general, a large forecast traffic volume on a highway facility results in high design standards. With transit the reverse is true, in that the operating standards are raised to try to obtain an increase in demand. Thus, one might logically argue that any standards used in the transit industry would not necessarily be those of an operating nature but would be those that would attempt to attract patronage to the system. These standards might be applied to management and to marketing as well as to operations. There is definitely a need for research to establish the criteria or standards that can be used in the transit industry, but those who are establishing the standards must realize that there are basic differences between the design and operation of a highway facility and the design and operation of a transit property.

Constraints

There are many constraints under which public transportation systems must operate. In many instances financial resources represent only a small portion of the limiting constraints. The political constraints and/or regulations are often more detrimental to public transportation systems. Many systems, both public and private, are prohibited from providing goods movement. A given system could obtain perhaps 10 to 20 percent of its revenue from the movement of goods if it were permitted to do so. Organized labor often prohibits the introduction of new concepts to the public transportation field. The addition of the 13C Agreement to all federal grants has severely limited management, in many cases, to providing only outdated, unimaginative public transportation systems.

Constraints involving franchise and other regulations place severe restrictions on public transportation systems. In developing alternatives, various constraints must be taken into account. If an alternative is not feasible because of political, economic, or other constraints, then this alternative should be viewed in light of this knowledge. Constraints other than financial are very real in the public transportation field. Pretending that they do not exist or do not apply when developing alternatives does not improve the relationship of planning and evaluation.

Evaluation Process

If the objectives, alternatives, criteria, and constraints can be well defined, the evaluation process becomes elementary. Without these being defined, the evaluation process is an impossible task. The results of the evaluation process will show whether the alternatives can accomplish the objectives under the constraints placed on the system.

SUMMARY

This conference is attempting to define research needs to improve the evaluation process for public transportation. It is extremely important to recognize the differences between highway planning and transit planning when performing the research. It will be difficult to obtain satisfactory results by applying planning methodologies from the highway field to the transit field. A framework for quantifying objectives for public transportation must be established. In light of the differences between highway and transit planning, the objectives will undoubtedly be different. Therefore, proper procedures must be developed for quantifying these objectives. It is recognized that this is a difficult task, but it must be done. Only after the objectives have been quantified can a public transportation system be appropriately planned, designed, operated, and evaluated. This conference has the expertise and the ability to direct the research efforts toward evaluating public transportation. The evaluation of public transportation is not an impossible task. Let us proceed with the charge that is given to us.

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REFERENCE

1. Heathington, Kenneth W. Evaluation of Urban Public Transportation. Engineering Issues—Journal of Professional Activities, Proc. ASCE, Vol. 100, No. EI3, Proc. Paper 10662, July 1974, pp. 241-249.