Abridgment

Caracas Metro: A Luxury?

DANIEL SPERLING

Concentration of population is increasing in less developed countries, bringing with it paralyzing traffic congestion. Many cities have responded by designing and constructing expensive rail rapid transit systems. One of those cities is Caracas, Venezuela. In many ways Caracas approximates the ideal city for fixed-rail rapid transit: Linear land use patterns, rapid growth, lack of expansion space, and excessive congestion all seem to reinforce that observation. In this paper, the rationale for the Metro is explored as to its validity in terms of urban form, costs, benefits, and possible alternatives. Metro's route layout will best serve the more affluent and not the poor, accessibility to jobs will not be increased significantly, and Metro's design conflicts with the city's more recently articulated objectives of spatial and economic decentralization. Concerns for rational planning and judicious public spending were shunted aside, and the notion of a prestigious public work and availability of easy financing was allowed to dictate the decision to construct. Commitments to inflexible and costly underground rail systems, especially in countries of the Third World, may not be advisable in many cases. Many low-cost and moderate-cost strategies could provide equivalent or greater benefits at much lower cost. Strategies for expanding transportation opportunities and efficiencies could benefit from greater imagination, expertise, and political will.

Buoyed by its windfall oil wealth, Venezuela decided in 1975 to build a modern rail rapid transit system in its capitol city. To civic and political leaders it promised glamour and sophistication; to urban and transportation planners it promised resolution of overwhelming traffic congestion. Although conventional planning wisdom asserted that Caracas was the ideal city for a rapid transit system, an updated view suggests that the huge investment and ongoing subsidies may overwhelm the modest benefits. This case study serves to illuminate some neglected but critical issues associated with selection of urban rail systems.

NEED FOR TRANSIT

Although its population size is not inordinately large compared with that of most major cities in Latin America and Asia, Caracas is faced with restrictive physical barriers to continued growth. Constraints of land availability and rapidly escalating costs of public services (partly due to the difficulty of serving hillside developments) oppose the forces of expansion. Because Caracas lies in narrow valleys, pinched between mountain ranges, it has been forced to increase population densities to extremely high levels; much of the growth has pushed on to previously undeveloped and fragile hillsides. Topography has historically concentrated city growth into a linear pattern, punctuated by a series of activity centers stretched in an east-west orientation.

Almost all recent geographic expansion has been in illegal ranchos, squatter settlements that blanket the precipitous slopes around the valleys, or in bedroom suburbs located over the hills south of the city. Although data are inconsistent, the general belief is that more than 30 percent of the people live in ranchos.

Automobile ownership in Caracas is high and increasing at a rapid rate. In 1975 more than 10 percent of the population owned cars--a higher rate than in Buenos Aires, Singapore, Sao Paulo, and most other cities in the developing world (1). The rate has been increasing in Caracas at more than 15 percent/year, which is considerably higher than the population growth rate. Even the recently constructed large network of arterials and freeways is not able to accommodate the boom in automobile use, partly because more than 50 percent of all trips are by automobile. In view of the dense urbanization and high level of automobile use, it is not surprising that Caracas's congestion levels are among the world's most severe. (The severity of congestion is highlighted by visual observations that bumper-to-bumper traffic persists 12 h/day and by data that indicate almost constant vehicle flows from early morning to evening.)

METRO DE CARACAS

The Metro rapid transit system was conceived as the backbone of an integrated and coordinated transportation system. Bus routes were redesigned to serve as feeder lines. Four interconnecting lines were designed to comprise a rapid transit system of 50 km and 50 stations, as shown in Figure 1. However, only the longest line, which follows the major east-west corridor, has been funded. The expected completion date is in 1983. The line being built is 20 km long and has 22 stations, 19 of them underground. This first line is expected to cost more than $2 billion, almost 10 times greater than the initial estimate of $250 million.

No firm plans have been accepted for the second, third, and fourth lines. This examination is therefore limited to the first line, since it is the only line that will be constructed in the near future.

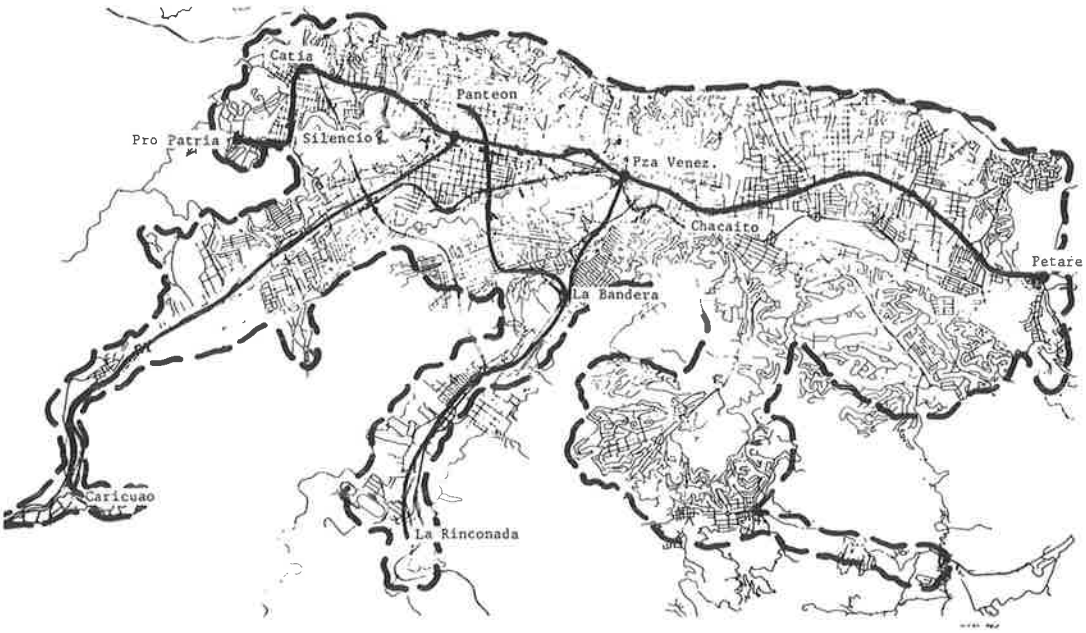
Benefits

The principal reason for building Metro is to ease congestion in the central corridor. High-speed trains on exclusive rights-of-way will bolster corridor capacity significantly. Benefits are expected to accrue to both Metro users and nonusers. Metro users would benefit from considerable time savings because of stifling congestion levels and cost savings because Metro fares will be less than automobile-operating costs. Nonusers would benefit from decreased congestion on the roadways, because each Metro rider represents one less trip on surface roads.

Designers predict that more than 50 percent of all benefits (operating costs and time savings) accrue to nonusers, mostly to car drivers and car passengers (2). They predict that about 40 percent of all peak-hour travelers will be carried by Metro; 77 percent of them will transfer to or from other modes (3). Their studies indicate that most of these Metro users will be diverted from surface public transit and relatively few from automobiles (2).

Added travel capacity might allow more growth to occur in the central corridor. The linear development pattern would be reinforced if more persons were able to reach employment centers along the corridor. Designers predict that Metro's added capacity generates a social benefit. Perhaps the greatest significance of Metro is for the large concentration of poor people who live in Catia, a large district located several kilometers from the city center at the western end of the Metro line. Catia residents would enjoy greater mobility and a higher level of accessibility with direct rapid service to the many jobs and services located along

Figure 1. Configuration of Caracas Metro system.



the central corridor of Caracas.

Doubts and Mitigating Factors

Considerable changes have occurred since the 1950s, when planning for Metro began. In the 1950s and 1960s people were just becoming conscious of the ramifications and costs associated with the rapid growth of Caracas, particularly in transportation. Continued demolition to provide more freeways and arterials was judged intolerable, and so Metro was born. But much of the planning and analysis was narrowly limited and short-sighted. Planners rationalized the rapid transit system almost entirely on expected savings in time and operating costs (2). Little attempt was made to analyze the fixed-route Metro system within the context of changing perceptions and growth patterns of the city, which is an especially embarrassing deficiency when viewed in light of the urban and regional decentralization plans and policies of the Fifth National Plan (1976-1980). We now see that, even as major activities are relocating away from the center and growth patterns are being reoriented toward the south of the country, the very expensive and permanently fixed alignment of Metro is being built exclusively to serve the already overburdened central corridor. Metro's alignment seems to contradict and conflict with the long-term spatial objectives of city officials.

Metro is not particularly suited to the needs of lower-income people. This assertion is based on an analysis of current (1975) use patterns of buses, which serve as rough (but probably reliable) estimates of poor people's transit requirements. Generally speaking, the buses' shabbiness and the social stigma attached to bus transit effectively render it a service almost exclusively for the poor. Similarly, por puesto (modern vans that operate as jitney vehicles) use patterns reflect needs of people who have moderately higher incomes, roughly classifiable as middle income. Por puesto service is more comfortable, flexible, faster, expensive, and directly responsive to desires of dispersed middle-class commuters. In any case, current transit users, primarily of buses and to a much less extent of por puestos, are expected to be Metro's typical riders.

Figures 2 (4) and 3 (4), indicate current demand for bus transit services. Clearly, the city center (El Silencio) is the major node of attraction. The overwhelming majority of bus trips, however, is distributed through a vast network in and around roughly a 3 km radius of the center (more than 90 percent of all bus trips are less than 6 km) (4). Few transit trips are generated in the entire eastern half of the city, including the central corridor between Petare (at the eastern end of the Metro line) and the center, which indicates that the Metro line is not especially responsive to the needs of the poorer people and that it will, in fact, serve a very small proportion of trips made by poorer people. On the other hand, trip volume patterns of por puestos, as shown in Figures 4 (4) and 5 (4), indicate that the trip lengths of the higher-income por puesto passengers are much longer and more oriented in the east-west direction.

Two observations can be made from this analysis:

1. Metro's route alignment is better suited to higher-income than to lower-income residents and
2. Metro's flat-fare policy would favor the higher-income commuters who live in the more attractive neighborhoods located farther from the center, because the poor, who now use buses or walk, would be paying the same fare as wealthy patrons but for much shorter trips.

Operation of the highly mechanized Metro line will be costly. The government will be obligated to either keep fares low to attract low-income riders, requiring a hefty and continuous subsidy, or to raise fares, thereby precluding poor people from sharing the benefits.

The expensive, capital-intensive nature of Metro has several ramifications. A large amount of foreign financing will be needed, and a large amount of the equipment and services must be purchased abroad, thus the level of foreign dependency will be increased. Furthermore, compared with conventional bus transit, Metro will employ relatively few people.

Clearly the objectives and justification of Metro

Figure 2. Caracas 1975 estimated person trips by bus: volumes more than 4000/day from and to Chacaito and Petare.

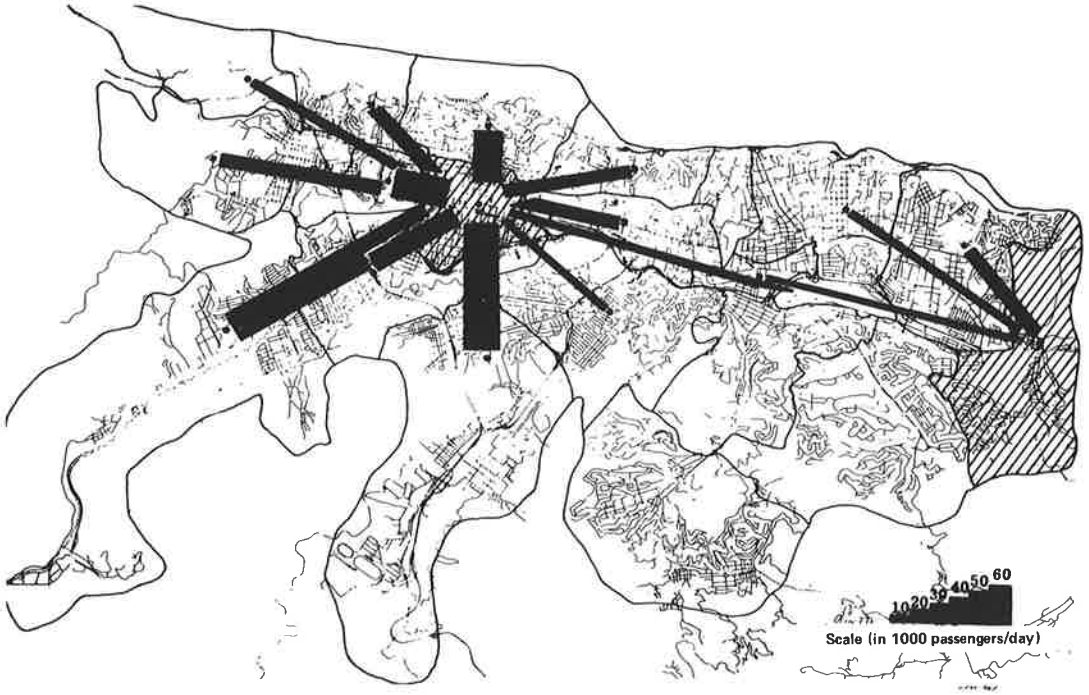
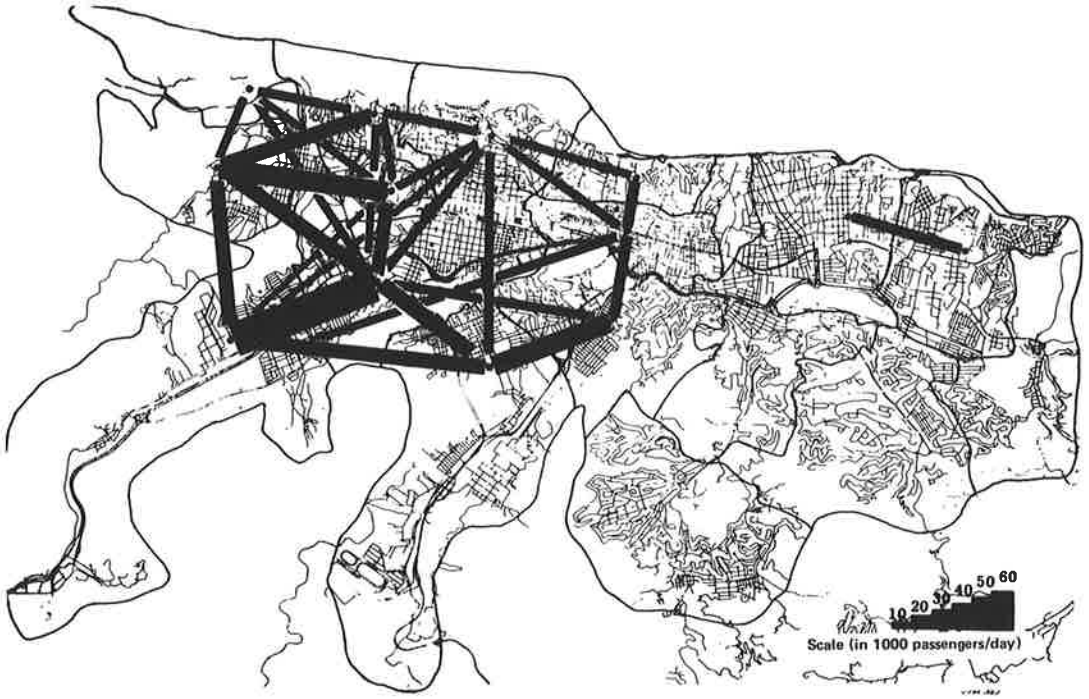


Figure 3. Caracas 1976 estimated person trips by bus: volumes more than 4000/day from all other zones.



are strained. Some people might say, however, that there really is no alternative; this is partly true. No one technology could provide the same capacity within the same physical constraints on land availability. There are, though, arrays of alternate options for increasing road use, personal interactions, and freight movements that require little or no additional construction. These options include better signalization, separation of vehicle types, improved surface transit operations, better enforcement, and improved mail and telephone service. Because each option is itself a subject of investigation, none will be described here. But note that the potential for decreasing congestion is truly enormous, to a large extent because present efficiency is low.

CONCLUSIONS AND POLICY IMPLICATIONS

Availability of easy financing, the complexities of

Figure 4. Caracas 1975 estimated person trips by por puesto: volumes more than 4000/day from and to Silencio, Chacaito, and Petare.

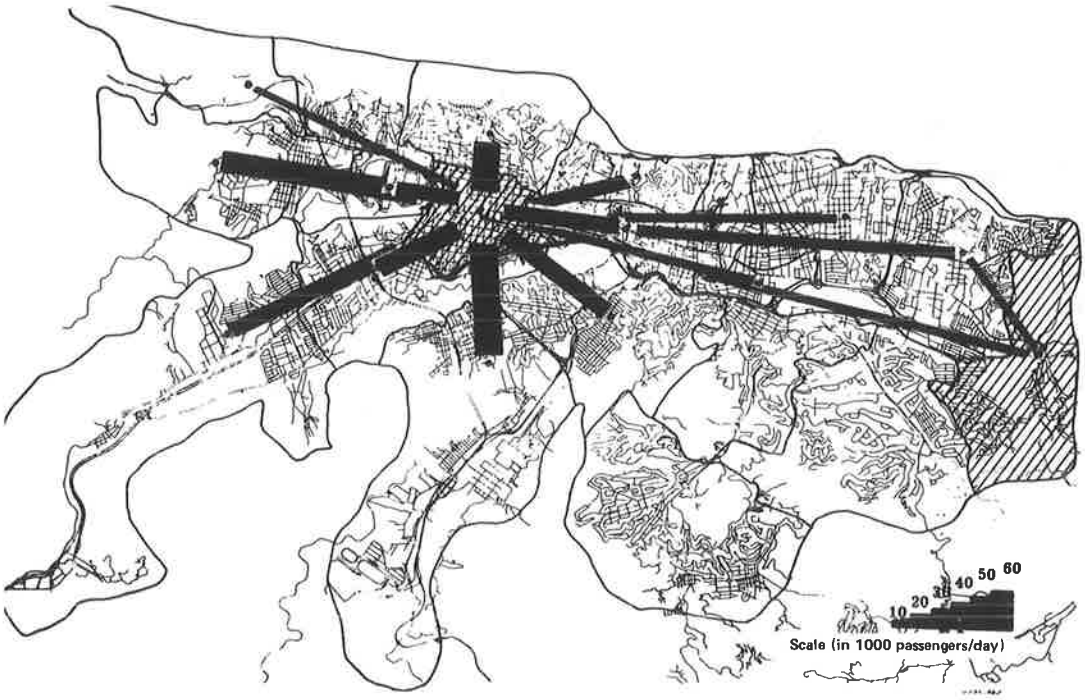
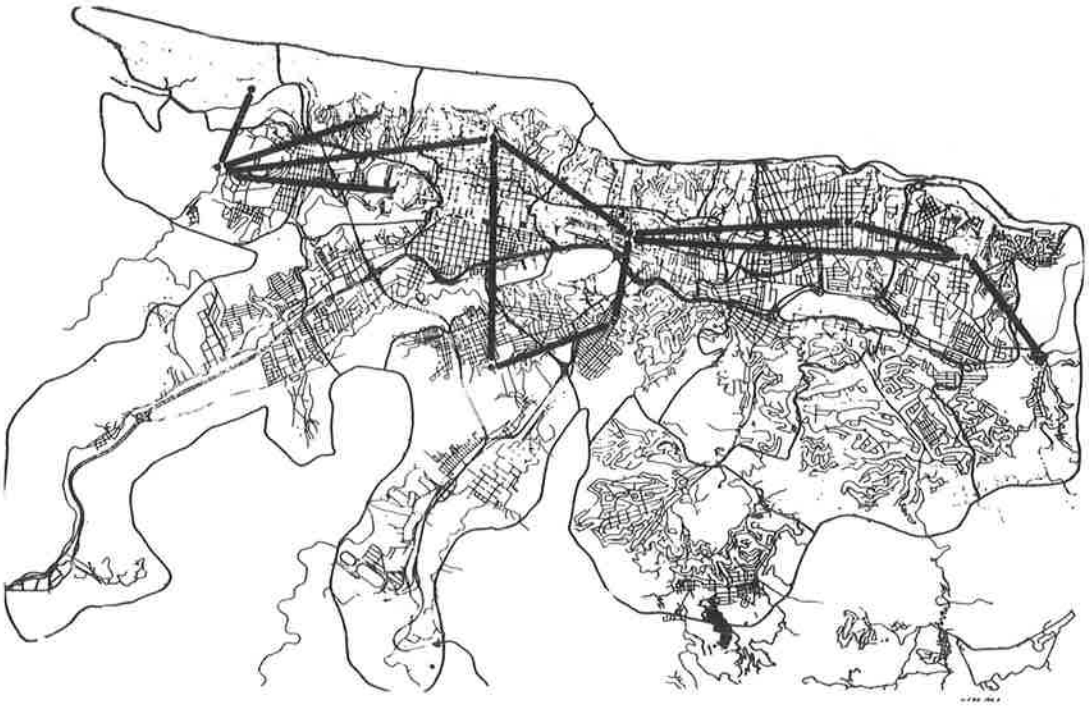


Figure 5. Caracas 1975 estimated person trips by por puesto: volumes more than 4000/day to and from all other zones.



correcting and improving the existing transportation system, and the prestige associated with a subway were the real forces that ensured widespread support for Metro. Doubt is cast on the appropriateness of Metro by its high cost, the availability of a vast array of alternative low-cost options, and its failure to support the attainment of several high-priority objectives. Metro will not benefit the poorer people; only a small percentage of bus trips, the principal means of travel for the poor, can be transferred to Metro's routes, and only then at a higher cost to user and operator.

Neither will Metro divert many people from their cars. It will not significantly increase accessibility to jobs, it will not stimulate any significant growth, and it will not increase mobility for many people. Perhaps most important for the long run, it will directly conflict with policies and

objectives for decentralizing and deconcentrating services and jobs.

The planning and design of Metro was conducted within rather narrow confines. Designers overly simplified a problem and proposed a conventional static solution for a dynamic urban environment. The eventual approval of Metro was politically motivated, based on infatuation with expensive, modern technology. In short, Metro, which has a multibillion-dollar price tag, is a difficult project to justify.

The experience in Caracas is not unique. Similar scenarios are unfolding around the world. Cities are confronted with unprecedented urban growth and traffic congestion they are not prepared for and are unable to handle. It has become increasingly clear that the solution to strangling traffic jams is not more highways. The costs are just too great. City officials, in desperation, have grasped at the promises of rail transit technology. This sense of desperation, however, often results in inadequate assessment of other alternatives.

Strategies for expanding transportation opportunities and efficiencies have suffered from lack of imagination, expertise, and political will. In Caracas, as elsewhere, low-cost strategies (including parking and vehicle restraints) and increased governmental intervention in public transport, face opposition from labor unions, merchants, and transit operators and owners. Moderate-cost strategies, including special lanes and roads for buses and trucks, have not gained widespread acceptance. And so Caracas, just as other cities are inclined to do, adopted the Metro option, almost to the exclusion of alternate strategies.

Other cities can learn from Caracas. Critical comparative analysis of costs and benefits of rail transit systems and less costly and possibly more effective alternate projects should lead to improved transit service rather than improved transit monuments.

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Abridgment

Implementation of a New Transit Funding Procedure in Minnesota

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The Minnesota Department of Transportation (MnDOT) is responsible for administering state and federal transit and paratransit grant programs that provide operating and capital assistance to more than 60 public and private agencies. The amount of state subsidy has increased from $20 million in state FY 1978 to about $32 million for FY 1981. The tremendous growth in the state subsidy has forced a revision in the subsidy-allocation policy. MnDOT has previously covered two-thirds of the operating deficit for each transit system. This discretionary deficit-based procedure implied no upper limit for the state subsidy as system deficits skyrocketed. A new procedure for subsidy allocation is proposed so that maximum levels of state participation will be established for systems grouped by the service area population. These maximum levels, expressed as a percentage of total operating cost, vary according to the size of the service area. The actual deficit incurred up to the policy maximum level will be subsidized in most cases with federal, state, and local dollars at the rate of 3:2:1. Beyond this level, unmatched local dollars are required to cover any additional deficit. The maximums imply a reasonable level of fare-box revenue that all systems must attain either through the fare box or local levy.

Minnesota has provided funds for the operation of public transportation services since 1974. In July 1977, the Minnesota Department of Transportation (MnDOT) began administration of the transit and paratransit grant programs. Since that time, the amount of state subsidy has increased from $20 million/year to a projected expenditure of about $32 million in state FY 1981. During this same period, the number of projects that receive state assistance has grown from 20 to more than 60. MnDOT is responsible for administration of 10 state-funded grant programs, including a capital equipment program and a statewide rideshare program. Programs funded by Sections 18 and 16(b)2 of the Urban Mass Transportation Act of 1964, as amended, are also administered by MnDOT.

The rapid expansion of public transportation services and the failure of user fees to keep pace with increasing operating costs have led to an increasing dependence on state subsidies. In recent years in Minnesota, local budget overruns (caused in part by rapidly escalating labor and fuel costs) have been covered by MnDOT so that service cuts have been avoided. This practice has promoted the image of a never-ending supply of state subsidy dollars, so grant recipients are not forced to manage budgets. The prospect of tight public money in the near future is forcing MnDOT to confront the subsidy-allocation problem.

This paper identifies the existing subsidy-allocation procedures employed by MnDOT's Office of Transit Administration (OTA) and a proposed alternative for the future. The Minnesota legislature, which establishes program funding levels every two years, will address the transit subsidy issue in the 1981 session. This new procedure will be presented at that time for consideration.

EXISTING CONDITIONS

Public and private organizations are eligible to re-