Governmental and Public Constraints to the Implementation of Light-Rail Transit in Dayton, Ohio

Jack L. Jensen and Ronald G. Rude, Transportation Coordinating Committee, Dayton, Ohio

This paper discusses the local, state, and federal governmental and institutional constraints to the implementation of light-rail transit. The experiences of the Dayton region are used in an attempt to draw broad-based conclusions and general recommendations applicable to other medium-sized urban areas. The planning process that led to the selection of the light-rail mode in Dayton is also described.

There are a number of local, state, and federal institutional constraints that can be expected in the implementation of light-rail transit (LRT) systems. These constraints will particularly apply to an area that has no existing rail transit facilities. Due to the simplicity of the concept and technology, LRT provides a great deal of flexibility in planning, design, and building, but here the simplicity ends. The governmental and public constraints that must be overcome make the job much tougher than it looks on the surface. Despite the design or technical advantages of a new LRT system, such a system is an unfamiliar and sometimes costly competitor to established travel modes. The public, local government, and technical agencies are experienced with planning, funding, improving, and operating highway and bus transit systems. In contrast, LRT is an unknown that makes demands on the imagination and resources of voters, elected officials, and technicians. Using the experience of Dayton, Ohio, as an example, we will outline the problems encountered at all levels of government in the implementation of an LRT system. An attempt will also be made to draw broad-based conclusions and general recommendations applicable to other medium-sized cities.

First it is important that we define the mode of transportation being considered. One problem that has been encountered at both the local and federal levels is a misunderstanding of what LRT is. The public and even the chief agents in transportation planning often do not know what LRT is and what it can do. For those with a highway background, LRT might be compared to the expressway, which has control of access and some at-grade intersections. Heavy-rail transit or commuter rail may be thought of as the freeway of transit—total separation of grades and complete control of access. Bus transit can be thought of as the arterial system of transit and feeder buses as the collector system.

LRT, as envisioned for Dayton, would consist of a rail guideway system whose route configuration may include portions that are not grade separated. LRT may operate in city streets with vehicular traffic or in reserved right-of-way with vehicular crossings at intersections. Light-rail vehicles (LRVs) are electrically powered, are capable of operating singly or in trains, and can be constructed to accommodate loading from either high or low platforms.

DAYTON PLANNING PROCESS

A description of the Dayton LRT proposal and a brief history of the transportation planning process that led to the selection of the light-rail mode will be given. This historic overview will be used as a basis for pointing out the constraints and problems that have been encountered and how some of them have been resolved, although others remain. Many of these constraints are typical of those faced by other communities throughout the nation and should be anticipated by any area seeking to implement LRT. The review of the planning process will show the logical connections among the long- and short-range planning efforts within the region as well as spell out the series of steps that have carried Dayton to its present status.

Dayton has a population of more than 200 000 in a metropolitan area that contains about 850 000 people. The need for some form of fixed-guideway transit facility was recognized by area planners in the early 1960s. During that time, a regional transportation plan was developed and adopted that called for high-speed transit service in three corridors to the southeast, northwest, and northeast of the Dayton central business district (CBD). As in most urban areas in the 1960s, Dayton devoted most of its energies to the implementation of highway facilities. A unique opportunity presented itself in 1970, when the U.S. Department of Transportation (DOT) announced it was accepting applications for its Urban Corridor Demonstration Program. The purpose of this program was to demonstrate ways of improving peak-period flow into downtown areas. The Dayton regional transportation planning agency submitted an application to evaluate the use of an abandoned railroad in its southeast corridor. A grant was awarded, and a number of alternative transit systems were analyzed. Near the completion of the study, the planning agency and its consultants were ready to recommend a busway to serve the corridor; however, due to the increased interest in LRT technology in the United States, concerns about jurisdiction, and a particularly vocal private citizens' group, it was decided that LRT should be given further consideration.

In 1972, the region requested funds from DOT to evaluate the feasibility of LRT service in the corridor. In October 1973, a feasibility study was completed, and its conclusion was that this was a feasible transit mode for the Dayton area. A comparative evaluation was then made of the busway and LRT, and in December 1973 the regional transportation policy board instructed its staff to take the necessary steps toward implementing the LRT system.

During the first half of 1974, a committee made up of representatives of the six jurisdictions in the corridor developed a formula for allocating the local funding share of the program. In the last half of 1974, a preliminary implementation application was prepared for submittal to the Urban Mass Transportation Administration (UMTA) and the Ohio Department of Transportation. The application was formally submitted by the Miami Valley Regional Transit Authority in January 1975.

During UMTA's 11-month review of the application, a number of meetings were held in Dayton and in Washington, D.C., to discuss the program. In December

1975, UMTA rejected Dayton's preliminary application. UMTA felt that Dayton did not have its nonfederal funds securely committed and that sufficient consideration had not been given to alternatives to an LRT system. In responding to the question of other options, Dayton's regional transportation planning agency has prepared a work program for conducting an alternatives analysis as required under UMTA's September 1976 regulations. The question of local-share funding will be addressed below.

PROPOSED RAIL TRANSIT SYSTEM FOR DAYTON

As it is now envisioned, the route for Dayton's southeast corridor would use LRT technology in a 95 percent exclusive right-of-way system connecting downtown Dayton with communities extending about 19.6 km (12.2 miles) southeast to Centerville via a currently underused freight branch of an existing railroad system. This would be the first of several lines proposed to serve the metropolitan area. The program meets the essential criteria of performance and cost for a mass transportation system serving a medium-sized city. Off-the-shelf technology and equipment will be used and a well-located railroad right-of-way requiring a minimum of remodeling is available. Since feasibility studies have indicated that this mode is applicable to the Dayton region, it is important to note that the geographic and demographic characteristics of this area closely resemble those of other urban areas throughout the United States.

The roadbed for most of the route will consist of a double track with continuously welded rail and resilient pads between the rails and ties to ensure quiet operation. There will be 15 stations. They are to be simple but attractive and functional. There will be boarding platforms for both directions, bus loading areas, automobile pickup points, and parking areas. A total of 2700 parking spaces is planned at 7 of the 8 southern stations at which the necessary property can be easily acquired. Feeder buses will operate on a demand-responsive basis out of a number of stations to provide flexible, convenient access to the system. Feeder-bus schedules will be coordinated to match arrivals and departures of rail vehicles so as to minimize transfer delay.

Rail cars for the system will use an overhead electric power source and standard-width track. The LRV required for the Dayton system is a single-unit car that seats 55 passengers and has the ability to operate in trains of up to four units. The cars will be able to average 56 km/h (35 mph) while making 15 stops. At many points along the corridor, they will be able to attain speeds of up to 80 km/h (50 mph). A trip from one end of the line to the other will require 22 min. The same trip by automobile currently takes 35 to 45 min during the peak hour. Service would be provided at all times except early morning hours, when freight service would continue to be provided for industrial customers.

The capital investment in the system will be about $65 million, or about $3.3 million/km ($5.3 million/mile). This system offers most of the advantages of more complicated and expensive facilities currently being planned or built; however, the Dayton proposal is much more cost-effective and can be implemented in a relatively short time.

CONSTRAINTS TO IMPLEMENTATION

Barriers to the implementation of LRT service have been encountered at the local, regional, state, and federal levels. These constraints have proved to be somewhat different from those that affect other modes and seem to be unique to LRT for the medium-sized city.

Local Constraints

The first category of constraints concerns those at the local level. Local questions involve which corridor should be developed first, how the local cost of the project should be divided, which agency should operate the system, who should subsidize the system once it is in operation, and what are the land-use implications of LRT. The complexity of local concerns in the Dayton area is indicated by the fact that the first line proposed would serve 4 municipalities and 1 township, all of which are in one county. The ultimate rail system currently being evaluated would serve 13 municipalities and 10 townships and involve the cooperation of two counties.

The mid-1960s regional transportation plan for the Dayton area called for three high-speed transit lines serving the Dayton CBD. The one to the northwest would provide transit to the city's most densely populated residential area. The northeast line would serve Wright-Patterson Air Force Base (which has 27 000 employees), Wright State University, and the city of Fairborn. The southeast route would serve the more affluent suburbs and areas that contain substantial portions of the region's elderly population.

When the area planners selected a corridor for evaluation in the Urban Corridor Demonstration Program, the southeast corridor was chosen because of the availability of an abandoned railroad right-of-way. It was felt that the projects selected by DOT would need to have some unique characteristics, and at that time the federal agencies were particularly interested in preserving railroad rights-of-way for transportation purposes. Therefore, funding for implementation of the southeast line was requested first because advance studies had been completed for this routing.

When the various communities were passing resolutions of support for the preliminary application for the southeast LRT line, the city of Dayton requested assurance that work would continue toward implementation of the other two corridors, because it was felt that these two lines would be more beneficial to Dayton residents than the southeast route, which served a number of suburban communities as well as the city of Dayton. This assurance was given; the regional transportation plan was reevaluated for these three corridors as well as four others that were being studied in detail with respect to requirements for the year 2000.

One constraint that develops at the local level in the early stages of a project involves how the project is visualized. The initial reactions of some officials to consideration of an LRT proposal for the southeast corridor of Dayton suggested that in their minds the transit line was a one-way facility in the outbound direction. Officials in the center city saw the potential of allowing the commercial activity of the city to travel outward to suburban shopping areas. They also saw it as an aid to the more affluent residents of the city to move to the suburbs and have easy transportation access to their downtown jobs. Officials in the suburbs, on the other hand, in some cases saw the project as a way of bringing the socially deprived to their community. The planners, in one sense, also saw the proposed line as a one-way facility inbound, since they and the promoters of LRT pointed to the developmental value of such a service to the center city and downtown activities. The planners also saw the system as providing an alternate mode of travel to suburban residents, i.e., providing mobility to the young and the elderly in the sub-

urbs that is not readily available to them in an automobile-dominated system.

All of these conceptions had to be addressed and the fears overcome. One must not overlook such problems in developing major transit facilities in a regional plan. Some of these perceptions depend on the current concerns of other planning services in the region. If, for instance, the housing opportunities plan is currently generating a great amount of discussion, then the issues related to housing opportunities become issues of the transportation corridor; if it is not a matter of current concern, then those issues may not provoke a constraint. Each area must examine its current activities and anticipate how they affect one another as they go into the planning process for a particular project.

There have been no further problems in Dayton regarding the selection of the line to be built first; however, this is an item that must be given serious consideration in the initial stages of any planning process. A compromise among the needs and desires of all the communities involved must be reached in order for the jurisdictions to continue to work together toward the implementation of a staged, coordinated, and comprehensive system.

A second local constraint involves construction funding. Where the local cost of a program of this magnitude would come from is certainly a basic question for the jurisdictions involved. Assuming that 80 percent of the cost would be provided through an UMTA capital grant, a committee made up of representatives of the six jurisdictions (four cities, a township, and a county) involved in the Dayton program was formed to decide the source of the remaining 20 percent, the local share. The committee members, who were appointed by their respective councils, board, or commission, spent 4 months dealing with a number of complicated formulas involving existing and forecast land use and service areas and weighed the various schemes before reaching a decision on how to assign the local shares. The funding formula was then endorsed by each of the governing bodies.

This approach is recommended for solving the local-share question. There is no standard formula or approach, yet all jurisdictions must be satisfied or they will not provide their share of the cost. Since high-level representatives of all the communities had discussed the funding problems in detail and reached a common recommendation to take back to their respective policy boards, it proved easier to obtain support for the formula than if a single agency or city had proposed a scheme. This situation has pointed out the need for additional research in such fields as value capture, tax-increment funding, and model funding formulas. This research is essential and must continue to be supported by the federal government.

The local aspects of subsidizing the deficits of operating an LRT system obviously must be addressed as the issue of the feasibility of LRT is evaluated. The problems involved in providing for that subsidy are the same as those described in regard to capital grants. An important issue in both cases is the definition of a local builder and operator. That problem may not be as severe in some other urban areas as it is in Dayton, since in some areas of the country the service area of a single public transit authority covers the proposed service area for such projects; in Dayton that is not currently the case.

The problem of the operating subsidy is complicated by the cash-flow problem in UMTA's operating assistance program that is created by the slowness in processing section 5 applications. We believe this problem can be overcome. Sometimes the problem is partly the result of slowness at the local level in filing the application and all of the necessary supporting documentation (in a form acceptable to UMTA) to get the project moving expeditiously. We have experienced cash-flow lags of more than 1 year in the operating assistance program as a result of the combination of slowness from these two sources.

It is apparent that UMTA would require some assurance or guarantee of the local matching funds required to subsidize the anticipated operating deficit of a proposed new system before it would make any commitment for capital expenditures. This commitment would have to be based on the local regional transit authority's budget or be guaranteed by commitments from the local jurisdictions involved in the program. If the local communities are to provide the funds, this would be based on a formula involving estimated operating expenses and ridership forecasts. Given the lack of reliability that such estimates carry, it is very difficult to get a local governmental body to commit itself to such expenses.

Another concern of local communities will be the land-use impact of LRT in an area that does not currently have rail transit service. The Dayton implementation application to UMTA for the construction of the southeast line proposed a before-and-after land-use evaluation, particularly around station sites and in the Dayton CBD. The purpose of these studies would be to provide other cities with a basis for estimating impacts and to make information available for use in future corridors in the Dayton region.

The cities have been concerned about what will happen to land use around a transit station. Will high-rise development occur? What will happen to land values? How can growth and change be controlled? What can be expected from a joint development program or special assessment districts? The goals and objectives of each community involved must be given thorough consideration in the planning and design of the system. It seems logical that this work begin with a detailed land-use analysis of what currently exists within the corridor and how the communities want these areas to develop. Many of these land-use aspects have not been tested from a legal standpoint; further research is necessary in this area.

It is obvious that rail stations will have an impact on surrounding land and, if there is proper consideration before implementation of the transit system, the communities can turn this transportation asset into a complete land development advantage for their citizens. It cannot automatically be assumed that every community along the route wants high-density development or redevelopment to occur adjacent to the stations.

The subject of a before-and-after land-use evaluation in the Dayton area remains a consideration within the elements of the alternatives analysis. The major tasks in this analysis are

1. To analyze possible needs for public facilities directly related to the corridor,
2. To determine general development and redevelopment potentials in the corridor,
3. To evaluate the feasibility of joint development projects within the corridor,
4. To evaluate the market potentials of sites, and
5. To investigate possible value-capture techniques within the corridor.

It is suggested that land-use evaluations at least this detailed are required to properly develop a high-quality transit line.

Regional Constraints

The next category of constraints deals with problems at the regional level, including such questions as who should operate the system, how the right-of-way is to be preserved, how rail freight should be handled, and what role citizen participation should play.

Any region that implements a new type of transit service will have to determine who will operate the system. For the calculation of operating expenses, the consultant who prepared the LRT feasibility study for Dayton assumed that the Miami Valley Regional Transit Authority would operate the system. As previously noted, the first leg of the proposed regional system lies within six jurisdictions, but the existing transit authority only includes two of these communities—the central city and its oldest, most affluent suburb. Under this structure, the nonmember jurisdictions would have to contract for service or join the authority. A contractual arrangement would involve a direct, annual general fund expenditure for the four jurisdictions; joining the authority would require levying a 2.73-mill annual property tax on their citizens. A third mechanism permitted under Ohio law would have the existing authority disband and be reconstituted as a countywide authority. This was done in June 1976. To provide a funding base for the new authority, the people of the county were asked to vote a 0.5 percent increase in the sales tax, which would have produced $7 million/year. The issue failed, and the old two-city transit authority was reinstated. Any single jurisdiction could operate the system, but it would have the same problem of contracting with the remaining communities that the transit authority has.

In many urban areas there may not be a question as to who the operator of the system will be. The existing transit authority may already cover the area to which service is to be supplied, but the proposed service area frequently extends beyond the authority's jurisdiction, e.g., across a county line. In such cases, early consideration should be given to the operating mechanism.

Another subject for concern in Dayton's southeast corridor is rail freight service. There are a number of small industries along the southern portion of the existing line that are receiving rail freight service from a connecting railroad. The decision was made early in the planning process to continue rail freight service in this corridor. Due to the nature of some of the industries being served, the expense of trucking their supplies and products would be prohibitive, and they would be forced to relocate if rail service were removed. In an effort to conserve right-of-way, it was also decided that the transit and freight vehicles would use the same track. The transit vehicles would operate from 5:00 a.m. to midnight, and the freight vehicles would have the use of the tracks from midnight to 5:00 a.m.

An additional question related to the issue of freight service is who should operate the service. The consultant who evaluated the feasibility of LRT in the southeast corridor of the Dayton region recommended that the transit agency should have control of all movements along the right-of-way. Under these circumstances, the most effective way to arrange for the freight service would be for the crew to be employees of the transit agency, which would operate the system as a short-line railroad. An alternative approach would be for the transit operator to lease the freight rights to a second party.

Having the transit and freight services use the same track is an approach used successfully in some European cities. It has the added advantage in Dayton of replacing a deteriorated track with a new facility that will enhance its freight potential. However, it is recommended that cities planning LRT facilities make every effort to separate the transit and freight tracks within a corridor. This would eliminate the complicated legal entanglements and operational conflicts that can evolve with joint use of track. In other corridors within the Dayton region, it is anticipated that railroad right-of-way would be leased, and the transit lines will be constructed parallel to the existing freight tracks.

In many situations in the northeastern part of the United States, the opportunities for using low-density rail lines are being lost. Since the Consolidated Rail Corporation is not taking over the lines, they are being sold to private interests. We have proposed that either the federal government or our state government establish a land bank to purchase and hold all abandoned rail rights-of-way for future transportation use.

An element that is critical to the success of implementing any public improvement on the scale of a mass transit system must have early, strong, and continuous citizen participation. Establishing a mechanism for this is a requirement under any alternatives analysis and is a part of the Dayton region's work program for further evaluation in its southeast corridor. However, the formal mechanism for establishing citizen participation already exists in the Dayton community, as it does in most urbanized areas, through a citizens' transportation council. This is an advisory group to the transportation policy board; its major function is to obtain public input.

For most projects, citizen involvement must be aggressively sought if any feedback is to be obtained at all. However, in the case of Dayton's LRT project, it was actually a group of private citizens who forced the issue of giving LRT further consideration at a time when the local planners were about to propose a busway. The group, the Citizens Committee for DART [Dayton Area Rail Transit], prepared a voluminous report outlining an LRT system for the southeast corridor just before a busway report on this same corridor was released by the regional transportation planning agency and its consultant. Unlike the vague, often unbalanced work of the typical ad hoc commitee, the citizens' report set out ideas and concrete proposals that quickly gained wide attention and support. As a result of their efforts, a consultant was retained to study the feasibility of LRT in the corridor. This group has continued since 1971 to promote the LRT plan among citizens, business leaders, civic clubs, and local, state, and federal politicians. Their members have also been active in national conferences on LRT.

Overall, this unofficial citizens' committee has been effective in promoting LRT service for Dayton. However, because of their lack of knowledge of governmental functions, the committee has often caused problems for the regional transportation planning agency; in some instances it has actually delayed progress on the program. It is therefore recommended that attempts be made to direct the energies of unofficial citizens' groups or private individuals into a more formalized mechanism, such as a council of citizens that works more directly with the regional transportation policy board, which can channel citizen input to the appropriate officials and maximize its impact. Local, state, and federal funds are available for obtaining citizen input to the planning of new transit facilities and should be used to their fullest extent.

One of the major problems when aggressive private citizens promote a particular transportation concept, in this case LRT, is the occasional mixing of concepts and ideas within their approach to promoting a mode. In our case, for example, too often the value to a community of land development was promoted on the basis of the kinds of land development that occurred in connection with heavy-rail commuter lines in and around stations.

That issue has been mixed in with the justification for LRT Similarly, the idea of the ultimate flexibility to upgrade an LRT system to a subway or heavy-rail commuter system has been promoted as an advantage when, in reality, no one today can envision a city of Dayton's size requiring that kind of rail system. For all reasonable purposes, the LRT system is the ultimate level for Dayton's transit system. This mix of promotional aspects adds to the confusion that exists in dealing with public knowledge and public support of a transportation mode.

In our area there is another constraint that is a barrier to carrying out the requirements of an alternatives analysis. Although transportation planners can go through the process of analyzing an exclusive busway as one alternative to LRT in the same right-of-way, if that is not an acceptable alternative to the citizens of that corridor, it is not a practical alternative. The reason it is not acceptable in this case is basically that the public sees it as a way of putting a strip of concrete pavement down the railroad right-of-way so that the decision can later be made to stop providing bus service and start letting cars run on that pavement; this would make it a backdoor way of obtaining a highway. Although this has never been anybody's intention, that possibility has been raised in the minds of the residents of that corridor, and that fear can be played on by the advocates of other modes; this has good and bad points. A good point is that it aids in promoting the LRT concept. The bad point obviously is that it makes redundant the alternative of a busway. Developing a freeway for automobile use, possibly with bus routes operating on it, is a technical alternative and previously was considered for a portion of our first corridor. But the public came to the conclusion that it did not want a freeway, and the Dayton City Commission has adopted an informal resolution clearly stating that it would not construct a freeway in that corridor. This is another technical alternative that is not politically practical and therefore not worthy of further investigation.

State Constraints

The next area of constraints involves those at the state level. In the Dayton area these have concerned state participation in the local funding share and the issue of integration of proposed intercity rail passenger service with local operations. In the preliminary application submitted to UMTA in 1975 for implementation funds to build Dayton's rail facility, it was proposed that 10 percent of the financing would be obtained from the state of Ohio. Funds for the Ohio Department of Transportation are allocated by the state legislature on a biennial basis. Thus, it is impossible for the state to commit funds to a project such as Dayton's, which is estimated to take 6 years for implementation.

Assuming a total project cost of $65 million, the state's share would be $6.5 million. If this figure were distributed over a 6-year period, the state would need to commit $1.1 million/year to the program. Since the region must compete with areas such as Cleveland, Cincinnati, and Columbus and a number of smaller operators, it is not realistic to believe that Dayton can obtain an adequate share of available funds. It is possible that the project could be programmed on a cash-flow basis with a state obligation at the front end of each stage and state funds provided at the time of contract signing. However, UMTA's acceptance of such an arrangement is not certain at this time.

The state funding levels and budgetary practices vary widely throughout the country. This is an area that must be investigated thoroughly in a region's early planning stages for an LRT system. Special agreements and new legislation may be needed to assure adequate and timely state support.

The second point for consideration is the integration of intercity and local rail transit service. The Ohio Rail Transit Authority, a statewide rail transit planning agency, entered into an agreement with a consultant in February 1977 to study the feasibility of high-speed intercity rail passenger service in Ohio. One or more of the lines under consideration would connect the cities of Dayton and Cincinnati. The statewide lines would serve a corridor similar to that served by the local line but with a different level of service. Again, similar plans are being prepared for other states, and their potential must be considered. The question of joint use must be evaluated under these circumstances.

Possibly the greatest constraint at the state level is the fact that most state departments of transportation are recently converted highway departments; they generally lack a commitment to transit and support for a fixed-guideway concept. In Ohio we have been fortunate to receive state support, but that support comes within the fiscal constraints of Ohio law. To take a specific project of this type to the state legislature for special funding consideration produces the image of proposing pork-barrel legislation. That image is difficult to overcome. Our solution is to develop the nonfederal share guarantees at the local level and then run our own risks with the state; this should remove it from the concern of UMTA.

Federal Constraints

Since no project of the magnitude of an LRT system can be constructed and put into operation today without the assistance of federal dollars, it is necessary to comply with federal law and regulations and to deal with the federal bureaucracy. When most people in the transportation profession criticize the federal government, they address the problem of the absence of a national transportation policy. While we can agree that there is not an officially adopted national transportation policy, we believe that in fact one does exist, even though it was partly backed into by the adoption of laws, rules, and regulations in areas not specific to transportation. In fact, we contend that the national transportation policy is supportive of a highway transportation system. It is supportive of a long-headway diesel bus transportation system. It is not supportive of LRT as a transportation alternative or of transit as a major element of transportation or, for that matter, of efficiency in highway transportation.

The national transportation policy puts social burdens on the transit system without putting those same social burdens on the highway system. At the same time, national policy stimulates suburban sprawl through loans to middle- and upper-income persons subsidized by the Federal Housing Administration and income incentives based on tax deductions for mortgage costs and real estate taxes, while it does not provide tax incentives for redevelopment in the center-city areas. People in the transportation planning profession at all levels of government express platitudes about coordinated planning, development control, growth strategies, and so on, but we have never in the history of transportation in this country constructed a highway or a transit facility only because it encouraged desirable land development rather than because it satisfied an existing need. Hence, while we promote LRT by pointing to the land-use value created, those who weigh the justification for LRT look at the existing ridership, densities, and land consumption in order to determine whether the system can be installed. In

essence, one must be able to justify a project on the basis of need, not on the basis of creating a need or shaping land development. This immediately produces a major constraint for all medium-sized and small cities, particularly with regard to LRT.

The federal agencies are properly concerned that, if they were to approve an LRT system for Dayton, many cities throughout the United States could request similar funding, and this would severely tax the capability of the federal government to finance transit projects. Rather than addressing the policy and priority questions that problem presents, the federal government has treated LRT as a system to fall back on, one that would cost less than constructing a commuter rail or heavy-rail system. As long as the federal government, many planners, and some citizens' groups look at LRT as a preliminary step toward commuter rail or as a means of investing less capital than would be required for commuter rail while providing reasonably similar levels of service, we will continue to be faced with the idea that there are not more than a dozen cities in the United States that can expect funding for LRT, as has been stated by past administrations.

If both planners and the federal government truly believe that the concerns of this nation include energy conservation, improvement of air quality, and the provision of transportation for all our population, then we must conclude that the development of major transit facilities is desirable. LRT systems can promote the shaping of land, can promote the reduction of energy consumption and the improvement of air quality, and can satisfy many of our social objectives. We suggest, therefore, that what we need is not a transportation policy but a change in the existing transportation policy so that it will fit all national objectives. The suggestion that one of the criteria for approving funding of an LRT project is the assurance of public and private commitment to redevelopment is merely an excuse for procrastination. Public and private commitment follows transportation decisions or develops unrelated to them, but it does not develop simutaneously. It puts an undue burden on transportation planners to expect them to develop a composite package that includes a total land redevelopment commitment.

It is not suggested here that it is improper for the federal government to have proposed and implemented alternatives analysis regulations but rather that it is unfair to require a literal response to those regulations retroactively. This problem is certainly not unique to UMTA. It exists in all of our federal agencies. If an LRT project has evolved from a transportation planning process, it has gone through an alternatives analysis in the true meaning of that word, whether or not all the specific requirements listed in UMTA's regulations have been fulfilled. We are suggesting here that another federal constraint arises from the length of time it takes to develop a major project, since there is a risk that changes in the rules and regulations will require doubling back to satisfy those regulations, thus adding to the time for development and therefore exposing it to greater risk of changing regulations. This can entail considerable penalties of cost and time.

The vicious circle that develops in terms of the federal requirement to assure that there is financial commitment to a project presents some interesting constraints. It is very difficult to get a local or state commitment without a federal commitment. What evolves is a case of contingent commitments that depend on the commitment of the other levels of government. In essence, it requires a multiple cycling through federal, state, regional, and local jurisdictions before the final funding package is totally committed.

There have been many proposals at the federal level for dealing with some of the transportation funding problems, including both (a) establishing a transit trust fund and (b) breaking up the highway trust fund and creating a single transportation trust fund. The real problem is that we are unable to commit funds for the long periods now required to implement projects and seem unwilling to find ways of shortening that period to fit the time frame available. The commitments that are made for all forms of transit funding are actually invalid, although they are normally lived up to. A present city council cannot bind a future city council; funds cannot be appropriated beyond the current year, and funds not appropriated are not legally committed.

The state transportation department cannot make a commitment beyond the monies appropriated by the legislature. In Ohio the legislature appropriates on a biennial basis. There is no contractual commitment authority beyond that biennium. One-year and 2-year budgets do not fit transportation project schedules except for the purchase of buses. The persistent planner and the persistent local official, however, can overcome these obstacles if the current administration makes clear its position toward funding LRT projects of the type we have defined that have evolved from a proper planning process. It is in fact a waste of federal dollars, state dollars, and local dollars to grant study contracts to evaluate the feasibility of LRT projects in any city if the basic decision has not first been made that LRT projects are an alternative acceptable to the federal government in such a city. In Dayton, we are past the decision point. We want LRT. The alternatives analysis process serves only to satisfy UMTA's requirements, not to provide input to the decision-making process; this somehow makes everything seem backwards.

CONCLUSIONS

Significant constraints to the implementation of LRT service in Dayton obviously still exist; after 12 years nothing is on the ground. However, many barriers to the creation of an LRT system have been overcome, and the remaining problems are fairly well understood by those involved in transportation planning. The problems involve local, regional, state, and federal constraints.

Rail transit is inherently service to a corridor. Corridor choice and staging are crucial issues. Local governments must be involved in cooperative planning at the earliest point, because it is these jurisdictions that must apportion and bear the cost of the area's local share for capital costs and operating subsidies. It is these same jurisdictions that must control and adapt to the land-use impacts that rail service will bring.

LRT is a latecomer to the medium-sized American city. Its rights-of-way must be aligned through existing patterns of land uses and established circulation systems. Adapting existing rail lines for LRT service while acquiring parallel or new facilities will entail extremely high right-of-way costs. In addition, because of LRT's operating characteristics, it is unlikely that the proposed service area for any LRT system will coincide with an existing governmental jurisdiction or district. Designating or establishing a capable and acceptable operating authority is crucial for the success of an LRT project.

Regional transportation planning agencies that propose an LRT system should anticipate difficulties in coordinating state assistance with federal requirements. As always, the level of funding approved may be less than the amount felt to be needed. An additional state constraint on the design and operation of LRT commuter systems may exist in state plans for intercity rail ser-

vice. This factor may become increasingly significant.

A final constraint, and the one that has proved to be the most significant in Dayton, is the amount and types of federal assistance available and the delays met in processing applications for this aid. UMTA's programs for LRT do not have sufficient priority to provide a workable and timely source of funding. As was previously pointed out, Dayton's regional transportation planning agency is today back at the point reached in 1973—justification of a choice of mode. This is now our most severe constraint to the implementation of LRT.

Analysis of Transit Alternatives

R. Craig Hupp, Southeastern Michigan Council of Governments, Detroit
Donald N. Weisstuch, Leonard S. Wegman Company, New York*

The planning and implementation of major public works projects require the consideration of many engineering, social, environmental, political, and fiscal issues. In particular, the 1970s have seen nonengineering issues take precedence over engineering considerations in project planning and implementation. These issues are highlighted in a conceptual approach based on six tests of feasibility—physical, operational, institutional, social and environmental, financial, and economic feasibility. This paper describes the application of this approach and the nonengineering issues that were identified as having an effect on the planning of a light-rail transit system in Harrisburg, Pennsylvania. The feasibility tests were found to constitute a valuable approach because they lead to a formal or explicit recognition of several planning issues that are usually only implicitly recognized in planning studies. Once they were explicitly identified, these issues could be analyzed in terms of their impact on the planning process.

The planning and implementation of major public works projects require the consideration of a number of engineering, social, environmental, political, and fiscal issues. It once was the case that, if the need for the particular public works project was particularly clear, public support was unambivalent, and fiscal resources were adequate, the major thrust of the planning and implementation effort could be limited to the identification and resolution of the engineering issues. The process moved smoothly from planning through preliminary and final engineering studies to construction and operation. The conception, planning, design, and initial decade of implementation of the Interstate highway program (1956 to 1966) illustrates a situation in which only the engineering issues required detailed analysis. But times have changed. The completion of the Interstate system is now often challenged in many communities on social, environmental, and fiscal grounds. Few, if any, major transportation capital projects in the 1970s can be said to have unambivalent public support or adequate fiscal resources and, while the need for a solution to an identified problem may be clear, the best solution is not always self-evident. We believe that social, environmental, political, and fiscal issues are now taking precedence over engineering considerations in project planning and implementation and are generally proving to be far more difficult to resolve.

The attractiveness of light-rail transit (LRT), as evidenced by the success of TRB's conference on LRT in 1975 and many active LRT proposals in cities throughout the United States and Canada, is that it offers some hope of a compromise solution to the conflicting requirements of the nonengineering issues. An LRT alternative falls between a do-nothing alternative, which offends few interests but satisfies few needs, and a very capital-intensive transit alternative such as conventional rapid transit, which has the potential to satisfy many travel needs but carries a high cost in social, environmental, and fiscal resources. For example, LRT at grade or in a shared right-of-way represents a transportation compromise between the inefficient existing automobile and bus transportation system and the very efficient (from a transportation point of view) rapid transit subway operation. At the same time, it offers a fiscal compromise because the cost of building an LRT system at grade or in shared rights-of-way is often less expensive than a completely grade-separated or subway system and hence is more likely to be fundable. Thus, the revival of interest in LRT indicates a growing awareness of the need to address the nonengineering issues involved in the planning and implementation of a major transportation project or program.

We have developed a conceptual approach to the planning of major transportation projects that is intended to explicitly identify and highlight all of the issues involved in the planning and implementation of a new transportation system. The emphasis of this approach is to identify the implementability of a proposed transportation or transit alternative through tests of its physical, operational, institutional, social and environmental, financial, and economic feasibility. An alternative that passes the first five tests and outperforms other alternatives in the test of economic feasibility should have the best chance of being carried through to implementation. These tests are presented schematically in Figure 1.

The tests of feasibility are summarized briefly below in the context of a rail study recently conducted by Tippetts-Abbett-McCarthy-Stratton (TAMS) in Harrisburg, Pennsylvania. The test of physical feasibility addressed the question of whether it was physically possible to construct new rail services in a candidate travel corridor. Physical constraints were identified, engineering design criteria were established, and rough capital cost estimates were prepared. The test of operational feasibility was intended to identify operational conflicts with other transportation modes. If new facilities were required to permit operational feasibility, cost estimates were prepared. The test of institutional feasibility was intended (a) to identify all federal, state, or local agencies; private companies; public or semi-public authorities; and labor organizations and unions whose responsibilities, ownership, legal rights, and so on would affect or be affected by the inauguration of rail transit services and (b) to determine, as required, the agency or agencies that should own, operate, and manage the new transit service. A large part of the maneuvering between the Federal Railroad Administration (FRA),